

- The hub height and rotor diameter of the WTGs
- The position of the shadow receptor object (x, y, z coordinates)
- The size of the window and its orientation, both directional (relative to south) and tilt (angle of window plane to the horizontal).
- The geographic position (latitude and longitude) together with time zone and daylight saving time information.
- A simulation model, which holds information about the earth's orbit and rotation relative to the sun.

Study Envelope for Shadow Flicker

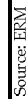
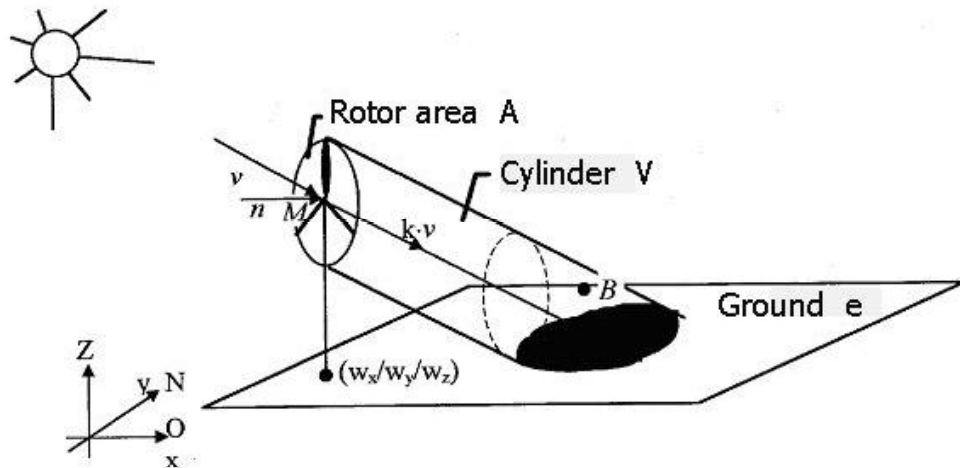


Figure 8.8 **An illustration of shadow effect from WTG**



Impact Assessment

The results of the shadow flicker assessment are shown in **Figure 8.9, Table 8.38** below as well as in **Annex C** and the supporting graphs provided in **Annex D**. The graphs shown in **Annex E** illustrate the times of the year at each of the 16 receptors in the analysis where theoretical shadow flicker was predicted to occur.

Table 8.38

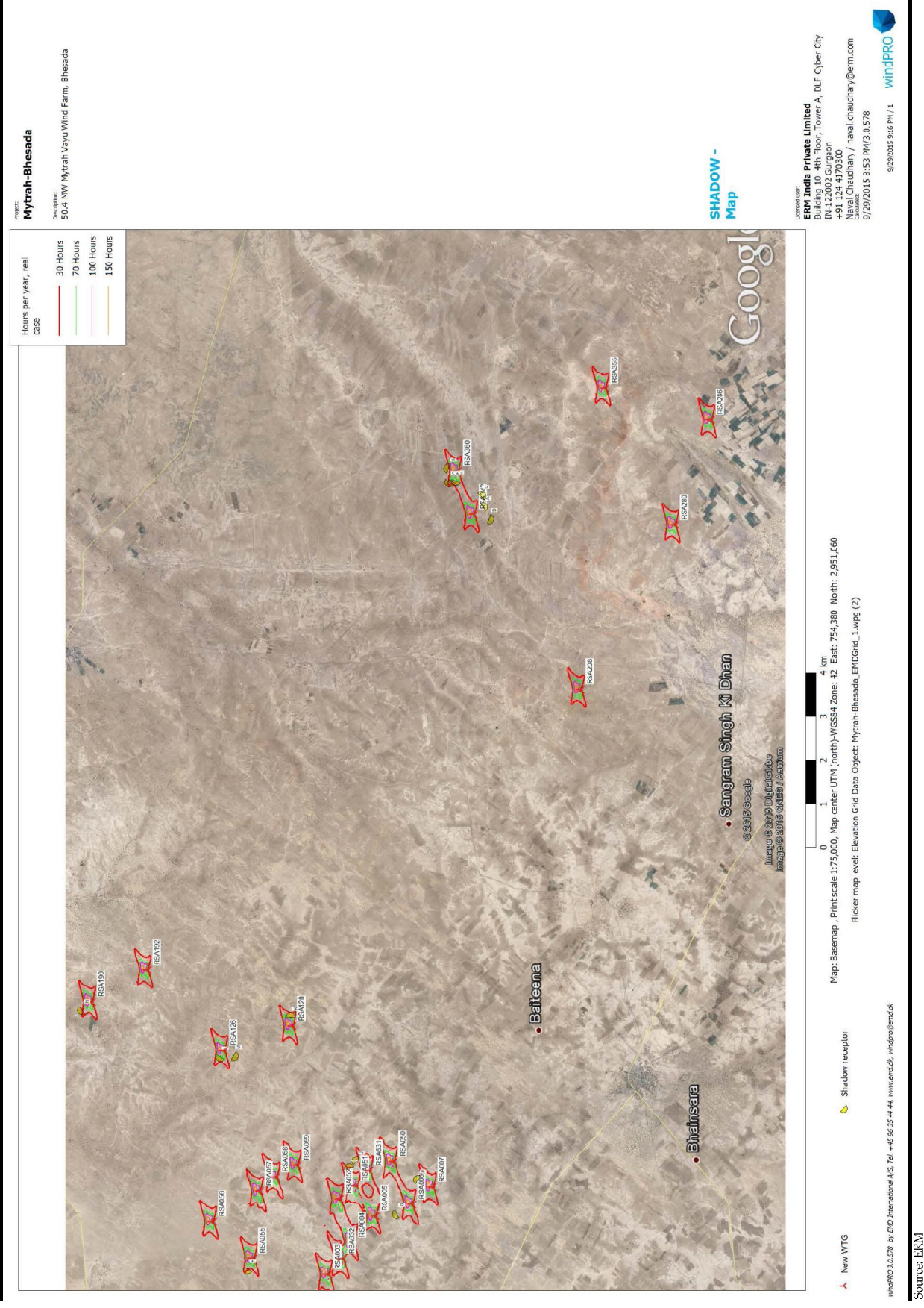
Shadow Flicker Analysis at Each Receptor

