Environmental and Social Impact Assessment for 50.4 MW Wind Power Project, Bhesada, Jaisalmer, Rajasthan

Mytrah Energy (India) Limited

Final Report

December 2015

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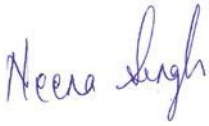
Approved by:	**Neena Singh** *Partner*	

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Abbreviations

ADB	Asian Development Bank
AoI	Area of Influence
AWEA	American Wind Energy Association
BCEC	Bhavna Construction and Engineering
BMTPC	Building Materials & Technology Promotion Council
CEA	Central Electricity Authority
CEIG	Chief Electricity Inspector to Government
CGWB	Central Ground Water Board
CHC	Community Health Centre
CHWTSDF	Common Hazardous Waste Treatment Storage and Disposal Facility
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CMS	Convention of Migratory Species
CMS	Central Monitoring Station
CPCB	Central Pollution Control Board
CSR	Corporate Social Responsibility
CT	Current Transformer
C-WET	Centre for Wind Energy Technology
DG	Diesel Generator
DPDC	Double Pole Double Circuit
EB	Electricity Board
EFPI	Equator Principles Financial Institutions
EHS	Environment Health and Safety
EHV	Extra High Voltage
EP	Environment Protection
EPC	Engineering Procurement Construction
ERM	Environmental Resource Management
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
FCA	The Forest (Conservation) Act
GDP	Gross Domestic Product
GHG	Greenhouse Gas Emission
GIS	Geographical Information System
GoI	Government of India
GRC	Grievance Redressal Cell
GRP	Glass-fibre Reinforced Plastic
GSI	Geological Survey of India
GSS	Grid Substation
Ha	Hectare
HLFPPT	Hindustan Latex Family Planning Promotion Trust
HSE	Health Safety and Environment
IA	Impact Assessment
IFC	International Finance Corporation
IL&FS	Infrastructure Leasing and Financial Services
ILO	International Labour Organization
IMD	India Meteorological Department
INR	Indian Rupees

IPD	Indoor Patient Department
IPP	Independent Power Producer
IPP	Indigenous Peoples Plan
IPPF	Indigenous Peoples Planning Framework
IREDA	Indian Renewable Energy Development Agency
IUCN	International Union for Conservation of Nature
kVA	kilo Volt Ampere
MCOH	Multi Circuit Over Head
MECC	Mohangad Engineering and Construction
MEIL	Mytrah Energy (India) Ltd.
MoEFCC	Ministry of Environment, Forests and Climate Change
MTOE	Million Tonne Oil Equivalent
MW	Megawatt
NASA	National Aeronautics and Space Administration
NGO	Non-Governmental Organisation
NGT	National Green Tribunel
NOC	No Objection Certificate
O&M	Operation and Maintenance
OBC	Other Backward Classes
OHSAS	Occupational Health and Safety System
OPD	Out Patient Department
PHC	Primary Health Centre
PPA	Power Purchase Agreement
PSS	Pooling Substation
PT	Primary Transformer
PUC	Pollution Under Control Certificate
RDPPC	Rajasthan Discoms Power Procurement Center
RF	Resettlement Framework
RO	Reverse Osmosis
ROW	Right of Way
RP	Resettlement Plan
RRECL	Rajasthan Renewable Energy Corporation Limited
RSPCB	Rajasthan State Pollution Control Board
RVPN	Rajasthan Vidyut Prasaran Nigam
SC	Scheduled Caste
SCADA	Supervisory Control and Data Acquisition System
SEB	State Electricity Board
SEIAA	State Environmental Impact Assessment Authority
SLD	Single Line Diagram
SPS	Safeguard Policy Statement
SPSC	Single Pole Single Circuit
SRTM	Shuttle Radar Topography Mission
ST	Scheduled Tribes
TSDF	Treatment Storage and Disposal Facility
VCB	Vacuum Circuit Breaker
VDC	Village Development Committee
WB	World Bank
WPR	Work Participation Ratio
WTG	Wind Turbine Generator

EXECUTIVE SUMMARY

INTRODUCTION

Mytrah Energy (India) Limited ('Company' or 'MEIL') is developing a wind farm of 50 MW capacity at Bhesada in Jaisalmer District of Rajasthan. ERM has been commissioned by MEIL to conduct an Environmental and Social Impact Assessment Study (ESIA) for the Project. This wind farm is a part of the larger Wind Farm of 300 MW capacity which is being developed by Suzlon Energy Limited.

Project Description

The Key components of proposed wind farm includes 24 Wind Turbine Generators (WTGs), a pooling sub-station (PSS), internal and external transmission lines, access roads and additional project infrastructure such as material storage yard and scrap yard. The Project is presently in the preconstruction and construction stage. The WTG is of Suzlon, S 97 model with rated capacity of 2.1 MW.

The proposed wind farm site is located in Fatehgarh and Pokaran tehsils and Jaisalmer is the administrative centre of the district. The project area is spread across four (04) villages: Loona Kalan, Loona Khurd, Naya Loona Kalan and Sadrasar. The area surrounding the wind farm site comprises of rural setup with the primary land use being rain fed agriculture, primarily cultivating Kharif crops such as Pearl Millets, Cluster Beans and Water Melon. Suzlon was allotted 704.9 Ha Revenue Land, out of which 1.62 Ha land per WTG is sub-leased to the clients. The Pooling Substation (PSS) is based in Betina village and is a part of the 704.9 Ha land allotted.

The 220 kV extra high voltage (EHV) external transmission line will be about 53 km having about 165 towers –multi circuit over heads (MCOH) connecting Betina PSS to Akal Grid sub-station (GSS). The 33 kV internal line comprises of 476 single pole single circuit line covering total distance of 33.1 km followed by 178 double pole double circuit poles covering a distance of 6 km connecting 24 WTGs to the Betina PSS.

The proposed project is being developed by Suzlon Energy Ltd. (turnkey model) who will be the EPC and O & M contractor for the project. Suzlon is engaged in wind turbine manufacturing and provides wind energy solutions. The Company offers comprehensive product portfolios - ranging from sub-megawatt onshore turbines at 600 kilowatts, to commercially-available offshore turbine at 6.15 megawatts. In addition, there are 10 Sub-contractors involved in various activities like soil testing, road work, Storage yard, civil work, erection work, etc.

The resource requirement varies during different phases. The labour requirement might go up to 160-170 labourers during peak construction phase, while there will be a sharp decline during the operational phase. Reportedly, most of the labourers will be employed at local level, from the surrounding areas, while migrant labourers will be engaged for skilled jobs and will be accommodated in labour camp in New Achla village.

Water requirement will be met through tankers procuring water from local sources either ground or surface from nearby villages. Most of the raw material for construction and other supplies will be procured from Jaisalmer. There are two batching plants installed by Suzlon near Achla and Loona Khurd villages for providing ready mix concrete for WTG foundation and other civil work. Power requirement during the construction phase will be met through DG sets of 70 kVA each of capacity.

There will be provisions for fugitive emissions and dust control through sprinkling of water and ensuring 10-15 km / hr vehicular speed, 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. 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 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.

Land requirement and allotment process

Suzlon was allotted government land as per Rajasthan Land Revenue (Allotment of land for setting up of power plant based on Renewable Energy Sources) Rules, 2007 in the year 2013 across 16 villages of the tehsil Fatehgarh and Pokhran in Jaisalmer District. This was an allocation for the 300 MW project being developed by Suzlon, a part of which (nearly 50 MW) would be sold to MEIL. Suzlon subleases 1.62 hectare land per WTG to their clients. Hence, 383 Ha land would be transferred to Mytrah under project Bhesada for 24 WTGs. All these land parcels would part of the Government land allotted to Suzlon.

The Pooling sub-station in Betina was observed to be in operational stage at the time of site visit. Access road for 24 WTGs is being majorly developed in the government land allotted to Suzlon. On an average 1 km access road is being developed for each WTG. There could be possibility of taking private land as well for developing access road. However bifurcation of land detail for access road is not available presently, hence detailed assessment of land procurement for access road could not be done. Suzlon is reportedly paying compensation at the rate of INR 1000 per pole to private land owners for establishing internal transmission line. This is reportedly much higher than prevailing government rate of INR 250 per pole. Batching plant and Storage yards are located on government land allotted to the project.

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 mostly of government land, with small parcels of private land. Discussions with site representative suggest that nobody would become landless because of the land transaction for project.

The government land around the villages was observed to be primarily used as grazing field by the local community. The project will curtail the land availability for grazing but to a limited extent and the government land allotted to the project will not be fenced, as per one of the conditions of land allotment.

Discussions with land team of Suzlon suggested that there was sizable number of cultivators over the government land parcels used for project Bhesada, however, they have no legal rights over the land. Suzlon land team mentioned that issues pertaining to any user claim will be addressed through negotiation.

Baseline

The terrain around the project, 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 Rann of Kutch. There is no perennial river in the Jaisalmer district and the underground water level is very low.

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 wind farm 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 etc., are located within the study area. Physically, there is no demarcation or fencing for the wind farm site boundary and hence it is contiguous with the rest of the area.

ERM undertook a site visit (22nd August to 24th August, 2015) to understand the site setting, environmental and social sensitivities and to identify the relevant local stakeholders.

Landuse

The land use of the wind farm area (5-km buffer) has been estimated using satellite imagery and available toposheets. The image processing is being done by ERM using ArcGIS software. As per the estimations, the wind farm area is characterised by agricultural land (77%) followed by fallow land forming 21% of the total area.

The other land uses in the area are built up area comprising of rural settlements, urban contributing 1.2 % followed by marginal proportions of stony wastes, grassland and water bodies.

These estimated figures may not exactly match with the landuse done by the Government because of the land based records / information available with them. Additionally, the area is representation of the area of influence only and not the total area allotted to Suzlon as an area of 704.984 ha land falling in 16 villages was approved to them, out of which 383 ha of land would be transferred to Mytrah for their 24 WTGs.

Topography

The topography of the AoI was observed to be flat land. The elevation in 1 km radius from the project boundary ranges from 281 m to 323 m above MSL.

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.

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 man made reservoirs have been developed in the past 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.

Climate and Meteorology

The climate of the region is classified as arid climate (BWh) as per Köppen Climate classification[1]. The climate of the district is characterised by extreme

[1] **Köppen climate classification** is a vegetation-based empirical climate classification system developed by German botanist-climatologist Wladimir Köppen. His aim was to devise formulas that would define climatic boundaries in such a way as to correspond to those of the vegetation zones that were being mapped for the first time during his lifetime.

Köppen's classification is based on a subdivision of terrestrial climates into five major types, which are represented by the capital letters A, B, C, D, and E. Each of these climate types except for B is defined by temperature criteria. Type B designates climates in which the controlling factor on vegetation is dryness (rather than coldness). Aridity is not a matter of precipitation alone but is defined by the relationship between the precipitation input to the soil in which the plants grow and the evaporative losses. Since evaporation is difficult to evaluate and is not a conventional measurement at meteorological stations, Köppen was forced to substitute a formula that identifies aridity in terms of a temperature-precipitation index (that is, evaporation is assumed to be controlled by temperature). Dry climates are divided into arid (BW) and semiarid (BS) subtypes, and each may be differentiated further by adding a third code, h for warm and k for cold.

BWh is Tropical and subtropical desert climate.

temperatures during summer and winter. 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. Rainfall is erratic and usually scanty.

Natural Hazards

The Project area falls in seismic zone I which is defined as a low damage risk zone and vulnerable to earthquakes of intensity MSK VI[1], as defined by the Building Materials & Technology Promotion Council (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.

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

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

Ambient Noise

Noise level was recorded at 06 locations in the study area during the monitoring period. The equivalent ambient noise level for day time (Leq day) and night time (Leq night) at the monitoring locations were observed to be exceeding the prescribed central pollution control board (CPCB) limits except at location 3 (near WTG 128) which is below the prescribed corresponding limits for a residential area. The high noise levels are attributed to high wind speeds during the period, vehicular movement, and presence of other turbines.

Ecological baseline

The study area is predominantly open land with sparse grassland habitat. . These grasslands are represented by species such as *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 *Prosopis cineraria*, with *Acacia nilotica, Acacia catechu*, *Acacia senegal* and shrubs of *Salvadora oleoides, Capparis decidua* are also present. Smaller shrubs of *Salvadora oleoides, Euphorbia nerifolia, Calatropis procera,* "Bui" *(Aerva tomentora),* "Kair" *(Capparis decidua),*

Source: Adapted from Arthur N. Strahler, Physical Geography, third edition; John Wiley & Sons, Inc. and provided by www.Britannica.com

[1] MSK – Medvedev-Sponheuer-Karnik Scale is a macroseismic intensity scale used to evaluate the severity of ground shaking on the basis of observed effects in an area of the earthquake occurrence. This scale was first propoed in 1964. The MSK scale has 12 intensity degrees expressed in Roman numerals I (Not perceptible) – XII (very catastrophic). VI indicates strong felt by many indoors and outdoors.

Phog *(Calligonum polygonoides), Tecomella undulata, Salvadora persica and Zizyphus nummularia* and "Kheep" *(Leptadenia pyrotechnica)* are commonly found in the area.

Agriculture in the study area is mainly undertaken during the post monsoon season (July-September). Rainfall is the only source of irrigation. Some parcels of land are also been irrigated by tube wells and crops such as cumin (*Cuminum cyminum*), Cluster bean (*Cyamopsis tetragonoloba*), Ground Nut (*Arachis hypogaea*) were observed during the survey. Watermelon (*Citrullus lanatus*) is also grown during monsoon season.

In the agricultural land *Prosopis cineraria* is the most dominant tree. Species of *Ziziphus nummularia* (Ber), *Ziziphus mauritiana*, *Clerodendrum phlomoidis* (Irna), *Balanites aegiptium* (Hingota), *Calotropis procera* (Aak) shrubs are also sparsely present in the agricultural land not utilized for last 4-5 years. Among under-shrubs and herbs, *Crotalaria burhia* and *Tephrosia purpurea* (bewna) are the common species. *Acacia tortilis* is a common species planted under roadside plantation and for the rehabilitation of Gauchar (Grazing Land) lands of the region.

The water bodies in the study area are seasonal and accumulate the runoff water during rainfall. During the survey most of them were dried up.

Isolated plantations were raised by the forest department to check soil erosion and habitat restoration along with providing forage to mammal species such as Indian Gazelle (*Gazella bennettii*) and Nilgai (*Boselaphus tragocamelus*). The common tree species associated with these plantation areas are *Prosopis juliflora*, *Prosopis cineraria, Acacia Senegal*, *Salvadora oleoides* and *Salvadora persica.* Shrubs are represented by species of *Capparis decidua*, *Ziziphus nummularia*, *Leptadenia pyrotechnica* and *Balanites aegiptiaca*. Grasses are mainly *Aristida adsensionis*, *Cenchrus ciliaris*, *Cenchrus biflorus*, *Panicum turgidum*, and *Lasiurus sindicus*.