Shadow Receptor	Receptor Type	UTM Co-ordinates**			Nearest WTG	Distance from Nearest WTG [m]	Direction from WTG (Degree)	Real Case Scenario
		X (m E)	Y (m N)	Z (m)				
A	Residential	760400	2949841	297.0	RSA342	250	140	0:00
B	School	760123	2949694	297.9	RSA342	330	197	0:00
C	Residential	760645	2949887	297.7	RSA342	440	112	10:51
D	Temple	761265	2950643	292.7	RSA360	220	224	1:14
E	Residential	760984	2950472	296.0	RSA360	230	282	38:21
F	Storage	760967	2950543	294.2	RSA360	260	298	37:03
G	Residential	760956	2950616	294.0	RSA360	310	308	40:14
H	Storage	742806	2954861	308.8	RSA055	290	297	33:35
I	Residential	745173	2952595	311.8	RSA051	420	69	31:00
J	Residential	745343	2952423	315.0	RSA631	370	36	12:50
K	Residential	748599	2954000	306.7	RSA128	200	78	57:33
L	Residential	747671	2955581	306.1	RSA126	170	300	59:19
M	Residential	747699	2955285	307.1	RSA126	240	210	0:00
N	Residential	748683	2958759	294.2	RSA190	290	320	23:13
O	Residential	744151	2951481	311.1	RSA006	400	329	0:00
P	Residential	744945	2951019	309.2	RSA007	370	25	10:17

*Figures highlighted and bold represent greater than 30 hours per year of shadow flicker

** WGS84 Zone: 42

Figure 8.9



Given the guidelines of 30 hours or less per year is considered to be acceptable, the operation of the wind farm theoretically results in shadow flicker impacts that could be considered as significant for the purposes of this study. 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. It was further been noted that the scattered hutments are located within 500 m around 10 WTGs out of total 25 WTGs considered in this study. 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.

It is relevant to emphasise that predicted hours of shadow flicker effects are real case scenarios with certain assumptions. Assumptions made during the analysis include optimal meteorological, natural light and geometrical conditions for the generation of shadow flicker. The assessment does not account for trees or other obstructions that intervene between receptor and turbine during times when effects may occur. The assessment calculation is therefore an over estimation in the probability of effects. It should also be noted that for shadow effects to occur, properties need to be occupied, with blinds or curtains open and views to the wind turbine unobstructed. However, for the purposes of assessment, it has been assumed that all worst-case circumstances apply.

Table 8.39 Impact Significance of Shadow Flickering

Impact	Shadow Flickering during the Operation Phase				
Impact Nature	Negative		Positive		Neutral
Impact Type	Direct		Indirect		Induced
Impact Duration	Temporary	Short-term		Long-term	
Impact Extent	Local		Regional		International
Impact Scale	Within 350 m from the WTGs on the receptors located in the SE-NE and SW-NW orientation from the WTG/s				
Frequency	during sunny days				
Impact Magnitude	Positive	Negligible	Small		Medium
Vulnerability of Social Receptors	Low		Medium		High
	No major settlement is within 350 m from the WTGs. However, scattered hutments are located within the impact zone.				
Impact Significance	Negligible	Minor		Major	
	Considering the overall impact magnitude and vulnerability of social receptors, the impact significance is assessed as minor .				

Mitigation Measures

There will be close monitoring through engagement with residents during the operational phase where there are predicted impacts from shadow flicker. The likelihood of direct line of sight to the location of proposed turbine locations can be assessed visually and the potential for using screening like higher

fencing and planting trees can be explored at problem locations. The use of curtains can also be explored. If these prove effective and the impacts mitigated, the shutting down of turbines during certain environmental conditions, which meet the physical requirements for theoretical shadow flicker to occur, will not be required.

Should the impact of shadow flicker be identified, and the mitigation measures proposed above prove ineffective, further analysis can be carried out to identify the exact timings and conditions under which shadow flicker occurs, and a technical solution sought. This is likely to involve pre-programming the turbine with dates and times when shadow flicker would cause a nuisance for nearby receptors. A photosensitive cell can be used to monitor sunlight, and the turbine could potentially then be shut down, when the strength of the sun, wind speed and the angle and position of the sun combines to cause a flicker nuisance.

Assessment of Residual Impacts

The results of the WindPro shadow flicker assessment show a real case estimate with certain assumptions and the mitigation measures above will be implemented for the identified properties that experiences shadow flicker.

Residual impacts following the application of required mitigation measures, as discussed above, is likely to result in to **minor** to **negligible** impacts.

8.6 KEY ECOLOGICAL RISKS

Criteria

The impact assessments were undertaken based on following impact assessment matrix as presented in **Table 8.40** for Habitats and **Table 8.41**.

Table 8.40 Habitat-Impact Assessment Criteria

Habitat Sensitivity/ Value		Magnitude of Effect on Baseline Habitats			
		Negligible	Small	Medium	Large
Negligible	Habitats with negligible interest for biodiversity.	Not significant	Not significant	Not significant	Not significant
Low	Habitats with no, or only a local designation / recognition, habitats of significance for species listed as of Least Concern (LC) on IUCN Red List of Threatened Species, habitats which are common and widespread within the region, or with low conservation interest based on expert opinion.	Not significant	Not significant	Minor	Moderate

Habitat Sensitivity/ Value		Magnitude of Effect on Baseline Habitats			
		Negligible	Small	Medium	Large
Medium	Habitats within nationally designated or recognised areas, habitats of significant importance to globally Vulnerable (VU) Near Threatened (NT), or Data Deficient (DD) species, habitats of significant importance for nationally restricted range species, habitats supporting nationally significant concentrations of migratory species and / or congregatory species, and low value habitats used by species of medium value.	Not significant	Minor	Moderate	Major
High	Habitats within internationally designated or recognised areas; habitats of significant importance to globally Critically Endangered (CR) or Endangered (EN) species, habitats of significant importance to endemic and/or globally restricted-range species, habitats supporting globally significant concentrations of migratory species and / or congregatory species, highly threatened and/or unique ecosystems, areas associated with key evolutionary species, and low or medium value habitats used by high value species.	Not significant	Moderate	Major	Critical
Negligible	Effect is within the normal range of natural variation				
Small	Affects only a small area of habitat, such that there is no loss of viability / function of the habitat				
Medium	Affects part of the habitat, but does not threaten the long-term viability / function of the habitat.				
Large	Affects the entire habitat, or a significant proportion of it, and the long-term viability / function of the habitat is threatened.				

Table 8.41 Species-Impact Assessment Criteria

Baseline Species Sensitivity/ Value		Magnitude of Effect on Baseline Habitats			
		Negligible	Small	Medium	Large
Negligible	Species with no specific value or importance attached to them.	Not significant	Not significant	Not significant	Not significant
Low	Species and sub-species of LC on the IUCN Red List, or not meeting criteria for medium or high value.	Not significant	Not significant	Minor	Moderate

Baseline Species Sensitivity/ Value		Magnitude of Effect on Baseline Habitats			
		Negligible	Small	Medium	Large
Medium	Species on IUCN Red List as VU, NT, or DD, species protected under national legislation, nationally restricted range species, nationally important numbers of migratory, or congregatory species, species not meeting criteria for high value, and species vital to the survival of a medium value species.	Not significant	Minor	Moderate	Major
High	Species on IUCN Red List as CR, or EN. Species having a globally restricted range (ie plants endemic to a site, or found globally at fewer than 10 sites, fauna having a distribution range (or globally breeding range for bird species) less than 50,000 km ²), internationally important numbers of migratory, or congregatory species, key evolutionary species, and species vital to the survival of a high value species.	Not significant	Moderate	Major	Critical
Negligible	Effect is within the normal range of variation for the population of the species.				
Small	Effect does not cause a substantial change in the population of the species, or other species dependent on it.				
Medium	Effect causes a substantial change in abundance and / or reduction in distribution of a population over one, or more generations, but does not threaten the long term viability / function of that population, or any population dependent on it.				
Large	Affects entire population, or a significant part of it causing a substantial decline in abundance and / or change in and recovery of the population (or another dependent on it) is not possible either at all, or within several generations due to natural recruitment (reproduction, immigration from unaffected areas).				

Impacts during construction Phase

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

- clearance of vegetation for storage yards;
- laying of WTG foundation and WTG installation
- laying of transmission lines and transmission towers

- laying of approach roads

8.6.1

Clearance of Vegetation leading to impact on habitat

Context

The land clearance activities for the construction activities lead to the removal of vegetation at the WTG location and access roads. Vegetation clearance results in loss of habitat for several species of herpetofauna, birds and mammals thereby denying breeding, roosting and foraging sites. This is also true for terrestrial migrant species that forage within the wind farm area.