The only amphibian species observed in the study area was the Skittering Frog (*Euphlyctis cyanophlyctis*). It is a common dicroglossid frog found in South Asia.

A total of seven (07) species of Reptiles belonging 4 families were observed from the study area. Monitor Lizard (*Varanus bengalensis*) has been listed in Sch.I and Spiny Tailed Lizard (*Saara hardwickii*) has been listed in Sch. II of Wildlife Protection Act and has conservational significance.

A total of seventy six (76) species of Avifauna were observed from the study area. White rumped vulture (*Gyps bengalensis*) is Critically endangered, Egyptian Vulture (*Neophron percnopterus)* is Endangered, Imperial Eagle (*Aquila heliaca*) is Vulnerable and Eurasian Roller (*Coracias garrulous*) Cinereous vulture (*Aegypius monachus*), Eurasian Spoonbill(*Platalea leucorodia*), Eurasian Griffon (*Gyps fulvus*) are Near Threatened as per IUCN Red data list (2014).

Shikra (*Accipiter badius),* White Eyed Buzzard (*Butastur teesa*), Black Shouldered Kite (*Elanus caeruleus*), Short Toed Snake Eagle (*Circaetus gallicus*), White Eyed Buzzard (*Butastur teesa*), Egyptian Vulture (*Neophron percnopterus*), Imperial Eagle (*Aquila heliaca*), and Indian peafowl (*Pavo cristatus*), Steppe Eagle (*Aquila nipalensis*), Short-toed Snake eagle (*Circaetus gallicus),* Tawny Eagle (*Aquila rapax*) are listed as Schedule I species in the Wildlife Protection Act, 1972.

Twenty five (25) species were observed as migratory of which one species Imperial Eagle (*Aquila heliaca*) is listed in Appendix I and one species Demoiselle Crane (*Anthropoides virgo*) is listed as Appendix II of Convention of Migratory Species (CMS) and are protected under the CMS to which India is a signatory.

A total of sixteen (16) species of mammals of thirteen (13) genera belonging to 12 families were observed / reported from the study area. None of the species is threatened as per the IUCN red-list (2014). Indian Gazelle (*Gazella bennettii*), Caracal (*Caracal caracal*) and Asiatic Wild Cat (*Felis sylvestris*) are listed as Sch. I as per the Wildlife Protection Act, 1972.

Socio-economic baseline

The project lies in the Jaisalmer district in the north-west Rajasthan. For administrative purposes, Jaisalmer is divided in four sub-divisions or tehsils. The project lies in Fatehgarh and Pokhran *tehsils* of Jaisalmer and there are eighteen (18) villages in the study area, out of which four (04) villages lie in the core area.

As per the 2011 Census records, the AoI has 2,311 households supporting a population of 6,418 individuals. The entire population in the AoI falls in the rural category. The sex ratio, both adult and child, is higher in the core area at 894 females per 1000 males and 1016 girls per 1000 boys respectively, as compared to the buffer area figures of 855 females per 1000 males and 840 girls per 1000 boys. The sex ratio in the AoI is strongly skewed towards males (a general pattern in the state and the district as well), however the child sex ratio in core area shows signs of improvement of the female presence in the generation to come. However, the buffer area villages register significantly negative child sex ratios which also accounts for lower child Sex Ratio (and 840 girls per 1000 boys) than adult Sex ratio (850 females per 1000 males) in the buffer area.

There is a considerable presence of Scheduled Caste population in both core and the buffer areas, with 27.1% and 11.6% contribution. In the buffer area, 6 villages out of 14 (Achla, Lakhasar, Mehrajot, Naya Achla and Pratappura and Sangram Singh ki Dhani) do not have any SC population. In terms of ST population, only Sadrasar houses 21.1% ST population in the core area, while only 3 villages (out of 14) register the presence of ST population in the buffer zone.

The AoI is categorized by nearly 44% working population (main and marginal workers). Majority of the working population of the AoI (52%) comes under "Marginal Workers", i.e., being employed for more than 6 months in a year. The core zone houses nearly 62% of marginal workers while the proportion goes a little higher to 55% in buffer zone.

According to Census 2011 data, approximately 65% of the main working population in the AoI is dependent upon farm based activities for their livelihood. The farm based activities primarily comprise of agriculture, agricultural labour and livestock rearing. The main crops in the region comprise of pearl millet, cluster bean (guar) and Watermelon amongst Kharif crops. Certain pockets of land are irrigated, where people also take up cultivation of Mothbean, *Jeera* (Cumin) and Groundnut, however such cases are rare.

In addition to agriculture, livestock holdings play an important role in the livelihoods of the community, in terms of providing extra income in addition to meeting the nutritional intake of the household. 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.

The villages in the AoI draw water from a host of sources ranging from untreated tap water, uncovered wells, pond, hand pumps and tube wells in some cases. However, all these sources put together, fail to suffice the water needs of the people year round. People store rain water in underground tanks, which lasts only till the end of October. Thereafter, majority of the villagers have to resort to buying water from external sources and pay Rs. 300-800 (depending upon the distance) for a Water tanker.

There are no Government Pre-primary schools in the AoI, nor was the need of Pre-primary schools, cited during community consultations. Only four (04) villages in the core area and six (06) villages in Buffer areas have Government Primary Schools.

The access to electricity in the area is reported to be usually good and reportedly the power outages occur rarely, that too in case of faults.

According to Census of India 2011 data, there are no PHCs and CHCs in the AoI; however there are five (05) Primary Health Sub Centres (PHCs) in the buffer area villages of Betina, Bhesada, Khelana, Naya Rasla and Rasla.

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.

Suzlon is the EPC and O&M contractor for the site and all activities are being carried out by them. There have been village information meetings prior to setting up of the project and the private land owners for project facilities were contacted directly.

The consultations with the stakeholders also revealed that low key CSR activities were being conducted during the time of the site visit and they were expected to scale up eventually.

Key issues identified through the stakeholder consultations are:

- Preference of wind power projects than solar power projects;
- Preference to local community in employment; and
- 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.

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.

According to the consultations with the local community, it was understood that presently the local community communicated any concern/grievance verbally to the project land team. 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.

The grievance redressal cell (GRC) will be established which will be driven internally by the Suzlon and MEIL Project teams and shall representation from the following teams to ensure fair and timely solution to the grievances:

- Suzlon Section Heads and HoD
- Suzlon Site Manager/Project Manager
- Suzlon EHS Officer
- Suzlon HR Department
- Senior representation on behalf of MEIL
- Any other concerned person with decision making authority in relevance to the grievance or aggrieved party

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.

Impact Assessment

The project activities that would result in impacts are as follows:

- Construction of temporary structures such as construction site office, store yard, labour accommodation, 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;
- Erection of WTGs and associated transformer yard and permanent site office;
- Selective clearing of vegetation in areas designated for WTG erection and other surface infrastructure;
- Storage of materials as well as transport of construction material;

Change in Landuse

Currently, the entire Project area is primarily agriculture land (nearly 77%), followed by fallow land (nearly 21%). WTGs (RSA 005, RSA 006, RSA 192, RSA 208) near Naya Achla, Khuhra, Motisar, Naya Loona Kalan villages on the north, south and north-western edge of the proposed project had some agricultural activities (though as reported by site representative, the land was revenue land and any cultivation 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 residual impact is expected to 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.

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

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 which is a secondary occupation and rain dependent.
Based on the above the impact after incorporating the embedded control, the impact significance is considered to be **negligible.**

Impact on land due to improper waste disposal

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

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 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**.

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

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. 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.

Around 3 m^3 / month water is required to meet domestic requirements of O&M staff and about 5.6 m^3 per month of utility water is required for use in the SCADA building and sub-station complex.

Based on the above the impact is assessed to be minor. The significance of impact will be **negligible to minor** on implementation of mitigation measures.

Air Quality

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.

There are few receptors falling within 500 m of any of the WTGs (near *RSA 006, RSA007, RSA 051, RSA 126, RSA 128, RSA 190, RSA 342, RSA 360, RSA 631*) as well as near access roads / dirt tracks to be used for the project. The

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

Ambient noise levels

It has been noted during the site reconnaissance that 16 receptors[1] (12 residential structures, 2 storage sheds, 1 temple and 1 school) are present within 500 m from the project WTGs location and the nearest major settlement Motisar is located at about 3.5 – 4.5 km distance from the WTG RSA 342 and RSA 360 respectively.

The ambient noise levels due to operation of the 24 WTGs in all wind conditions will be well within the MoEFCC and WB / IFC guideline values for daytime at all the noise sensitive receptors during daytime. The night time noise levels during all the wind conditions will be exceeding at the residential receptor located at about 250 m from the nearby WTGs. Noise levels at school were observed well within the applicable standard. Therefore, the impact magnitude during daytime will be negligible, whereas during night time, it will be minor to moderate depending upon wind conditions.

Shadow Flicker

A total of 16 structures have been identified as being within the study area of the wind farm. It has been noted that no village settlement is located within the study envelope. All the shadow receptors considered in this study are scattered hutments located within 500 m from any of the WTG location. The results show that theoretical shadow flicker in real case scenarios occur at 7 shadow receptors and the maximum shadow flicker occurs at shadow receptor 'L', located close to the WTG *RSA126*, with a maximum of 59:19 hr / year. Further, shadow flicker impact of more than 30 hours per year was observed due to only 5 WTGs, which are: *RSA360, RSA055, RSA051, RSA128,* and *RSA126*.

Ecological Impacts

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

The impacts of vegetation clearance will be both direct and indirect and limited to construction phase of the project. The loss of habitat through

[1] Where any settlement was noticed within the study area, only 1 or 2 receptors close to the WTGs were considered as noise receptors. The vacant hutments around the WTGs were not being taken into consideration in this study.

vegetation clearance will be temporary prior to mitigation measures. Implementation of the mitigation measures will further reduce the impact significance on the habitat and species to negligible and 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 habitat does hold several Schedule I species but there are no nationally recognized populations of these within and the habitat is common in the region. Overall impact significance is assessed as negligible for habitats and minor for species.

Approach roads are integral to any wind farm projects as they are established usually away from habitation and the main commutation routes. Biodiversity along these therefore tends to be higher. 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 may affect photosynthesis, respiration, transpiration and overall affect the productivity and hence, quality of habitat. 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.

Approach roads will also lead to mortality of faunal species crossing the road (especially smaller mammals) and occasionally birds flying across.

Overall impact significance of the construction of approach roads is assessed as negligible for habitats and minor for species

A total of seventy one (71) species of birds were identified and thirteen (13) species of raptors were observed from the study area. These species could be under threat of collision with the Operating WTG's.

These raptors and scavengers of conservation significance species are attracted to carcasses of live-stock (goat/sheep/cow) outside the village area disposed by villagers. By accessing these sites the density of raptors may increase around the wind farm area increasing their risk of collision with WTG's

The proposed transmission line used for power evacuation from the WTG to the sub-station may pose a threat of electrocution to bird species. Some birds species also tend to use these wires and poles as their roosting sites and are electrocuted when in contact with two electrical phase wires.

The significance of impacts prior to any mitigation methods is likely to be **minor for habitats and moderate for species**.

Land Procurement impact

Entire 24 WTGs would be located on government allotted land. Access road and right of way for internal transmission line is also largely being developed on government land. However there is likelihood of affecting certain patches of private land for the construction of internal access road and erection of internal transmission line.

As reported during consultation with local community and land team of Suzlon that cultivation over the government land by way of cultivating it during monsoon season is very common in the district of Jaisalmer. Several cases of such encroachment were faced by the project while initiating construction work at site.

Based on above mentioned context of impact, impact significance is assessed to be **Moderate.**

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. Being the principle contractor for project Bhesada, Suzlon would be held accountable for ensuring labour rights and welfares measures are adequately met in complete project cycle. Water requirement at wind farm site office as well as for in labour colony, is being met using hired water tankers. Toilet facilities are not provided at site (stockyard location, labour colony). Workers grievances are verbally entertained and actions are taken accordingly.

Based on the above the impact after implementing the embedded controls is assessed to be Moderate. The significance of impact will be reduced to minor on implementation of mitigation measures.

Impact on Economic opportunities

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 require semi-skilled and unskilled workers. Locals are being engaged by the project mainly for security guards and other unskilled category of jobs. Semi-skilled and skilled workforce are employed from outside in view of lack of this category of workforce. Further many petty contract opportunities like hiring of vehicles, water tankers, tractors etc. have been extended to local persons.

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. Project will reportedly absorb locals to the best extent possible in the limited

employment opportunities during operation phase. The impact of the project activities is assessed to be positive.

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 wind farm site has the following location advantages:

- No ecological sensitive receptor such as national Parks, Wildlife Sanctuary, within 5 km radius; Though forest land exist in the AOI but none of the WTGs and any associated facility are / shall be located within these lands.
- No cultural property of archaeological importance and tribal population is getting impacted;
- No major habitations falling within 500 m of WTG locations.

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.

SUZLON *management*

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

In addition to the Corporate EHS head, Suzlon will place a site HSE Officer, Site Quality Incharge and Site Security Incharge, whose roles and responsibilities include the implementation of the ESMP.

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 together with its O&M partner Suzlon 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 / or any other external agencies identified. The entire process of inspections and audits shall be documented. The inspection and audit findings are to be implemented by the site HSE officer in their respective areas.

Reporting and documentation

Suzlon 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.).

Conclusions and Recommendations

The proposed project is a green energy project comprising of 24WTG to generate 50.4 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:

- Majority of the project area is primarily fallow land (nearly 50%), followed by patches of agriculture land and fallow land.
- There are about 16 receptors located within 500 m of WTG locations and the nearest major settlement Motisar is located at about 3.5 – 4.5 km distance from the WTG
- The construction of proposed project may bring local changes in the landuse pattern of the site;
- The negligible quantity of sewage will be generated at site office, which will be disposed through septic tanks;
- The project will have negligible to moderate residual impacts varying across receptors and day and night time post implementation of mitigation measures as suggested;
- The results show that theoretical shadow flicker in real case scenarios occur at 7 shadow receptors and the maximum shadow flicker occurs at shadow receptor 'L', located close to the WTG *RSA126*, with a maximum of 59:19 hr / year.
- 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
- The proposed project will not result in any physical displacement of people.

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 interested in developing a wind farm of about 50 MW comprising of 24 Wind Turbine Generators (WTGs) in Jaisalmer district of Rajasthan, hereinafter referred to as 'proposed Project' or 'Project'. The Project lies in the Jaisalmer Wind Farm area where Suzlon Energy Limited has erected around 1 GW of wind power plants and has various owners, including MEIL.