Embedded/ in-built control

The Labour force and the supervisory staff will be provided in-house and external trainings for the situations dealing with wildlife encounters and dos and don'ts while dealing with these situations. Selection of Labour camps, batching plants, equipment laydown areas will be made away from the areas where the wildlife movement is reported.

Significance of Impact

The loss of habitat through vegetation clearance will be temporary prior to mitigation measures. Loss of habitat is at a small scale and does not affect the overall viability/functionality of the overall habitat for the species listed. The impact will furthermore not cause a significant change in the population of species as individuals of species recorded are abundant. There are several threatened vulture species, but being aerial, habitat loss through vegetation clearance does not impact them. The impact magnitude is thereby considered small. The habitat is considered of low sensitivity as it harbours species listed of Least Concern (LC) on IUCN Red List of Threatened Species, does not harbour any nationally recognized populations and is considered quite common in the region. However as there are several Schedule I species within the wind farm area, species sensitivity is considered medium. Overall residual impact significance (refer to *Error! Reference source not found.*) of habitat loss through vegetation clearance is assessed as **negligible** for habitats and **minor** for species.

Additional Mitigation Measures

Following mitigation measures will further reduce the impact significance on the habitat and species to **negligible** and **minor**.

- Vegetation clearance shall be limited to the project activity area;
- No major vegetation should be removed, alternate route should be planned in case any tree/large shrubs is falling within access road alignment;
- Top soil should be stored separately for restoration of the habitat;

- Strict prohibition on use of fuel wood and shrubs from nearby areas as kitchen fuel;
- Local grass species should be seeded in disturbed areas during monsoon period.

Residual impact significance

Overall residual impact significance of habitat loss through vegetation clearance is assessed as remaining negligible for habitat and **minor** for species. While mitigation measures are likely to minimize habitat loss it is unlikely that the habitat will be restored to its original value.

Table 8.42 Impact due to Clearance of Vegetation

Impact	Clearance of vegetation						
Impact Nature	Negative		Positive		Neutral		
Impact Type	Direct		Indirect		Induced		
Impact Duration	Temporary	Short-term	Long-term		Permanent		
Impact Extent	Local		Regional		International		
Impact Scale	Limited to Wind Farm area (specifically construction areas)						
Frequency	Construction phase						
Likelihood	Likely						
Impact Magnitude	Positive	Negligible	Small	Medium	Large		
Resource Sensitivity (Habitat)	Low		Medium		High		
Resource Sensitivity (Species)	Low		Medium		High		
Impact Significance	Negligible		Minor		Moderate	Major	
	Significance of impact is considered negligible for habitats and minor for species						
Residual Impact Magnitude	Positive	Negligible	Small		Medium	Large	
Residual Impact Significance	Negligible		Minor		Moderate		Major
	Significance of impact is considered negligible to minor .						

8.6.2 Impact on wildlife habitat due to Construction Activity

Context

The WTG foundation laying and WTG component installation will require camping/ of work force on site, movement of vehicles for transportation of men and material, construction noise due to excavation etc. These activities will cause habitat disturbance for several species within the wind farm area which will tend to then avoid this area. This moving away from the area could result in abandoning of traditional breeding, roosting and foraging sites and exposure to fresh predators thereby resulting in potential reduced breeding success, impacts on health and survival and higher mortality due to

exposure to fresh predators or hunting/trapping by construction workers. Noise generated by construction activities and vehicle movement may further disturb fauna movement in the nearby areas.

Embedded/ in-built control

The Labour force and the supervisory staff will be provided in-house and external trainings for the situations dealing with wildlife encounters and dos and don'ts while dealing with these situations. Selection of Labour camps, batching plants, equipment laydown areas will be made away from the areas where the wildlife movement is reported.

Significance of Impact

The impacts of construction of WTG foundation and installation of WTG will be both direct and indirect and limited to construction phase of the project. It is at a small scale and does not affect the overall viability/functionality of the overall habitat for the species listed. The impact will furthermore not cause a significant change in the population of species as individual species numbers are abundant. The impact magnitude is thereby considered small. The habitat is considered of low sensitivity as it harbours species listed as of Least Concern (LC) on IUCN Red List of Threatened Species. 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. Once again threatened vultures being aerial are not impacted by construction activities. However as there are several Schedule I species within the wind farm area, including the Indian gazelle, caracal and Asiatic wild cat, species sensitivity is considered medium. Overall impact significance is assessed as **negligible** for habitats and **minor** for species.

Additional Mitigation measures

Following mitigation measures will further reduce the impact significance:

- It is suggested to start the project in phased manner, it is suggested to start the work on a set of WTG and then proceed for other set of WTG
- Construction activities should not be carried out at night (600 pm to 600 am) where several species of wildlife are active.
- Good housekeeping should be followed for construction activities, waste packaging material should be properly disposed;
- Efforts should be made to minimize construction noise
- Labour movement should be restricted between construction camps and construction sites;
- Camp and kitchen waste should be collected and disposed in a manner that does not attract wild fauna.
- Temporary barriers should be installed on excavated areas;
- General awareness regarding fauna should be enhanced through trainings, posters etc. among the staff and labourers;
- Proper sanitation facilities should be provided at the labour camps; and

- Anti -poaching/hunting policy should be strictly enforced.

Residual Impact significance

With the implementation of the suggestive measures, the residual impacts on the habitat and species will be both **negligible**.

Table 8.43 **Impact due to construction activities**

Impact	Construction activities					
Impact Nature	Negative		Positive		Neutral	
Impact Type	Direct		Indirect		Induced	
Impact Duration	Temporary	Short-term		Long-term	Permanent	
Impact Extent	Local		Regional		International	
Impact Scale	Limited to Project area (specifically construction areas)					
Frequency	Construction phase					
Likelihood	Likely					
Impact Magnitude	Positive	Negligible	Small	Medium	Large	
Resource Sensitivity (Habitat)	Low		Medium		High	
Resource Sensitivity (Species)	Low		Medium		High	
Impact Significance	Negligible		Minor		Moderate	Major
	Significance of impact is considered negligible for habitat and minor for species.					
Residual Impact Magnitude	Positive	Negligible	Small	Medium	Large	
Residual Impact Significance	Negligible		Minor		Moderate	Major
	Significance of impact is considered negligible .					

8.6.3 **Impact associated with laying of Approach Roads**

Context and receptors

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.

Embedded/ in-built control

Road route alignment will be kept as such that no tree or major shrub species are required to be removed. Wherever, feasible existing village/cart road will be upgraded as approach road to minimize the disturbances.

Significance of Impacts

The impacts of laying approach roads will be both direct and indirect and limited to construction phase of the project. Impacts are at a small scale and do not affect the overall viability/functionality of the overall habitat for the species listed. The impact will furthermore not cause a significant change in the population of species as species numbers are abundant. The impact magnitude is thereby considered small. The habitat is considered of low sensitivity as it harbours species listed as of Least Concern (LC) on IUCN Red List of Threatened Species, does not harbour nationally recognized populations of these species and is quite common in the region. There are however several Schedule I species, especially Schedule I mammals, that could be impacted through road construction. Species sensitivity is thereby considered medium. As mentioned above threatened vultures are not affected by road construction as they use aerial habitats. Overall impact significance of the construction of approach roads (Refer to **Table 8.44**) is assessed as **negligible** for habitats and **minor** for species.

Additional Mitigation measures

The suggestive mitigation measures for minimization of impacts due to laying roads are;

- Construction activities should be planned and undertaken in a phased manner. It is suggested to proceed with sets of WTG together, instead of opening all the areas;
- Project related activities should be avoided during the night time.
- Damage to the natural topography and landscape should be minimized;
- Strict prohibition should be implemented on trapping, hunting or injuring wildlife within the subcontractors and should bring a penalty clause under contractual agreements;
- A minimum possible number of routes should be authorized for use during construction by the labourers and staff,
- Speed limit of the vehicles plying in these routes should be kept 20-25 km/hr to avoid road kill
- Where natural drainage crossing is envisaged at approach roads, culverts should be provided for crossing of herpetofauna species;

Residual Impact significance

With the implementation of the suggestive measures, the residual impacts will remain negligible for habitats and **minor** for species. While impacts of road

construction can be mitigated, mortality of fauna on roads and habitat alteration caused by road construction (such as consequences of dust deposition and proliferation of invasive species) cannot altogether be ruled out.

Table 8.44 Impact due to construction of approach road

Impact	Construction of Approach roads					
Impact Nature	Negative		Positive		Neutral	
Impact Type	Direct		Indirect		Induced	
Impact Duration	Temporary	Short-term		Long-term	Permanent	
Impact Extent	Local		Regional		International	
Impact Scale	Limited to approach roads and construction areas					
Frequency	Construction phase					
Likelihood	Likely					
Impact Magnitude	Positive	Negligible	Small	Medium	Large	
Resource Sensitivity (Habitat)	Low		Medium		High	
Resource Sensitivity (Species)	Low		Medium		High	
Impact Significance	Negligible		Minor		Moderate	Major
	Significance of impact is considered negligible for habitats and minor for species.					
Residual Impact Magnitude	Positive	Negligible	Small		Medium	Large
Residual Impact Significance	Negligible		Minor		Moderate	Major
	Significance of impact is considered negligible to minor .					

Impacts during Operation Phase

Wind farm operations have direct and indirect impacts on the bird and bat communities. The impact during operation phase of the wind farm is discussed in the sections below.

8.6.4 Avifaunal Mortality due to Collision and Electrocution

Context

1. Mortality due to collision risk

A total of 71 species of birds were identified. 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 such as White rumped vulture (*Gyps bengalensis*); Critically endangered, Egyptian Vulture (*Neophron percnopterus*); Endangered, Imperial Eagle (*Aquila heliaca*); Vulnerable) 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 as indicated in **Figure 8.10**.