The existing pooling sub-station (PSS) at Betina will be used for this wind farm while internal and external transmission lines and other associated facilities will be developed for the project.

ERM has been commissioned by MEIL to conduct an Environmental and Social Impact Assessment Study (ESIA) of the proposed Project and associated facilities. This report presents the results of the ESIA study.

1.1 PURPOSE OF THE REPORT

ERM understands that MEIL intends to invest in the wind farm project with financial assistance from lenders / multilaterals etc. 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, in addition to 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 identifies and evaluate 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 ERM has performed and reported this study includes the following:

- Applicable Indian national, state and local regulatory requirements;
- ADB safeguards Policy Statement, 2009;
- IFC Performance Standards (2012);
- IFC / World Bank General EHS Guidelines (2007);
- IFC / World Bank EHS Guidelines for Wind Energy Projects (2007 / 2015); IFC / World Bank EHS Guidelines for Electric Power Transmission and Distribution (2007):and

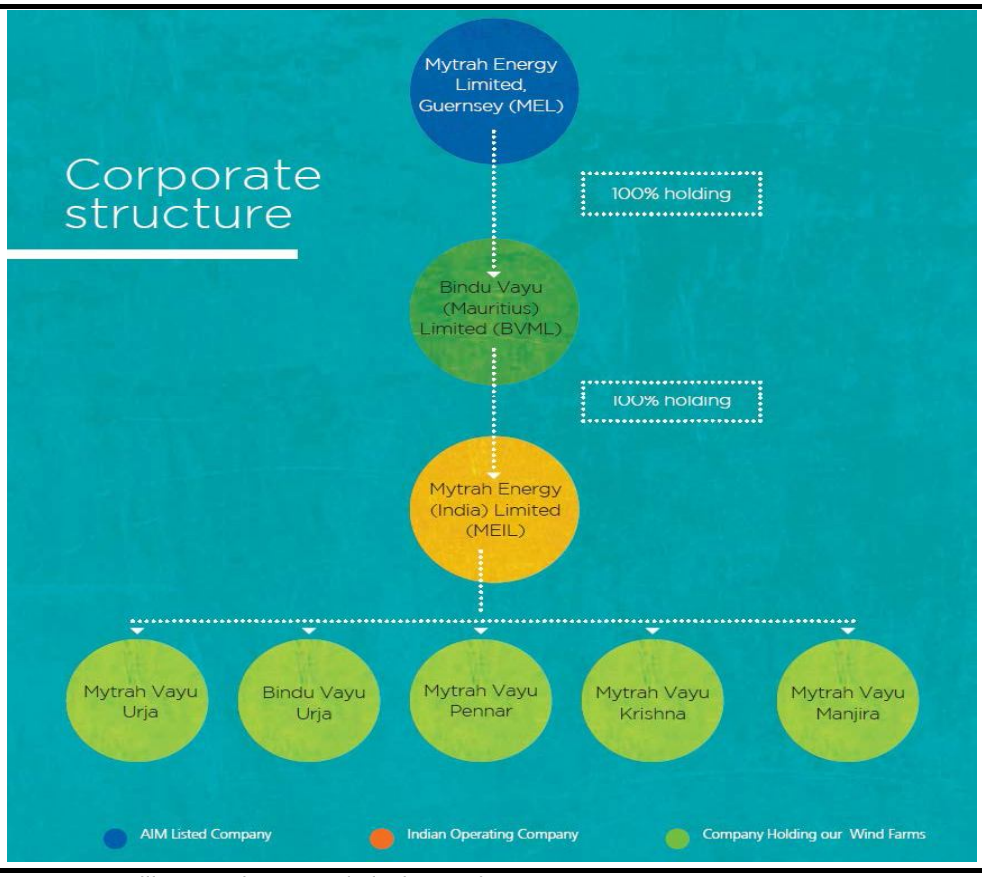
- Relevant ILO conventions covering core labour standards and basic terms and conditions of employment (limited to operational phase of the proposed Project).

**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. Thus, ERM is not preparing the ESIA for any regulatory requirements, hence, if any deliverable if used for the same purpose, ERM needs to be communicated by the Client.*

1.2 MYTRAH ENERGY (INDIA) LIMITED (MEIL)

Mytrah Energy (India) Limited (MEIL) is a wholly owned subsidiary of Mytrah Energy Limited (MEL) in India 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 578.7 MW power generation across 10 operational sites. It 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)	Operational since
1	Gujarat	Mahidad	25.2	October 2011
		Jamanvada	52.5	March 2013
2	Rajasthan	Mokal	42	September 2011
		Kaladonger	75.6	September 2012
3	Maharashtra	Chakla	39	February 2012
		Sinner	12.6	September 2012
4	Andhra Pradesh and	Vajrakarur	63	December 2012
	Telengana	Burgula	37.4	March 2014
5	Tamil Nadu	Vagarai	100.5	December 2014
6	Karnataka	Savalsang	95.2	December 2014
	Total		543.6	

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 is being developed by Suzlon Energy Ltd. (turnkey model) who will be the EPC and O & M contractor for the project. Suzlon Energy Ltd. is a part of the Suzlon Group and is an ISO 9001: 2008 certified company. It is an India-based company, engaged in wind turbine manufacturing and provides wind energy solutions. The Company offers comprehensive product portfolios - ranging from sub-megawatt onshore turbines at 600 kilowatts, to commercially-available offshore turbine at 6.15 megawatts (MW). (1)

1.3 OVERVIEW OF THE PROJECT

The Project comprises of 24 WTGs, each of 2.1 MW capacity to provide 50.4 MW power located in Jaisalmer district of Madhya Pradesh (MP). ***Table 1.2*** provides a snapshot of the proposed project.

(1) http://in.reuters.com/finance/stocks/overview?symbol=SUZL.NS

Table 1.2 Project Bhesada- a snapshot

Detail	Description	
Location	Jaisalmer district, Madhya Pradesh	
	Tehsil	Village
	Pokhran	Loona Kalan, Loona Khurd, Naya Loona Kalan and Sadrasar
Terrain	Flat and Undulating at some places	
Type of WTGs	24 WTGs of 2.1 MW each with 97 m rotor diameter and 120 m hub height. Model: S 97 hybrid tower with lattice structure at its base and tubular upper section	
Total Land Requirement for WTG's	Approx. 705 Ha of government land was obtained on lease by Suzlon Gujarat Wind Park Ltd. for WTGs and associated facilities as pooling substation, Storage yard, access roads, batching plant and transmission lines etc. has been obtained on lease by Suzlon .	
Substation	Pooling station is located in Betina Village covering 3.0 Ha. Grid Substation is located at Akal.	
External Transmission line	Suzlon has obtained permission and approval as per its Single Line Diagram (SLD) under section 68 of Electricity Act, 2003 for power evacuation from Bhesada site from Rajasthan Rajya Vidyut Prasaran Nigam (RVPN). The 220 kV extra high voltage (EHV) external transmission line will be about 53 kms having about 165 towers –multi circuit over heads (MCOH) connecting Betina PSS to Akal GSS. The 33 kV internal line comprises of 476 single pole single circuit (SPSC) line covering total distance of 33.1 km followed by 178 double pole double circuit (DPDC) poles covering a distance of 6 kms connecting 24 WTGs to the Betina PSS (*ref. Bhesada DPR status report as on September 25, 2015)*.	
Project Commissioning	March 2016	
Project Status at time of ESIA study	19 foundations constructed while 5 in Pre-Construction Stage. Out of 19 foundations, 8 WTG's are already being erected and 2 are under process as observed during the time of the visit (August 2015).	

1.4 ESIA SCOPE

The scope of work for the ESIA broadly entailed:

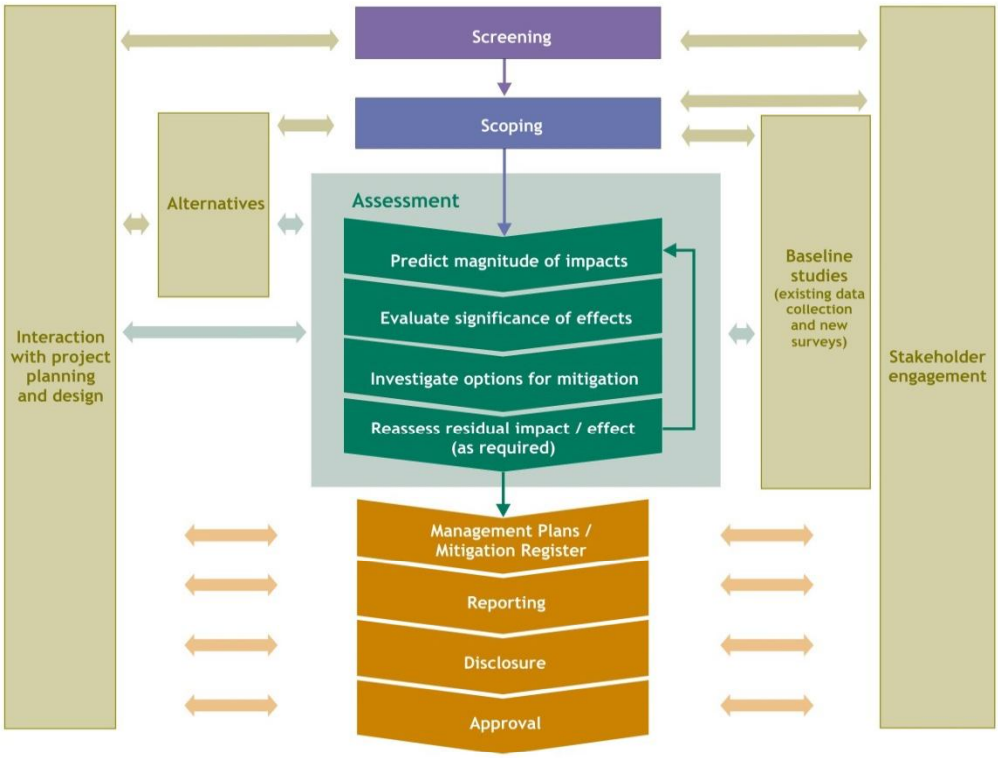
- Identification and review of the applicable local, state, national and international environmental legislation and regulatory framework.
- Collection of baseline information through limited primary field surveys and monitoring with respect to ambient noise quality, land use pattern and socio economic profile within the study area of 5 km radius from the boundary of the project. Though as part of initial scope ERM intended to collect baseline for surface water too, however no perennial surface water bodies were observed in the study area of 5 km and seasonal ponds were observed to be almost dry, thus no surface water samples were collected as part of baseline study. Additionally, as there will be no or minimal post-project activity leading to air emissions, no ambient air samplings were undertaken.
- Collection of secondary data on geology, geomorphology etc.

- Prediction and identification of environmental 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 ESIA methodology follows the overall ESIA approach illustrated in ***Figure 1.2***. The ESIA has been undertaken following a systematic process that predicts and evaluates the impacts the Project could have on aspects of the physical, biological, social / socio-economic and cultural environment, and identifies measures that the Project will take to avoid, minimise / reduce, mitigate, offset or compensate for adverse impacts; and to enhance positive impacts where practicable. The stages of the ESIA process are described below.

Figure 1.2 The ESIA Process



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

The main objective of the scoping is to ascertain the environmental issues associated with the project on which ESIA study will be focused by reviewing the project information and ascertaining likely environmental issues associated with the project activities through matrices. Scoping process determines terms of reference for ESIA study to be conducted for the project activities. This process helps in ensuring that all the relevant issues are identified and addressed in an appropriate manner in the ESIA study.

For this ESIA study, scoping has been undertaken to identify the potential Area of Influence (AoI) 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 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 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. The project description has been provided in ***Section 2*** of this ESIA report.

1.5.4 Baseline Conditions

Environmental baseline data has been collected through primary monitoring and surveys of the study area of 5 km distance from project area. Secondary information through literature surveys was also collected for the study area.

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

1.5.5 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.

ERM identified / profiled the various stakeholders of the project, such as the affected families, the village-level key informants, the line departments (revenue, land, agriculture, forest), state / district administration and civil society organisations as well as developed an understanding of their stakes, interests and influences on the project.

Details of the stakeholder engagement activities undertaken for this project to date are presented in ***Section*** 7.1 of this ESIA report.

1.5.6 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.

1.5.7 Analysis of Alternatives

A comparative analysis of alternative for the project is provided in terms of site location analysis and feasibility, power generation technology available including no project scenario etc., in ***Section 9*** of this ESIA report***.***

1.5.8 Environmental and Social Management Plan (ESMP)

The results of ESIA study form the basis of the project ESMP. The ESMP will incorporate measures and procedures for the short and long-term environmental and social management of the project during its various stages. The Environmental and Social Management Plan (ESMP) is developed for the project and is presented in ***Section 11*** of this ESIA report.

1.6 LIMITATIONS

The limitations to the impact assessment pertain to the availability of information regarding the project, the accessibility of villages and stakeholders and the secondary information for the project.

The consultations undertaken during the site visit were based on the present understanding of the project, the WTG locations and the project footprint area.

This understanding may change in case of a significant change in the WTGs finalized from the present list.

Furthermore, due to the confidential nature of the information required, certain information pertaining to the project, such as land requirement and records, employment details, stakeholder engagement details and management systems were not available for review at the time of the visit.

The consultations undertaken as part of the impact assessment were restricted to the stakeholders who were available during the site visit. Also, due to the large number of villages within the study area, and the limited time in which the assessment had to be completed, ERM undertook consultations in a sample of the villages, with a focus on the villages in the core zone and coverage of maximum number of stakeholder groups.

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 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 Legal and Regulatory Framework	Discussion of the applicable environmental and social regulatory framework and its relevance for the Project.
Section 4	Impact Assessment and Methodology	Description of the impact assessment process undertaken to identify potential environmental and social impacts.
Section 5	Scoping	Description of the Scoping outcomes undertaken as part of the ESIA process.
Section 6	Environmental and Social Baseline	An outline of the Environmental and Social Baseline status in the area of the Project.
Section 7	Information Disclosure Consultation and Participation	Overview of the stakeholder engagement activities undertaken during the ESIA.
Section 8	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 9	Analysis of Alternatives	Description of the reason for selection of adopted alternative.
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	Title	Description
Section 12	Impact Summary and Conclusion	Summary of impacts identified for the Project

2 PROJECT DESCRIPTION

2.1 INTRODUCTION

This section provides an overview of proposed wind farm 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.

The project forms a part of a proposed 50.4 MW Jaisalmer wind farm area being developed and promoted by M/s Suzlon Energy Ltd. in the same area. The project once complete is proposed to have 24 WTGs. The details about this development as reported to ERM during the site visit are summarised in ***Table 2.1*** below:

Table 2.1 Status of the Wind Farm being developed by SUZLON ENERGY LTD.

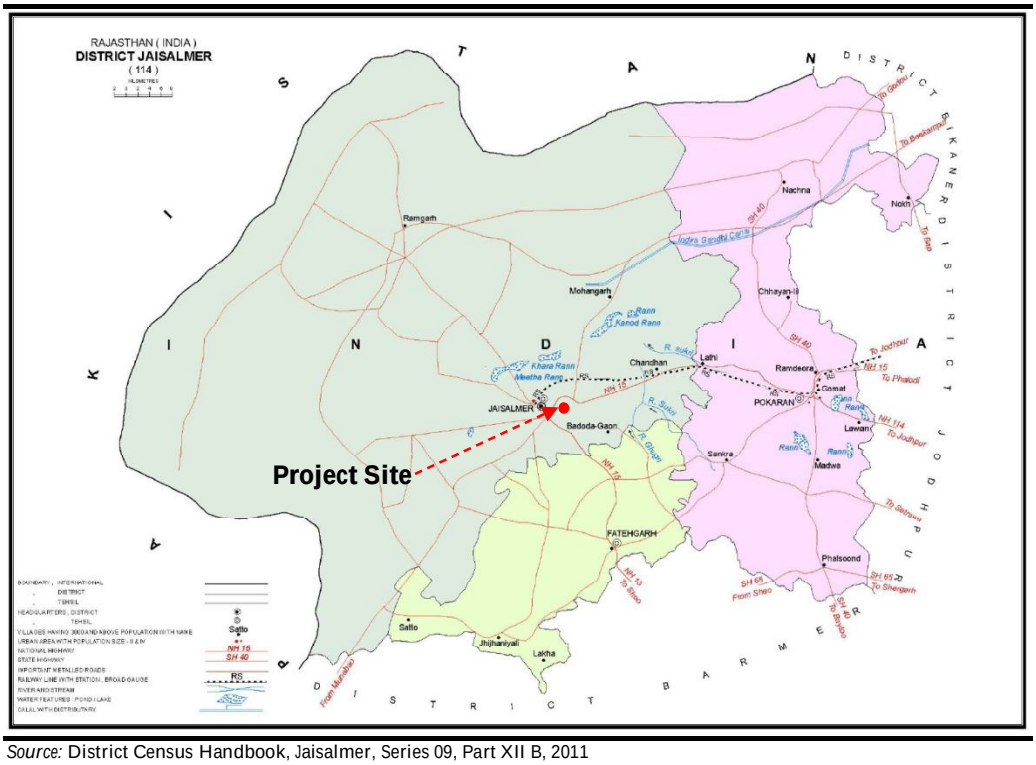
Total Capacity of the proposed development	50.4 MW
No. of WTGs	24
Execution Methodology	Construction work is to be done in two phases. Phase I active now: scheduled to be completed in March 2016
Current Status	**WTG Commissioning** – Completed for 8 (including EB and CEIG approval) **Electrical Work** – Pole erection completed for 16, equipment, transformer, breaker, CT and PT erection completed for 15. **Mechanical Work** – WTG tower erection for 17, nacelle and rotor completed for 15. **Civil Work -** Foundations completed for 19, soil test, location levelling and excavation done for 20.

Source: Bhesada – DPR Status as on 25 September, 2015 by MEIL

2.2 SITE SETTING

The wind farm site is located in an area of 704.9 Ha in Fatehgarh and Pokhran Tehsil of Jaisalmer district in Rajasthan. The district borders Barmer and Jodhpur districts of Rajasthan on its south and east respectively. The district is well connected by road and rail networks. The project location is shown in ***Figure 2.1***.

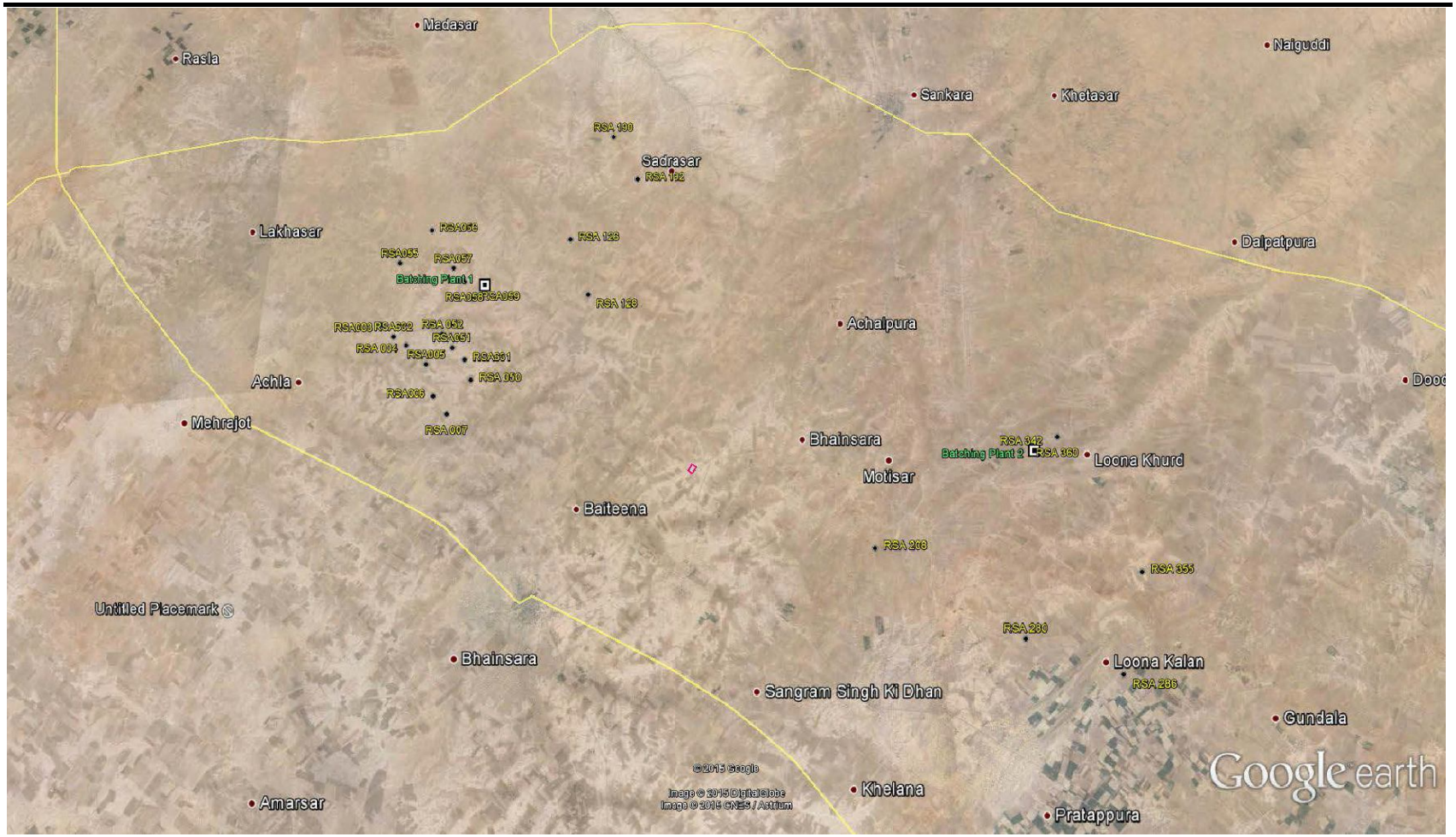
Figure 2.1 Map of Jaisalmer district showing location of the proposed windfarm site



Source: District Census Handbook, Jaisalmer, Series 09, Part XII B, 2011

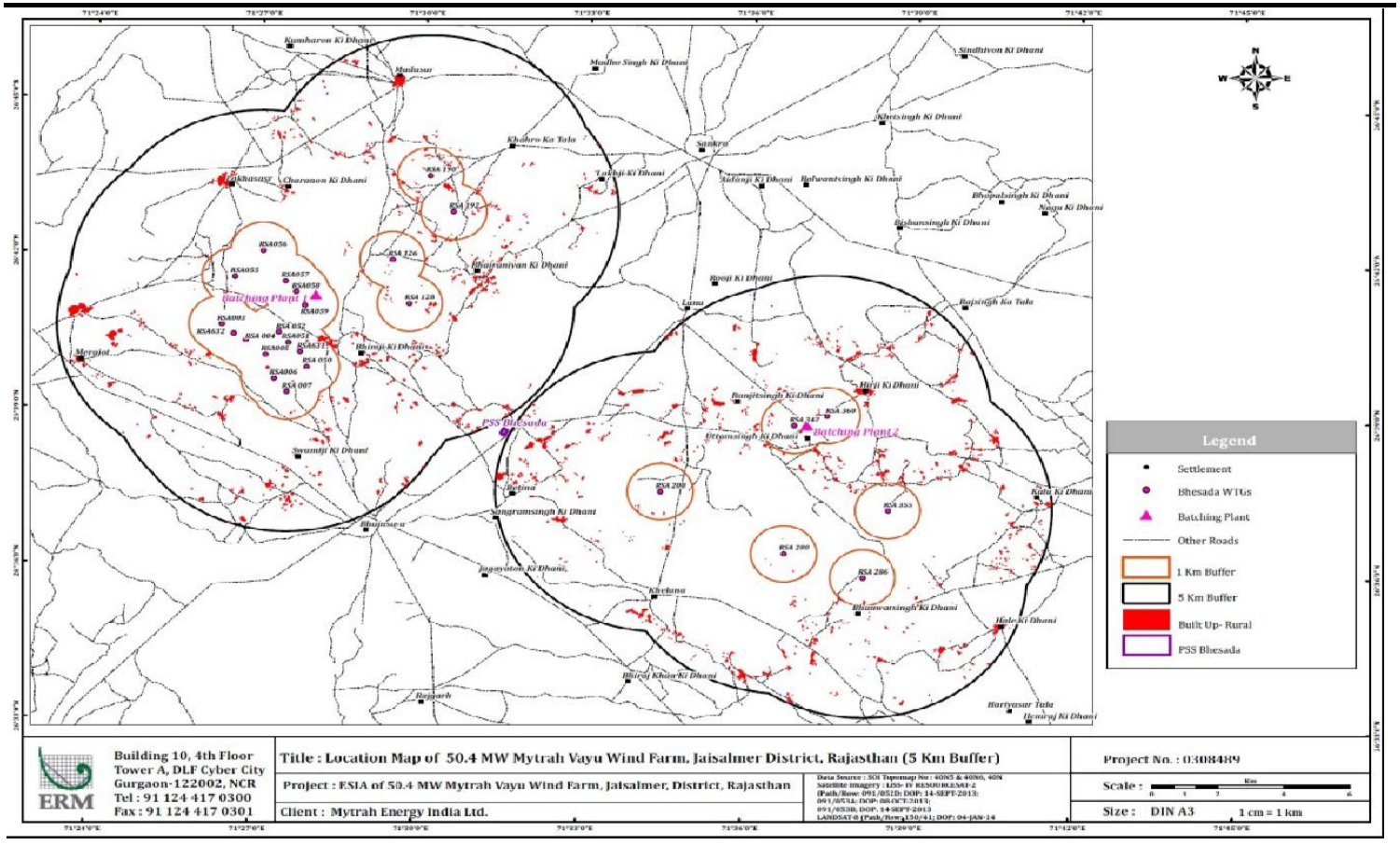
The proposed wind farm site is spread across two *tehsils,* namely: *Fatehgarh and Pokharan* and is located at a distance of 58 km south-east of Jaisalmer town, which is the administrative centre of the district. The project area is spread across four villages: Loona Kalan, Loona Khurd, Naya Loona Kalan, Sadrasar falling in Fatehgarh tehsil. The area surrounding the wind farm site comprises of rural setup with the primary land use being rain fed agriculture, primarily cultivating kharif crops such as Pearl Millets, Cluster Beans and Water Melon.

Figure 2.2 Satellite Imagery showing the Project Location and Sourrounding Villages



Source: Google Earth Imagery Dated 04.10.2013

Figure 2.3 Location of the Project



Source: ERM India

Location of WTGs in Project Bhesada is as presented in the ***Figure 2.3***.

2.3 FACILITIES

The proposed WTGs amount to capacity of 50.4 MW which would be fed to the State Power Grid of Rajasthan Rajya Vidyut Prasaran Nigam Ltd. (RVPNL). The key components of the proposed wind farm include the following:

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

The existing Betina pooling sub-station (PSS) will be used for power evacuation.

2.3.1 Wind Mills

The project is proposed to have 24 nos. Wind Turbine Generators (WTGs) of the Suzlon S 97 make, with a rated capacity of 2.1 MW each. The specifications of WTGs are provided in ***Table 2.2.***

Table 2.2 Specification for the proposed WTGs

S. No.	Parameters	SUZLON WIND - MODEL S 97
	No. of WTGs	24
OPERATING DATA		
1	Rated power	2100 kW
2	Cut-in wind speed	3.5 m/s
3	Rated wind speed	11 m/s
4	Cut-out wind speed	20 m/s *(without turbulence intensity according to GL guidelines)*
5	Survival Wind Speed	52.5 m/s
6	Hub height	120 m
7	Type	Hybrid structure (lattice + tubular)
8	Rotor Speed	12.0 to 15.5 rpm *(upto 18 rpm dynamically)*
ROTOR		
9	Pitch system	Electric drive with electric brake, gear box, frequency converter and batteries
10	Swept area	7386 m^2
11	Blade material type	Glass-fibre reinforced plastic (GRP) / Polyester
GENERATOR		
12	Type	Asynchronous 3 phase induction generator with slip rings operated with rotor circuit inverter system (DFIG)
13	Rated power	2.1 MW
14	Rated voltage	690 V
15	Frequency	50 / 60 Hz
16	Cooling system	IC6A1A6 (as per IEC 60034-6), air cooled
BRAKING SYSTEM		
17	Aerodynamic brake	
18	Mechanical brake	Hydraulic disc brake, activated by hydraulic pressure (active brake)
YAW SYSTEM		

S. No.	Parameters	SUZLON WIND - MODEL S 97
19	Type	Friction bearing with gear Automatic lubrication system
TOWER		
20	Type	Tubular steel
21	Tower Height	120 m
22	Corrosion protection	Double anti corrosion paint inside Triple anti corrosion paint outside

Source: S97-Product Brochure and Technical-Data

2.3.2 Pooling sub-stations

The 33 kV / 132 kV Pooling Sub-Station (PSS) of Suzlon at Betina will be used for this project. The pooling substation is spread across 3.0 Ha.