Figure 8.10 **Raptors attracted to Carcasses in Core area**



Egyptian vulture feeding on disposed Caracas

Source: Site and surrounding areas survey by ERM during 22nd to 25th August 2015

There are other wind farms operating in the area surrounding the wind farm site. Absence of WTG in the study area for now, might provide refuge to the avifauna and mammals from other areas where other wind farms are currently operating.

Demoiselle Crane (*Anthropoides virgo*), a large migratory species was found in large numbers in the buffer zone. The species flock in large numbers while moving from one waterbody to another posing collision risk with the operating wind farm. Further studies focusing on determining the distribution of Demoiselle Crane within the landscape surrounding the wind farm is recommended so as to project collision risks from spatial and temporal perspective.

2. Bird Mortality due to electrocution

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 bird species also tend to use these wires and poles as their roosting sites and are electrocuted when in contact to two electrical phase wires.

Embedded/ in-built control

At present the embedded are banding the WTGs blade with orange colour, installation of aviation lamps etc.

Significance of Impacts

There is limited embedded control in the project design presently. The magnitude of the impacts of the WTGs and transmission lines through both collision and electrocution are likely to be long term though their impacts are small as they are likely to affect only a small part of the aerial habitat (especially for migratory birds and vultures or other raptors) thereby not affecting overall habitat viability/functionality. As ascertained till now impacts on species is likely to be small as there will be no change in the population of any threatened species as a consequence. The sensitivity of habitats is medium due to the presence of the several Schedule I species and possibly nationally significant concentrations of migratory species and the sensitivity of species high, due to the presence of the critically endangered and endangered White-rumped vulture, Egyptian Vulture, Imperial eagle and possibly other migratory species of conservation significance. The significance of impacts prior to any mitigation methods (see **Table 8.45**) is likely to be **minor** for habitats and **moderate** for species.

Additional Mitigation measures

Following measures are to be undertaken for reduction in bird collision:

- As the bird monitoring study is suggested as the survey was conducted in monsoon season, the survey does not capture impacts on migratory birds. The study area reported to be wintering grounds for many migratory species. A total of 25 migratory species are reported from the study area. The threatened species such as White rumped vulture (*Gyps bengalensis*-IUCN-CR, 2015 Ver. 2) and Egyptian Vulture (*Neophron percnopterus*-IUCN-EN, 2015 Ver. 2) are observed to be present in the area. Hence a short term study during the migratory season is recommended;
- Relocation of Livestock carcass disposal sites away from WTG locations;
- Flash lamps on the WTGs will prevent bird collision at nights;
- Painting blades appears to increase visibility to birds. UV paint does not appear to have any value in collision reduction, and may even increase collisions for some species. Single solid black blade and 2 blank blade configuration appears to be the best for raptors;
- Some experts suggest painting foundations may reduce visual impact and avoid collisions with low-flying resident birds (e.g. sparrows, quails).
- Regular checking of the vacuums or holes in the towers to avoid nesting by any birds; and
- Bird mortality count in the immediate vicinity is proposed to establish correlations between the wind turbines operations and birds mortality for two years starting from the commissioning of the wind farm;
- A procedure is to be introduced in the operating manual where the carcass dumping sites are identified and removal of carcasses near wind farms is ensured in consultation with the local villagers;
- The transmission poles should be raised with suspended insulators in order to reduce the electrocution of bird species; and

- Bird-safe strain poles with insulating chains of at least 60 cm in length should be adopted.

Residual Impact significance

After implementation of mitigation measures, the significance of the residual impacts will be reduced to **minor** for both species and habitats

Table 8.45 *Impact Significance due Bird Collision Risk and Electrocutation*

Impact	Bird Collision Risk and Electrocutation -Operation Phase				
Impact Nature	Negative	Positive		Neutral	
Impact Type	Direct	Indirect		Induced	
	Impact is due to the rotation of the blades, collision risk to birds				
Impact Duration	Temporary	Short-term	Long-term	Permanent	
	Operation phase.				
Impact Extent	Local	Regional		International	
Impact Scale	Limited to Project Boundary (specifically WTG locations, internal roads, laydown areas, parking bays, substation, ROW of transmission line)				
Frequency	Not applicable				
Likelihood	Likely				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource Sensitivity (Habitat)	Low	Medium		High	
Resource Sensitivity (Species)	Low	Medium		High	
Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered minor for Habitat and moderate for species.				
Residual Impact Magnitude	Positive	Negligible	Small	Medium	Large
Residual Impact Significance	Negligible	Minor		Moderate	Major
	Significance of impact is considered minor .				

8.7 KEY SOCIAL RISKS

Criteria

For the assessment of social impacts, the sensitivity and magnitude criteria outlined in **Table.8.46** and **Table.8.47** respectively have been used.

The social impacts associated with the construction, operations and decommissioning stages have been assessed qualitatively and in some cases quantitatively (subject to availability of data), using professional judgement and based on past experience from similar projects.