2.3.3 Transmission lines – Internal and External

Internal transmission Lines

The 33 kV internal line comprises of 476 single pole single circuit line covering total distance of 33.1 km followed by 178 double pole double circuit poles covering a distance of 6 kms connecting 24 WTGs to the Betina PSS (ref. Bhesada DPR status report as on September 25, 2015). The internal 33k V transmission lines from each WTG will feed power into the 33 kV / 132 kV PSS at Betina village.

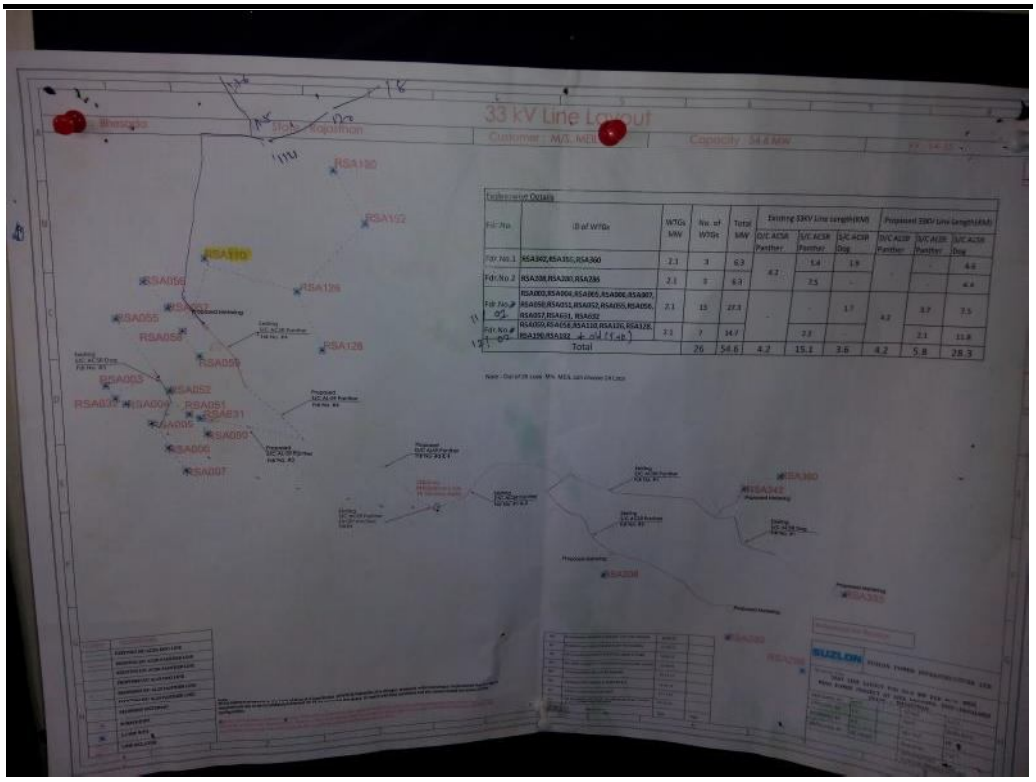
External Transmission Lines

The 220 kV extra high voltage (EHV) external transmission line will be about 53 kms having about 165 towers –multi circuit over heads (MCOH) connecting Betina PSS to Akal GSS.

Figure 2.4 *132 KV Transmission Line Route (PSS Betina to GSS Akal)*

Source: ERM India

Figure 2.5 Map showing power evacuation form the wind farm site to the pooling station



Source: Photograph taken from the Notice Board of Mytrah Office at Storage Yard Site

2.3.4 Access roads

The wind farm site area is bounded between Rasla-Mehrajot-Hariyasar, Hariyasar-Miniyana and Miniyana-Dalpatpura-Sankara roads. From Jaisalmer city it is accessible through Devikot-Rasla road, which is a paved single carriageway. From this major road, the site can be accessed by taking a right turn onto the kutcha road before Degraya Mata temple to reach Achala and Naya Achla villages and further to the WTG sites. Alternately, the Rasla-Mehrajot-Bhesada road can also be used to reach the site. The condition of this carriage way however, is poor (**Refer *Figure 2.6***).

Figure 2.6 The Project area, nearby villages and surrounding access roads (in blue and yellow)

Source: Google Earth Imagery dated 12.21.2013 and GPS tracks of site visit on 23.08.2015

2.3.5 Additional Project Infrastructure

Associated ancillary facilities and utilities for the project include:

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

2.3.6 Wind Turbine profiling

All 24 WTG locations were assessed for sensitivities within 1 km radius. A detailed WTG profiling is provided in ***Table 2.3***. The pictorial presentation of land use around WTGs is provided in ***Annex A***.

Table 2.3 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		Approach/ Access Road Condition			Distance from the nearest Paved Road	Land use around WTG Location (Explain)1 based on visual observation			
		Easting (m)	Northing (m)		Topography (undulating land/flat land /on plateau or hill ridge)	Landuse (Based on Land Records*)	Identification (Name/ ID in Map)	Distance (km) and Direction	(temple/ mosque/ graveyard etc.)	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	RSA 003	742733	2953002	312	Flat	Government Land	None	NA	NA	NA	NA	Naya Achla	2.6; SW	None	NA	None	NA	Yes	Kutcha	NA	4.0 km from Rasla-Bhesada	Barren	Barren	Barren	Barren
2	RSA 004	743475	2952476	310	Flat	Government Land	None	NA	NA	NA	NA	Naya Achla	3.0; SW	None	NA	None	NA	Yes	Kutcha	NA	3.5 km from Rasla-Bhesada	Barren	Barren	Barren	Barren
3	RSA 005	744093	2951976	321	Flat	Government Land	None	NA	NA	NA	NA	Naya Achla	3.5; WSW	None	NA	None	NA	Yes	Kutcha	NA	3.3 km from Rasla-Bhesada	Agricultural	Agricultural	Agricultural	Agricultural
4	RSA 006	744443	2951219	319	Flat	Government Land	House	0.40; NW	Pucca	Residential	-	Naya Achla	3.8; WNW	None	NA	None	NA	Yes	Kutcha	NA	2.5 km from Rasla-Bhesada	Agricultural	Agricultural	Agricultural	Agricultural
5	RSA 007	744776	2950677	311	Flat	Government Land	House	0.37; N	Pucca	Residential	-	Naya Achla	4.0; NW	None	NA	None	NA	Yes	Kutcha	NA	2.0 km from Rasla-Bhesada	Agricultural	Barren	Barren	Barren
6	RSA 050	745348	2951590	318	Flat	Government Land	None	NA	NA	NA	NA	Naya Achla	4.6; W	None	NA	None	NA	Yes	Kutcha	NA	3.5 km from Rasla-Bhesada	Barren	Barren	Agricultural	Agricultural
7	RSA 051	744766	2952436	323	Undulating	Government Land	House	0.43; NE	Pucca	Residential	-	Naya Achla	4.2; WSW	None	NA	None	NA	Yes	Kutcha	NA	4.0; Rasla-Bhesada	Barren	Barren	Barren	Agricultural
8	RSA 052	744464	2952797	312	Flat	Government Land	None	NA	NA	NA	NA	Naya Achla	4.0; SW	None	NA	None	NA	Yes	Kutcha	NA	4.25; Rasla-Bhesada	Barren	Barren	Barren	Barren
9	RSA 055	743063	2954736	315	Flat	Government Land	Hut	0.29; NW	Kutcha	Storage	NA	Naya Achla	4.0; SW	None	NA	None	NA	Yes	Kutcha	NA	3.8; Devikot-Sankara	Agricultural	Agricultural	Barren	Barren
10	RSA 056	743894	2955691	316	Flat	Government Land	None	NA	NA	NA	NA	Naya Achla	5.3; SW	None	NA	None	NA	Yes	Kutcha	NA	3.0; Devikot-Sankara	Barren	Barren	Barren	Barren
11	RSA 057	744606	2954629	313	Flat	Government Land	None	NA	NA	NA	NA	Naya Achla	5.0; SW	None	NA	None	NA	Yes	Kutcha	NA	4.1; Devikot-Sankara	Barren	Barren	Barren	Barren
12	RSA 058	744941	2954263	318	Flat	Government Land	None	NA	NA	NA	NA	Naya Achla	5.0; SW	None	NA	None	NA	Yes	Kutcha	NA	5.2; Devikot-Sankara	Barren	Barren	Barren	Barren
13	RSA 059	745218	2953785	316	Flat	Government Land	Hut	0.20; W	Kutcha	Storage	NA	Naya Achla	5.0; SW	None	NA	None	NA	Yes	Kutcha	NA	5.1; Devikot-Sankara	Barren	Agricultural	Barren	Barren
14	RSA 126	747819	2955503	319	Undulating	Government Land	House	0.16; NW 0.24; S	Pucca	Residential	-	Khuhra	2.0; N	None	NA	None	NA	Yes	Kutcha	NA	4.9; Devikot-Sankara	Barren	Agricultural	Barren	Agricultural
15	RSA 128	748416	2953962	324	Flat	Government Land	House	0.20; NE	Pucca	Residential	-	Khuhra	3.8; N	None	NA	None	NA	Yes	Kutcha	NA	6,5; Devikot-Sankara	Barren	Barren	Agricultural	Agricultural
16	RSA 190	748876	2958541	314	Undulating	Government Land	House	0.29; NW	Pucca	Residential	-	Khuhra	1.5; SW	None	NA	None	NA	Yes	Kutcha	NA	3.2; Devikot-Sankara	Agricultural	Agricultural	Agricultural	Barren
17	RSA 192	749626	2957286	312	Flat	Government Land	None	NA	NA	NA	NA	Khuhra	2.0; NW	None	NA	None	NA	Yes	Kutcha	NA	4.5; Devikot-Sankara	Agricultural	Agricultural	Agricultural	Agricultural
18	RSA 208	756252	2947531	315	Undulating	Government Land	None	NA	NA	NA	NA	Naya Loona Kalan	2.2; NNE	None	NA	None	NA	Yes	Kutcha	NA	5.2; Rasla-Bhesada	Agricultural	Agricultural	Agricultural	Agricultural
19	RSA 280	760288	2945041	288	Flat	Government Land	None	NA	NA	NA	NA	Loona Kalan	5.5; NW	None	NA	None	NA	Yes	Kutcha	NA	6.2; Rasla-Bhesada	Barren	Agricultural	Barren	Agricultural
20	RSA 286	762374	2945296	281	Flat	Government Land	None	NA	NA	NA	NA	Naya Loona Kalan	7.7; NW	None	NA	None	NA	Yes	Kutcha	NA	7.5; Rasla-Bhesada	Barren	Agricultural	Barren	Barren
21	RSA 342	751523	2949558	303	Flat	Government Land	House	0.25; WSW	Pucca	Residential	Yes	Motisar	3.5; W	None	NA	None	NA	Yes	Kutcha	NA	9.6; Rasla-Bhesada	Barren	Barren	Barren	Barren
22	RSA 355	763178	2947107	287	Flat	Government Land	None	NA	NA	NA	NA	Motisar	7.0; WNW	None	NA	None	NA	Yes	Kutcha	NA	9.5; Rasla-Bhesada	Agricultural	Barren	Agricultural	Barren
23	RSA 360	761210	2950434	297	Flat	Government Land	House	0.23; W	Pucca	Residential	Yes	Motisar	4.5; WSW	None	NA	Temple	0.22; NNW	Yes	Kutcha	NA	10.5; Rasla-Bhesada	Barren	Barren	Barren	Agricultural
24	RSA 631	745136	2952120	323	Flat	Government Land	House	0.36; N	Pucca	Residential	-	Naya Achla	4.5; WSW	None	NA	None	NA	Yes	Kutcha	NA	4.0 km from Rasla-Bhesada	Barren	Barren	Barren	Barren
25	RSA 632	743118	2952713	315	Flat	Government Land	None	NA	NA	NA	NA	Naya Achla	2.7; SW	None	NA	None	NA	Yes	Kutcha	NA	3.5; Rasla-Bhesada	Barren	Barren	Barren	Barren

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 planning and pre construction phase and the resources are being mobilized to begin the construction activity.

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

Most of the activities have been carried out by the project developer Suzlon.

2.4.2 Construction Phase

The Construction activities for the wind farm development 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 also exists at New Achala village which is housing migrant labours involved in construction activities

across the larger wind farm. The labour camp is under the purview of Suzlon. The storage yard for the Project is located at Naya Achla village spread across 3.75 Ha and is being maintained by the developer Suzlon.

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 20 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 20 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 Suzlon and therefore will be the main EPC contractor and will also be performing the operation and maintenance of the proposed Project. In addition to these developer is also performing the following activities:

- Land procurement;
- 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 2.4.***

Table 2.4 Sub-Contractors and their scope of work for Project Bhesada

Contractor Name and Address	Scope of Work
Soil Test	Geo Appraisal(P) Ltd, Jodhpur Geo Test House, Vadodara
Road Work	Mohangad Engineering and Construction (MECC) Bhavna Construction & Engineering Co. (BCEC)
Storage Yard	Bhavna Construction & Engineering Co. (BCEC)
Pooling sub-station – Civil Work	Karnimata Construction
Pooling sub-station – ETC Work	Karnimata Construction
Civil Foundation Work	Mohangad Engineering and Construction (MECC) Bhavna Construction & Engineering Co. (BCEC)
DP Yard Work	Civil Work: MECC & BCEC Electrical Work: Jagdamba Enterprises
220 kV EHV Line Work	Hi Tech Engineering
33 kV Line Work	Jagdamba Enterprises
Erection Work	Neelkanth Shiv Engineering

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 Suzlon, approximately 160-170 labourers will be employed depending on stage of construction. However, this number varies depending on the project phase. Most of the labours will be employed at the local level from the surrounding villages and also from different places across India depending upon labour availability and sourcing by the sub contractors. Apart from these there will be about 21 employees from Suzlon and 166 staff of its sub-consultants.

Operation Phase

Presently about 3 staff of MEIL and 21 staff of sub-contractors are working at the wind farm. These persons will be mostly from local area.

2.6.2 Labour Accommodation Facility

Suzlon is having an existing labour accommodation facility in New Achala village which will be utilized for this project as well. The facility has accommodation capacity and sanitation facilities for the said number of labourers.

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 2.5***). The water requirements are met through both ground and surface water source (canal water).

Table 2.5 Water Requirement during Construction Phase

S.N.	Area	Approximate Quantity	Source
1	Construction activities	200 m^3/location	Ground /Surface
2	Domestic water requirement	3 m^3 /day	Ground /Surface
3	Potable water	1 m^3/day	Purchased RO water

Source: MEIL

Operation Phase

Approximately 3 m^3/month of potable water and 5.6 m^3 /month of utility water will be required for domestic usage during the O &M phase planned to be sourced from surface and ground water sources. Most likely, local contractors with water tankers will be used for procuring the utility 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 town.

Operations Phase

Supplies, both for operational requirements and for the site staff, will be transported from Jaisalmer town. 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 depend upon the status of electricity board power supply, which shall be procured from outlets located close to the wind farm site. The fuel will be stored in diesel drums 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

There are two batching plants that have been installed by Suzlon near Achla and Loona Khurd villages 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 two DG sets of capacity 70 kVA each.

Operations Phase

The power requirement at site office and WTG monitoring building will be about 750 units / month during operation phase which is met through DG Set and state electricity board (SEB).

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 sprinkling of water and maintaining the vehicular speed to 10 – 15 km / hr;
- It will be ensured that the excavated soil is not kept uncovered;
- Vehicular emission will be controlled through proper maintenance of vehicles and vehicles with proper PUC will be operated at wind farm 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 WTG. 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.

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 24 WTGs of 2.1 MW each and model will be Suzlon S97. The specifications for the WTGs for the proposed project are listed in ***Table 2.6***

Table 2.6 Specifications for noise from WTGs for the proposed Project

Suzlon S 97 Specifications	
Hub Height	120m
Rotor diameter	97 m
Blades	Type SB47
	Quantity 3
	Length 47.5 m
	Material E-glass-reinforced Epoxy, vacuum injected
	Type of aerodynamic brake – pitch / full blade

Source: MEIL

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 2.7***

Table 2.7 Waste generated, their sources and method of disposal

S. No.	Waste Type	Source	Method of Disposal
1	Domestic solid waste	Labour activities	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.	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	Return back to the suppliers or re used on site
4	Sludge from Wastewater Septic Tanks	Site Office	Collected and disposed of through contractors
5	All non- recyclables	Construction activities	Collected and disposed of by the contractor at designated landfill sites.
1	Used oil / waste oil	DG set, construction machinery	Collected and disposed of through approved recyclers in accordance to *Hazardous Waste Rules, 2008.*
2	Oil contaminated rags	Cleaning activities	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 wind farm 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 a 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.

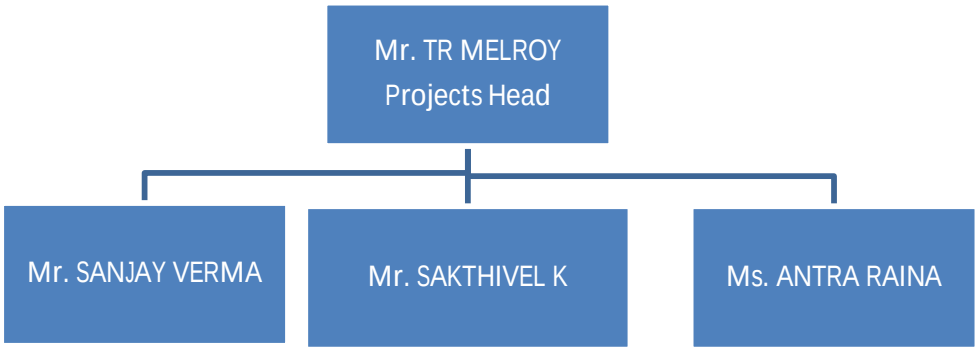
2.8 PROJECT SCHEDULE

The proposed timelines for construction and commissioning for Project Bhesada are expected to be completed by March 2016. The detailed schedule is being worked out and will be available shortly.

2.9 PROJECT ORGANISATIONAL STRUCTURE

The structure as is presented in ***Figure 2.7*** below:

Figure 2.7 Project Organisational Structure



Source: MEIL

Based on 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.

3 LAND REQUIREMENT AND ALLOTMENT PROCESS

Project Bhesada, being the turnkey project of Mytrah, is being developed as a part of 300 MW project of Suzlon Energy Limited. The land for the wind power project is required for the following components:

- Wind Turbines
- Internal and Approach Roads
- RoW for transmission line
- Pooling sub-station
- Batching plant and
- Stockyard

At the time of ERM site visit, it was observed that Pooling substation and external transmission line is already in operational stage. Out of the 24 WTGs location of project Bhesada, erection of 9 WTGs and foundation work for 10 WTGs location is completed. Location for remaining WTGs is finalised.

3.1 LAND DETAILS

Suzlon had initially applied for 1664.09 ha land allotment for and got approval for 704.984 ha government land in January 2013, which is being developed for different clients like Mytrah, ReNew, Grenco, etc.

Suzlon was allotted government land as per Rajasthan Land Revenue (Allotment of land for setting up of power plant based on Renewable Energy Sources) Rules, 2007 in the year 2013 across 16 villages of the tehsil Fatehgarh and Pokran in Jaisalmer District. ***Table 3.1*** provides detail on village wise land allotment for the entire 300 MW project which is being developed by Suzlon. This includes 24 WTGs of Project Bhesada.

Table 3.1 Village Wise detail of 704.984 Ha Revenue Land allotted to Suzlon

S. No	Village	Area (in Ha)
1	Maalusar	32.328
2	Ola	32.378
3	Bahla barti	62.967
4	Bonadi	13.080
5	Khelana	38.861
6	Meenajpura	03.294
7	Pratappura	02.687
8	Loonakalan	38.999
9	Naya Loonakalan	122.25
10	Motisar	47.935
11	Loonakhurd	06.427
12	Betini	24.858
13	Khoda	37.056
14	Madasar	58.734
15	Dalpatpura	07.366

S. No	Village	Area (in Ha)
16	Naya Achla	175.764
	Total	**704.984**

Source: Land allotment letter provided by Suzlon

24 WTGs of Project Bhesada is located in four villages namely Loona Kalan, Naya Loona Kalan, Loona Khurd and Sadrasar village.

3.1.1 Land details and existing procurement status for specific components

Land for WTGs

Suzlon subleases 1.62 hectare land per WTG to their clients. Accordingly 38.88 Ha land would be transferred to Mytrah under project Bhesada for 24 WTGs. All these land parcels would part of the government land allotted to Suzlon.

Land for Pooling Sub-station

Pooling sub-station is established on government land of Betina village. This is also part of 704.984 Ha government land allotted to Suzlon. Pooling sub-station was observed to be in operational stage at the time of site visit.

Land for external transmission line

External transmission line is already erected for power evacuation and it is connected to Akal sub-station and handed over to Rajasthan Power Transmission Company. Reportedly ROW (Right of Way) issues for land procurement for erecting external transmission line were settled by Liaison team of Suzlon. ERM is not clear about number of poles established for external transmission line and detail of compensation paid for settling ROW issues, could not be made available to ERM for review and assessment.

Land for Access Road

Access road for 24 WTGs is being majorly developed in the Revenue land allotted to Suzlon. On an average 1 km access road is being developed for one WTG. There could be possibility of taking private land as well for developing access road. However bifurcation of land detail for access road is not provided to ERM, hence detailed assessment of land procurement for access road could not be done.

Land for internal transmission line

Suzlon has obtained permission and approval as per its Single Line Diagram (SLD) under section 68 of Electricity Act, 2003 for power evacuation from Bhesada site from Rajasthan Rajya Vidyut Prasaran Nigam (RVPN). The 220 kV extra high voltage (EHV) external transmission line will be about 53 kms having about 165 towers –multi circuit over heads (MCOH) connecting Betina PSS to Akal GSS. The 33 kV internal line comprises of 476 single pole single circuit (SPSC) line covering total distance of 33.1 km followed by 178 double

pole double circuit (DPDC) poles covering a distance of 6 kms connecting 24 WTGs to the Betina PSS.
It was informed that Suzlon is reportedly paying one time negotiated amount at the rate of INR 1000 per pole to private land owners for establishing internal transmission line. This is reportedly much higher than prevailing government rate of INR 250 per pole. The details on the land for the installation of internal transmission line were not available and therefore, could not be reviewed and assessed.

Land for batching plant, Storage yard etc.

Batching plant and Storage yards are located on government land allotted to the project. It does not include or affect any private land parcels.

3.1.2 Specific issues with respect to land procurement

On the basis of the information available presently, some of the observations especially with respect to the project related land procurement are mentioned below.

Schedule V Area (1)

The project area does not fall under Schedule V area as defined in the Indian constitution.

Forest land

The WTG locations are being developed only on government land. Development of access road and internal transmission line is affecting some portion of private land. There is no forest land diversion involved in this project in any manner.

(1) Under the Schedule V of the Indian constitution, a number of districts located in eleven states of the country have been declared as fully or partially "Scheduled areas". The regulations framed under the Fifth schedule are aimed at preventing the exploitation of tribal at the hands of non-tribal especially in terms of alienation of tribal agriculture land by non-tribals. The term "Scheduled Areas" has been defined in the Indian Constitution as such areas which the President of India may by order declare to be "Scheduled Areas". Accordingly to paragraph 6 of the Schedule, the specification of Scheduled Areas in relation to a particular State / Union Territory is done by a notified Order of the President, after consultations with the State Governments concerned.

Tribal (Scheduled Tribe [1]) land

All WTGs are being developed on government land. Census 2011 data indicates very low percentage of ST population in one of the project impacted village Koda, rest of the villages have no ST population. Thus there is least possibility of affecting private land of any ST land owner.

Landlessness

Main project components like WTGs, pooling sub-station are being established on government land. Internal access road is also majorly developed / being developed on government land. Private land purchases are limited to certain patches of access road and certain poles of internal transmission line. In view of this scenario, it is assumed that nobody would be become landless because of the land transaction for project Bhesada.

Common Property Resources

Government land around the villages was observed to be primarily used as grazing field by the local community. Establishment of project footprints will curtail the availability of the area for grazing to some extent. However access to the balance government land allotted to Suzlon, will remain open for grazing field.

Rights of using government land as grazing field has also been ensured in government land allotment process. Allotment of 704.984 ha government land to Suzlon is provided with certain conditions. One of those conditions says allotted area will not be fenced by the company and right of grazing for local cattle within the allotted area will be preserved. Another condition of the allotment says company will plant at least 50 trees in allotted area.

Encroachment over Revenue Land

Cultivation on government land during rainy season is very common practice in Jaisalmer district. Types of crops grown on this land include *Jwar, motif, till bajra* etc. In most of the cases, villagers know that cultivation on government land is legally not permitted. But they still do it whenever there is good spell of rain. They pay fines imposed by local revenue officer for the use of revenue land for farming purpose for the season. Fine is usually calculated based on

(1) Article 366 (25) of the constitution of India defines Scheduled Tribe as "such tribes or tribal communities or part of or groups within such tribes or tribal communities as are deemed under Article 342 to be Scheduled Tribe for the purpose of this constitution".
Article 342 says – The President may, with respect to any state or union territory, and where it is a state, after consultation with the Governor there of by public notification, specify the tribes or tribal communities or parts of or groups within tribes or tribal communities which shall, for the purpose of this constitution, is deemed to be scheduled tribes in relation to that State or Union Territory, as the case may be.
Parliament by law include or exclude from the list of Scheduled tribes specified in a notification issued under clause 91) any tribe or tribal community or part of or group within any tribe or tribal community, but save as aforesaid, a notification under the said clause shall not be varied by any subsequent notification.

productivity level of the crops grown on the government land. Based on discussion with land team of Suzlon, it was assumed that there was sizable number of cultivators over the government land parcels used for project Bhesada. However number of such cases was not confirmed by Suzlon. This is however recognised as encroachment over the government land.

Suzlon has a practice of paying one time agreed monetised negotiated amount of INR 50000 (fifty thousand) per WTG to the Village Development Committee (VDC) of each the village where WTGs are being established. This amount is primarily intended to offset the loss of cultivation over government land. Besides this, villagers demand a one-time monetised payment for the government land being cultivated by them, which is used by the project for access roads (usually Rs. 20,000 per km).

No Objection Certificate (NOC) from Gram Panchayat

As per prevailing norms of the state (Policy for promoting generation of electricity from wind, by Government of Rajasthan, Energy Department, 2012), NOC from Gram Panchayat is not required or setting up the project if the land is a Government land. Hence NOC was not obtained by Suzlon for this project.

Cultural heritage

There is a temple called as 'Deg Rai Mandir' which is quite famous in Jaisalmer district. This temple is located beyond 10 km from the project Bhesada location. No other significant cultural heritage sites were observed in and around the project location.

4 APPLICABLE POLICY LEGAL AND ADMINISTRATIVE FRAMEWORK

4.1 INTRODUCTION

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

- 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 e.g. 3 Tier, AWS True power, etc.

Agency	Functions	Relevance & Applicability to the project
Technology (C-WET))		
Indian Renewable Energy Development Agency (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 RVPNL 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	The tribunal will have jurisdiction over all	U/s 17, any person responsible for any

Agency	Functions	Relevance & Applicability to the project
Tribunal (NGT)	civil cases relating to implementation of the 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.	untoward incidents (defined in Schedule 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.

Source: ERM

4.3 *APPLICABLE REGULATORY/ POLICY FRAMEWORK*

The key regulations that are relevant to the project across its lifecycle is summarized in ***Table 4.2***. 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	√	√	√	√	MOEFCC 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 MoEFCC CPCB	Permissible limits for ambient air quality, water quality, noise limits has been laid down by CPCB under EP Act, 1986 which requires to be complied with.

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, MoEFCC	
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, Forests and Climate Change (*MoEFCC*) or the State Environmental Impact Assessment Authority (*SEIAA*), Rajasthan.

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, Forest and Climate Change (MoEFCC) or state bodies.
Nodal Agency Consent from RREC	Required	Permission to establish at least 24 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).
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;

(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
		• Equal Remuneration Act 1976; • Workmen's Compensation Act, 1923; • Maternity Benefit Act, 1961.
Land procurement	Allotted	• Allotment of concerned land (704.984 ha for the complete windfarm of 300 MW as reported by Suzlon) from Hon'ble Revenue Minister, GoR *(vide allotment letter No. P. (12) (3) (58) (Registration no. 124/2004) Revenue 2011/311 dated 9/01/2013)*
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.

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 ***Annex 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 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.

In addition, during the construction, operation and eventual decommissioning of the site, the IFC EHS Guidelines for Wind Energy (2) and the *General Environmental, Health, and Safety (EHS) General Guidelines*[3] *(April 30, 2007*) will also be applicable for this project.

(1) http://www.ifc.org/ifcext/sustainability.nsf/Content/PerformanceStandards
(2)
http://www.ifc.org/ifcext/sustainability.nsf/AttachmentsByTitle/gui_EHSGuidelines2007_WindEnergy/$FILE/Final+-+Wind+Energy.pdf
(1) [3]
http://www.ifc.org/ifcext/sustainability.nsf/AttachmentsByTitle/gui_EHSGuidelines2007_GeneralEHS/$FILE/Final+-+General+EHS+Guidelines.pdf

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.