Table.8.46 *Impact Magnitude for Local Communities*

Extent / Duration / Scale / Frequency

Extent / Duration / Scale / Frequency	
Large	Change dominates over baseline conditions. Affects the majority of the area or population in the area of influence and/or persists over many years. The impact may be experienced over a regional or national area.
Medium	Clearly evident difference from baseline conditions. Tendency is that impact affects a substantial area or number of people and/or is of medium duration. Frequency may be occasional and impact may potentially be regional in scale.
Small	Perceptible difference from baseline conditions. Tendency is that impact is local, rare and affects a small proportion of receptors and is of a short duration.
Negligible	Change remains within the range commonly experienced within the household or community.

Table.8.47 Receptor Sensitivity for Local Communities

Category	
High	Profound or multiple levels of vulnerability that undermine the ability to adapt to changes brought by the Project.
Medium	Some but few areas of vulnerability; but still retaining an ability to at least in part adapt to change brought by the Project.
Low	Minimal vulnerability; consequently with a high ability to adapt to changes brought by the Project and opportunities associated with it.

Context for social impact assessment

Assessment of social impact for project Bhesada is done in the context of following mentioned project scenarios:

- Construction phase of the Project was in advance stage at the time of ERM's site visit as 9 WTGs were already erected and foundation work for 10 WTGs were completed;
- Shared facilities of the project like Pooling Sub-station and 220 kV external transmission line were already in operation stage at the time of ERM's site visit;
- Land for WTGs are entirely on Revenue land and Suzlon has been provided possession of this Revenue land by the district administration;
- Construction of access road and erection of internal transmission line is underway and it is being developed majorly on the Revenue land allotted to Suzlon. However patches of private land on certain locations are required for developing access road. Detail on private land affected was not provided for assessment.
- Suzlon would be responsible for operation & maintenance phase of the project;

Context

24 WTGs of Project Bhaisara is coming up in four villages that includes Naya Loonakalan, Motisar, Khoda and Naya Achla village. Entire 24 WTGs would be located on Revenue allotted. Access road and right of way for internal transmission line is also largely being developed on revenue 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. Shared facilities like Pooling sub-station and external transmission line are already established and under operational stage now. Other facilities like storage yard, batching plant, labour colony, construction site office etc. are all located on the revenue land allotted for the project.

As reported during consultation with local community and land team of Suzlon that encroachment over 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. Use of government land as grazing field is also quite a common practice of the locals.

Land department of Suzlon is responsible for land procurement for entire project land requirement. They are directly dealing with individual land owners and encroachers to negotiate on the land acquired by the project and the losses incurred by the villagers on acquired land like loss of standing crops or any other assets on the land.

Embedded/ In Built Control

Rights of using government land as grazing field has also been ensured in government land allotment process. Allotment of 704.984 ha Revenue 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.

As reported, Suzlon has a practice of paying INR 50000 (fifty thousand) per WTG to the Village Development Committee (VDC) of each the village where WTGs are being established. This one time negotiated amount is primarily intended to offset the loss of cultivation over government land. Further Suzlon is also reportedly paying INR 20000 (twenty thousand) for each kilometre of access road developed on revenue land. These measures are in addition to the compensation paid against purchase of any private land through negotiated settlement with affected land owners. Detail on monetised amount paid by Suzlon for various categories of losses was not shared with ERM for review and assessment.

Significance of Impact

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

Additional Mitigation Measures

In addition to the embedded measures, the following risk mitigation measures are suggested to minimize the risks land procurement and align the process of the compensation with the applicable international standards like IFC Performance standard 5.

- The compensation paid for loss of the private land should commensurate with full replacement value of the acquired land. Replacement value could be determined as current market rate of the acquired land plus transaction cost involved in buying same quantum of land in surrounding areas;
- Project should record compensation detail that must include number of affected persons and losses category that are identified/being identified and compensated by the project;
- Identify vulnerable family among the project affected families and give them priority for any income generation opportunities generated in project cycle. Vulnerable family could be defined as person becoming landless or marginal farmer in post land acquisition phase, women headed households, families who were completely dependent upon revenue land for their sustenance etc.

Residual Impact significance

Table.8.48 Impact significance due to Land procurement

Impact	Land procurement impact				
Impact Nature	Negative	Positive		Neutral	
Impact Type	Direct	Indirect		Induced	
Impact Duration	Temporary	Short-term	Long-term	Permanent	
Impact Extent	Local		Regional	International	
Impact Scale	Impact of land procurement is limited to the selected families of the few villages where project is coming up				
Frequency	Project life cycle				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
Resource/Receptor Sensitivity	Low	Medium		High	
Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of impact is considered to be Moderate				
Residual Impact Magnitude	Positive	Negligible	Small	Medium	Large
Residual Impact Significance	Negligible	Minor	Moderate	Major	
	Significance of Residual Impacts is considered Minor				

Context

The projects will require 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.