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;

IFC- PS no.	Description	Objectives
		• To anticipate and avoid, or where avoidance is not possible, minimize adverse social and economic impacts from land acquisition or restrictions on land use by (i) providing compensation for loss of assets at replacement cost4 and (ii) ensuring that resettlement activities are implemented with appropriate disclosure of information, consultation, and the informed participation of those affected; • To improve, or restore, the livelihoods and standards of living of 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,*

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5 REENING AND SCOPING

At the initial stage of the ESIA process, preliminary information was provided to aid determination of legal and other requirements applicable 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, ERM 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 ERM 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 wind farm 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 24 nos. WTG sites;
- 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 the above criteria, and as described below:

- The proposed Project's potential adverse environmental impacts are mostly confined to construction phase and site-specific and the impacts can be addressed with implementation of proper mitigation measures. The detailed assessment with regard to same is presented in Chapter 8 on impact assessment.
- The proposed project does not involve any involuntary resettlement as the project is being developed on revenue land which mostly comprises of barren and cultivable waste land. There are no settlements on these lands and impact on private land is restricted to access road development.
- The proposed project will have no specific impact on indigenous people as the population of indigenous people in the project area 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.

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 Wind farm 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 there are other projects which are being developed in the vicinity of the wind farm 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 mostly government land and is obtained on lease from government, though some private land may be purchased for a section of the access road, the details of the same are presently not available. 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 (AoI) for the project to identify potential interactions between the project and resources / receptors in the AoI, 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 Pre-Construction and 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 ERM 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, 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 ***Chapter 2 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.

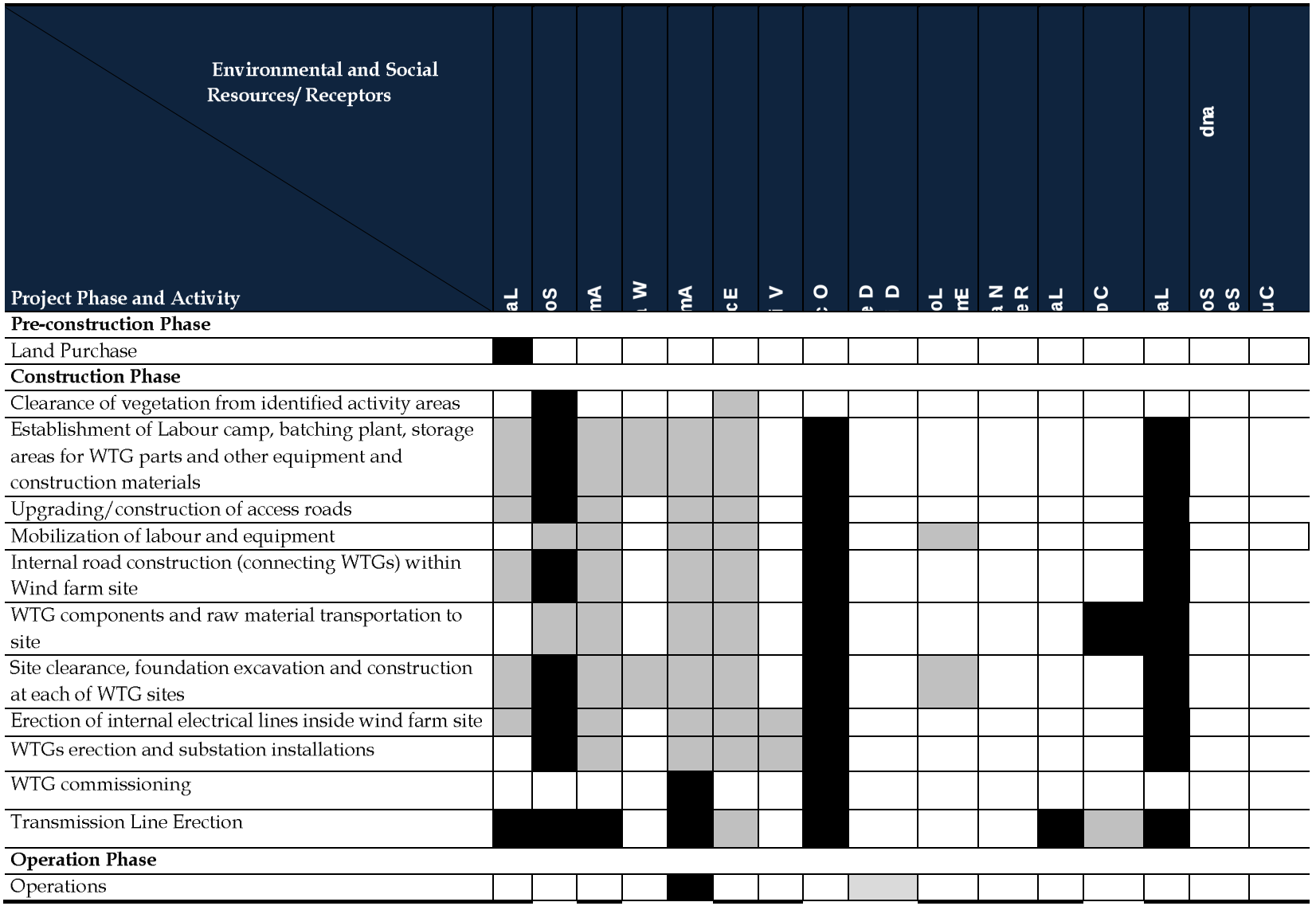
Interactions that are likely to lead to significant impacts are presented in ***Table 5.3*** and will be the focus of the impact assessment. Owing to site conditions there are certain possible interactions that will not take place. As a result these interactions have been "scoped out" and are presented 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 0.5-1 km from the proposed MEIL's wind farm, and in view of the 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																	
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, storage 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.
Ecological Impacts	• No forest land will be diverted for the project as was confirmed by the available land records from Suzlon; • 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 wind farm 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. • The operation of wind farm may result in collisions of birds and bats with wind turbine rotor blades and also electrical shocks from the transmission lines network, 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 and; o Owing to equipment defects / malfunctions or natural disasters

Interaction (between Project Activity and Resource/Receptor)	Justification for Expectation of Potentially Significant Impacts
	such as storms, 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.
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 labour 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.
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 Fatehgarh and Pokhran tehsil of Jaisalmer district in Rajasthan. Jaisalmer city, located at an aerial distance of 58 km south-east from the wind farm 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 Rann 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 49.2ºC and winter having minimum temperatures in the range of 1 ºC. The average rainfall in the district is only 16.4 cm as against the state average of 57.5 cm.

The project contains 24 WTGs and spread in an area of around 383 Ha of government land, as reported. The area comprises largely of flat land with average elevation of 311 m above the Mean Sea Level (MSL). 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 2.3.4*** 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 wind farm site and its footprint, nature and spatial distribution of potential social and environmental impacts (based on similar type of projects).

Project footprint Area: wind farm 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 704.9 Ha of land situated in Jaisalmer district of Rajasthan State. Physically, there is no demarcation or fencing for the Wind farm 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: Wind farm 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;

- **Shadow Flicker**: shadow flicker impacts area – typically 300m from operations sustained for 30 hours in a year.
- **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 *Error! Reference source not found.*.

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 (22nd to 25th August, 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.

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 August (23rd – 28th August, 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**	6	Once during the monitoring period	Noise levels were monitored on hourly basis for 24 hours at five (05) locations inside the Core Zone and one (01) 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

Environmental and social baseline data was collected through primary surveys as well as through secondary sources by literature survey and

[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.

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 land use of the wind farm area (5-km buffer) has been estimated using satellite imagery and available toposheets. The image processing is being done by ERM using ArcGIS software. The land use details of the wind farm area are presented in ***Table 6.3*** and illustrated by ***Figure 6.1***. The table indicates that the wind farm area lies in a predominantly agricultural land (77%) followed by fallow land (21%). The other land uses in the area are built up area comprising of rural settlements, urban contributing 1.2 % followed by marginal proportions of stony wastes, grassland and water bodies.

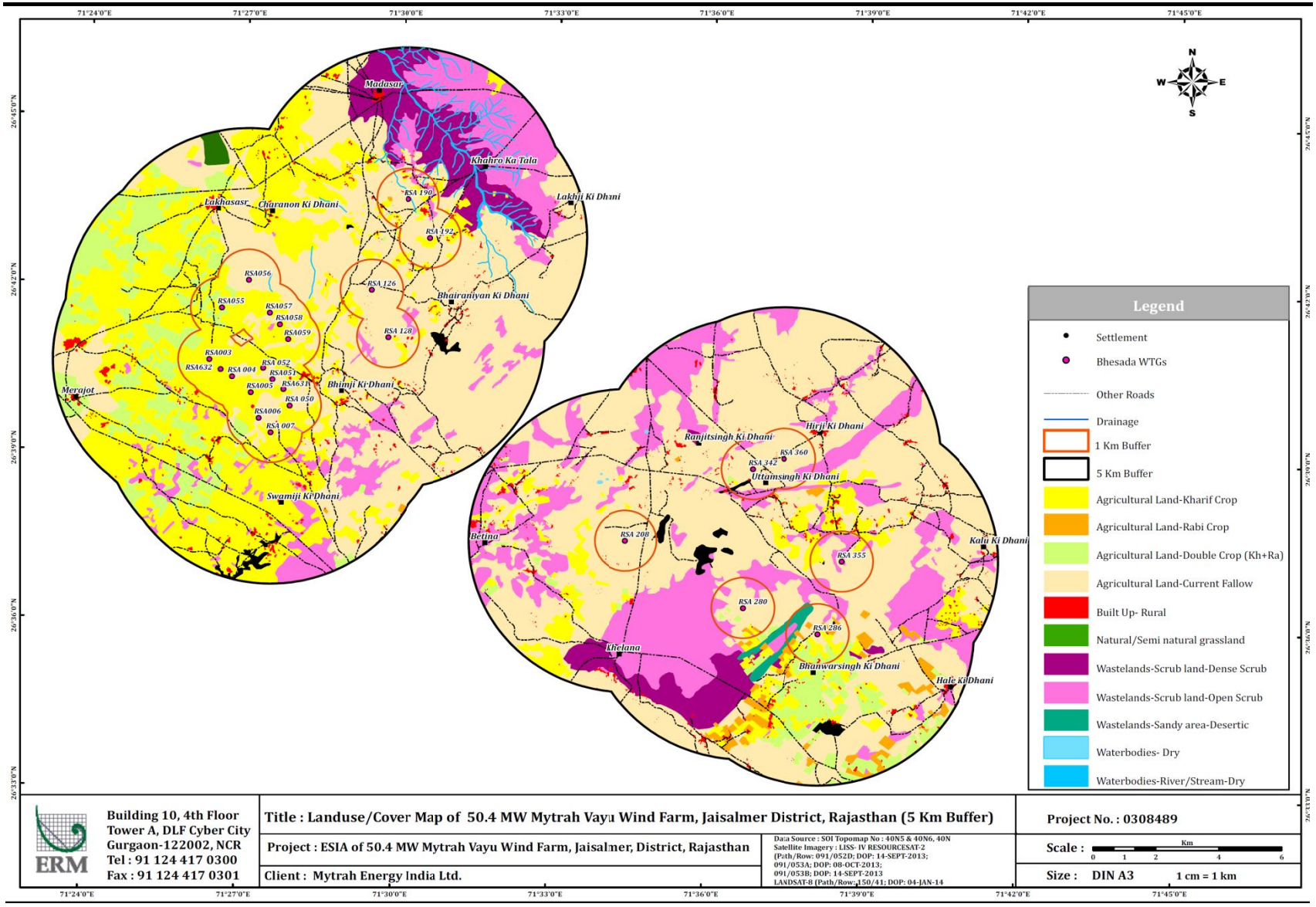
These estimated figures may not exactly match with the landuse done by the Government because of the land based records / information available with them. Additionally, the area is representation of the area of influence only and not the total area allotted to Suzlon as an area of 704.984 ha land falling in 16 villages was approved to them, out of which 383 ha of land would be transferred to Mytrah for their 24 WTGs.

Table 6.3 Landuse break-up detail

Land Use Category	Area (Sq. km)	% of Geographical Area
Agriculture	309.75	76.76
Grass and Open Shrub	0.75	0.18
Fallow land	84.2	20.87
Dunes	0.0	0.0
Sandy area and Sparse Shrub	1.18	0.29
Settlement	4.77	1.18
Stony Waste	2.13	0.53
Waterbodies	0.76	0.19
Total	403.54	100.00%

Source: ERM

Figure 6.1 Land use in the Project Area



Source: ERM India

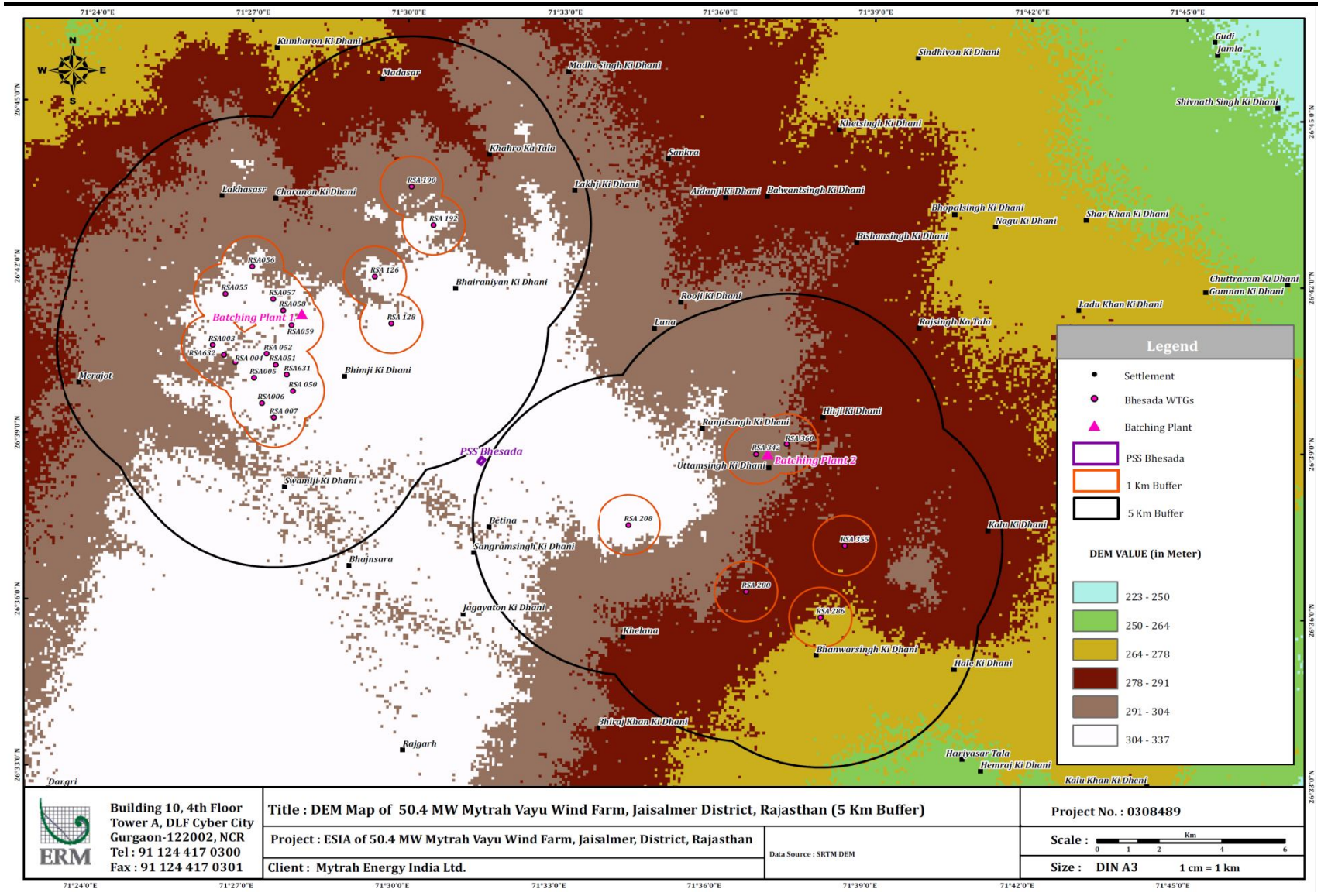
6.4.2 Topography

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 by 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. The elevation in 1 km radius from the Project boundary ranges from 281 m to 323 m above msl.

Figure 6.2 presents the elevation profile of the area.

Figure 6.2 Elevation Map of the Study Area



Source: ERM India

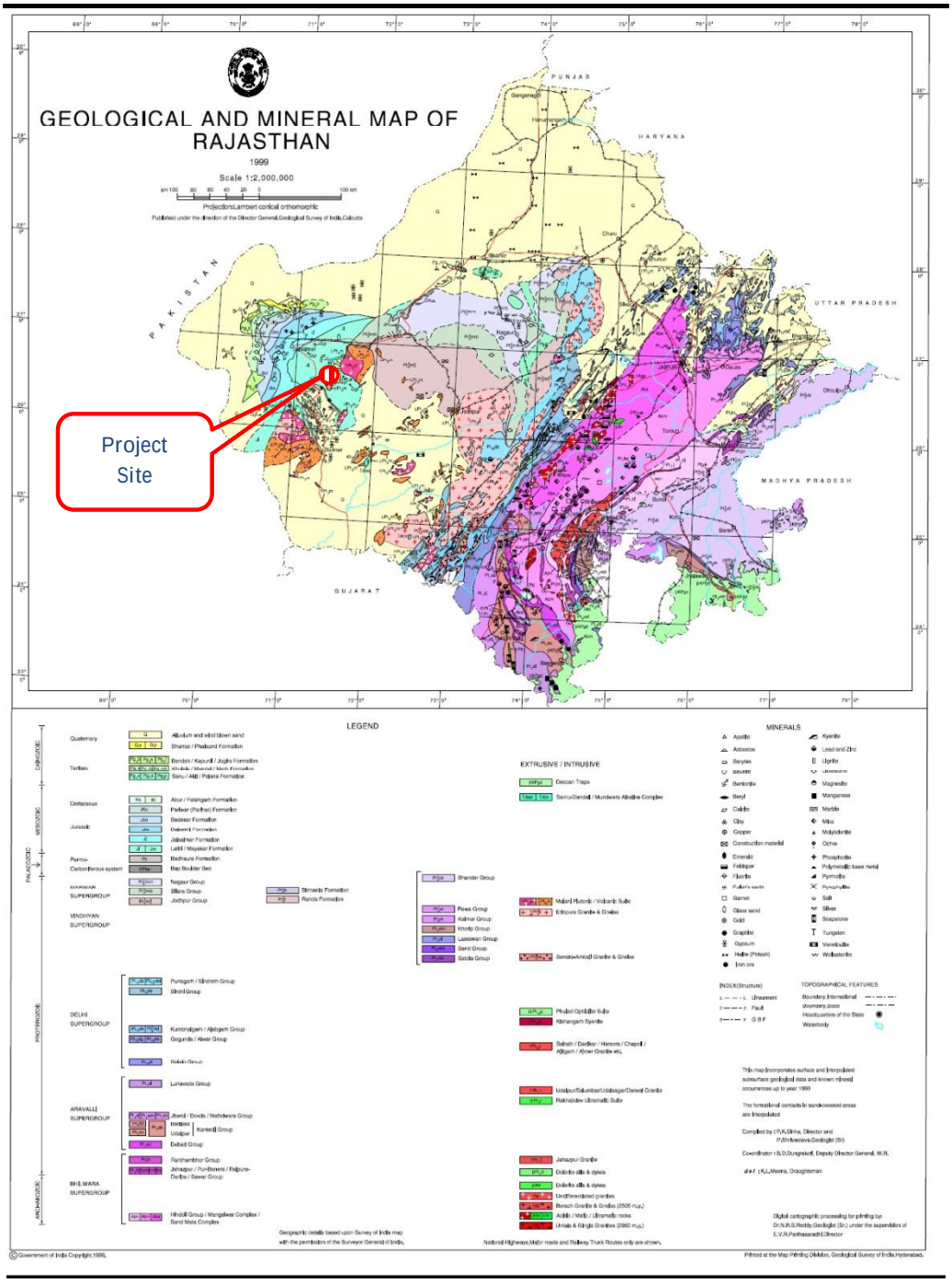
6.4.3 Geology

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 Geological Map of Rajasthan



Source: Geological Survey of India Portal (http://www.portal.gsi.gov.in)

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

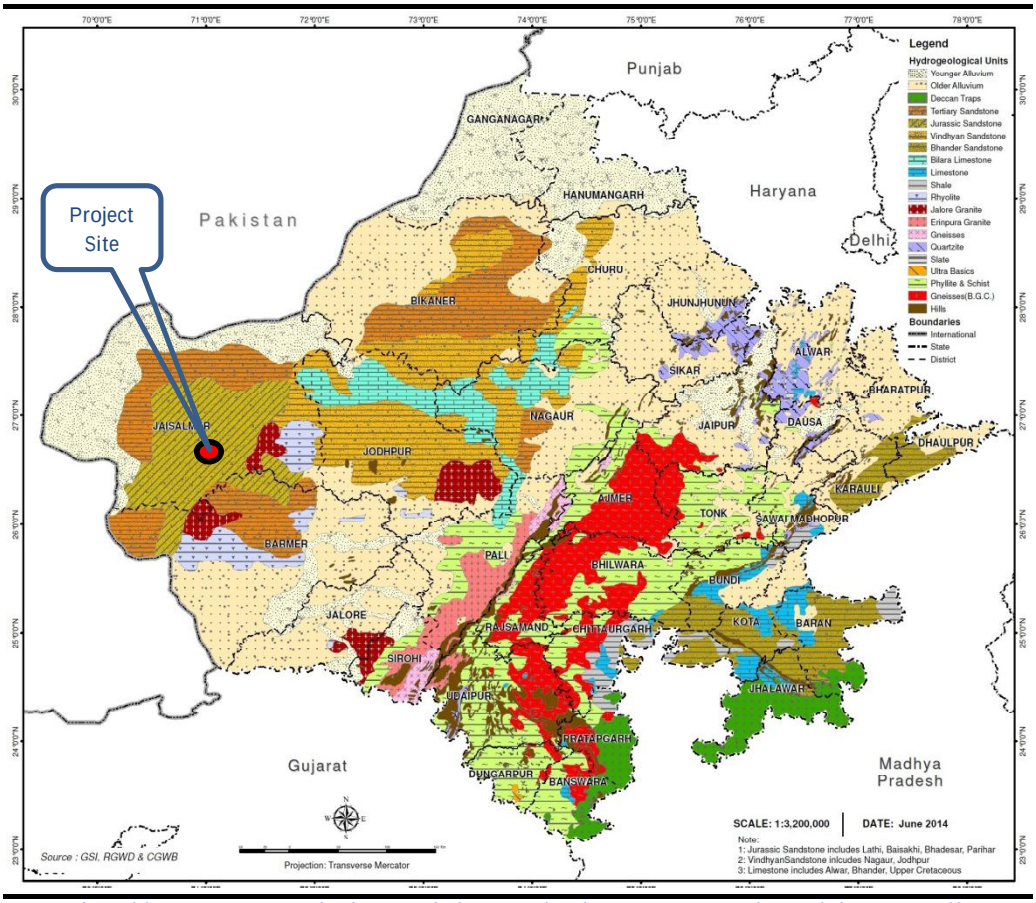
[1] http://ruidp.rajasthan.gov.in/IEE%20PDF/IEE%20Jaisalmer%20Drainage.pdf

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-geological Map of Rajasthan



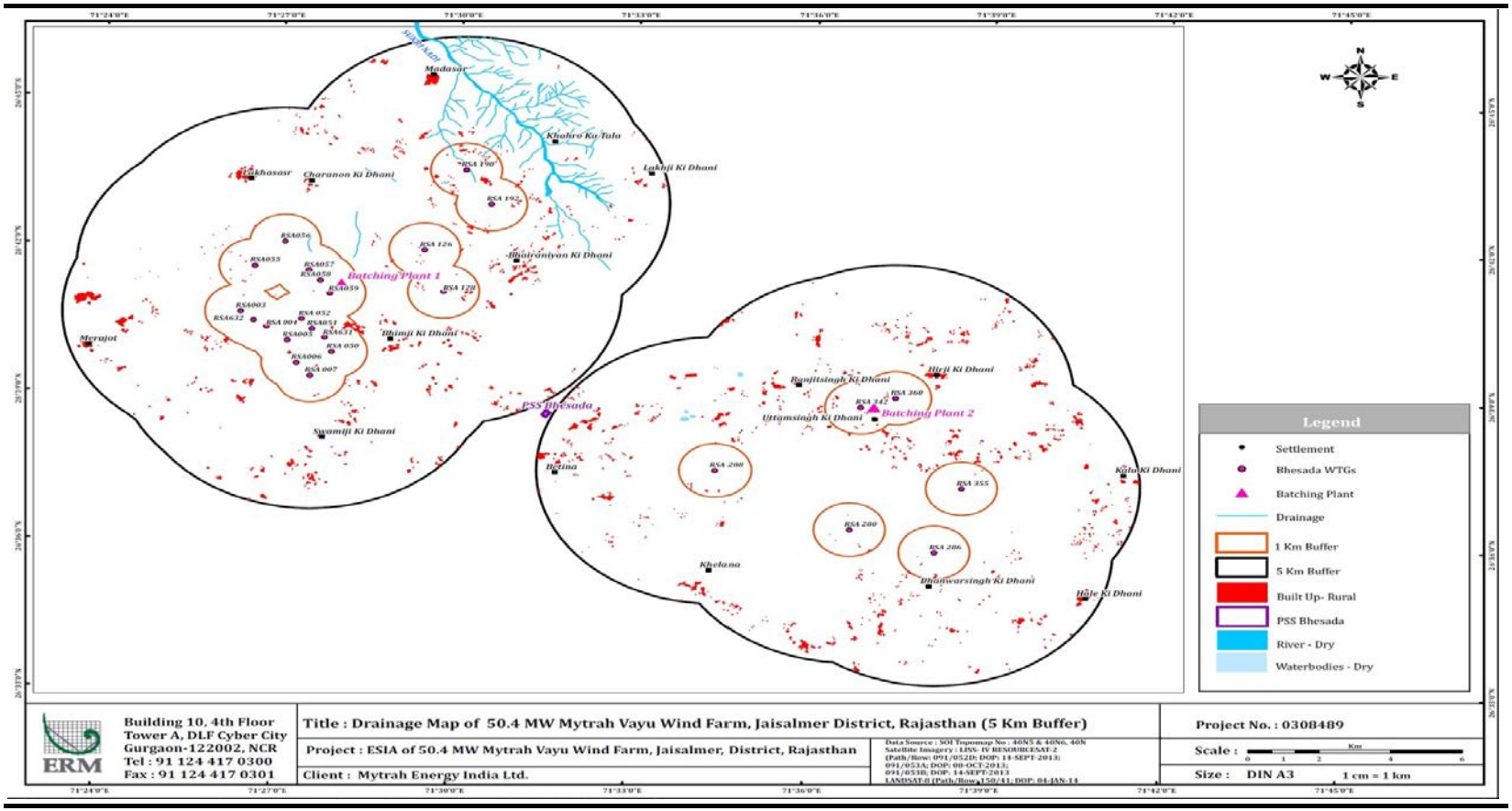
Source: http://waterresources.rajasthan.gov.in/SPWRR/Main%20Report%20Figures/Fig2.2%20.pdf

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. The drainage map for the AoI is shown in ***Figure 6.5***.

Figure 6.5 Drainage Map for the Bhesada Wind Farm Area



Source: ERM

In the AoI, no perennial ponds were observed, though few seasonal ponds were observed in which water level was low due to insufficient rainfall. The villagers in the AoI are primarily dependent on canal water for meeting agricultural needs and at few places groundwater was available.

6.4.6 *Climate and Meteorology*

Regional Meteorology

The climate of the region is classified as arid climate (BWh) as per Köppen Climate classification[1].

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)

[1] **Köppen climate classification** is a vegetation-based empirical climate classification system developed by German botanist-climatologist Wladimir Köppen. His aim was to devise formulas that would define climatic boundaries in such a way as to correspond to those of the vegetation zones that were being mapped for the first time during his lifetime.

Köppen's classification is based on a subdivision of terrestrial climates into five major types, which are represented by the capital letters A, B, C, D, and E. Each of these climate types except for B is defined by temperature criteria. Type B designates climates in which the controlling factor on vegetation is dryness (rather than coldness). Aridity is not a matter of precipitation alone but is defined by the relationship between the precipitation input to the soil in which the plants grow and the evaporative losses. Since evaporation is difficult to evaluate and is not a conventional measurement at meteorological stations, Köppen was forced to substitute a formula that identifies aridity in terms of a temperature-precipitation index (that is, evaporation is assumed to be controlled by temperature). Dry climates are divided into arid (BW) and semiarid (BS) subtypes, and each may be differentiated further by adding a third code, h for warm and k for cold.

BWh is Tropical and subtropical desert climate.

Source: Adapted from Arthur N. Strahler, Physical Geography, third edition; John Wiley & Sons, Inc. and provided by www.Britannica.com.