Sizable numbers of existing Suzlon staff at wind farm site were observed to be from Rajasthan and they are accommodated in Jaisalmer district. Labour camp for the migrant workers were established close by the batching plant location. 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. However there is lack of formal grievance redressal mechanism at site. Discussion with Suzlon site officials didn't indicate any sign of having any site level system of labour compliance monitoring at place.

Embedded/In Built Control

The contract agreement between Mytrah Energy India Limited and Suzlon is expected to have a clause around labour compliance, prohibition of child labour & forced labour etc. this contract agreement was not provided for review to ERM. Further Suzlon, being an internally reputed company is also expected to have its own HR policy and aligned with regulations of the country where it operate. However same was not provided to ERM for review.

Significance of Impact

Based on the above the impact after implementing the embedded controls is assessed to be **Moderate**.

Additional Mitigation Measures

The following mitigation measures are suggested in order to ensure compliance with labour laws/provisions as per the industry best practices:

- MEIL should expect Suzlon to establish a grievance redressal mechanism in place, to allow for the employees and workers to report any concern or grievance related to work activities
- There should be adequate arrangement of toilet facility at construction site for construction workers and other staff deployed at site;
- MEIL should Suzlon to establish a monthly monitoring and regular auditing mechanism for monitoring their sub-contractors and suppliers with respect to compliance to the applicable reference framework, in terms

of resources, migrant workers, child labour and forced labour, health and safety, payment of wages, labour welfare measures etc.

Residual Impact significance

The assessment of the residual impacts on labour rights and welfare are given below.

Table 8.49 Impact Significance on Labour Rights and Welfare

Impact	Labour Rights and Welfare						
Impact Nature	Negative	Positive		Neutral			
Impact Type	Direct	Indirect		Induced			
Impact Duration	Temporary	Short-term	Long-term		Permanent		
Impact Extent	Local		Regional	International			
Impact Scale	The project is reportedly employing local workers on a contractual basis wherever feasible, petty contract opportunities like hiring of vehicles are also being extended to the locals.						
Frequency	Project life cycle						
Impact Magnitude	Positive	Negligible	Small		Medium	Large	
Resource/Receptor Sensitivity	Low		Medium		High		
Impact Significance	Negligible	Minor		Moderate		Major	
	Significance of impact is considered to be Moderate						
Residual Impact Magnitude	Positive	Negligible		Small		Medium	Large
Residual Impact Significance	Negligible	Minor		Moderate		Major	
	Significance of Residual Impacts is considered Minor						

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

8.7.3 Impacts on Economic Opportunities

Context and source

The receptors for impacts on economic opportunities include the local community within the AoI. The construction phase activities of the project including construction of access road, civil works, foundation activities, site clearance and security 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.

Embedded/ In Built Control

The local community is preferred by the project for the requirement of semi-skilled and unskilled workers to the extent possible. Migrant workers are hired, as observed during the site visit, for skilled jobs like steel related jobs.

Significance of Impact

The impact is assessed to be **positive**.

Additional enhancement Measures

The project is recommended to have the following additional enhancement measures in place:

- The sourcing of local labour wherever possible should be made obligatory for the sub-contractors and in all major procurement activities
- Preference should be given to the vulnerable population in the AoI
- The project proponent will establish a mechanism to audit subcontractors and suppliers with respect to compliance of utilizing local labour and resources.

The assessment of impacts on economic opportunities is given below.

Table.8.50 **Impact Significance on Economic Opportunities**

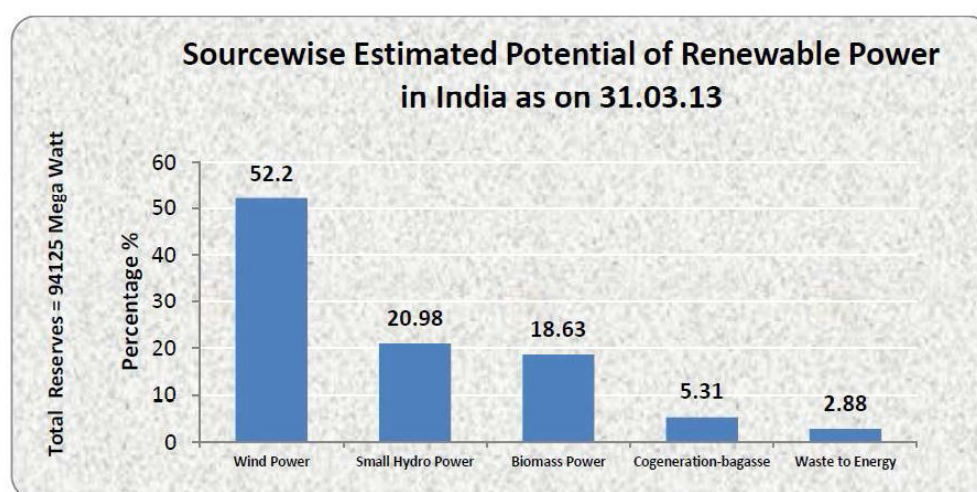
Impact	Economic Opportunity					
Impact Nature	Negative	Positive		Neutral		
Impact Type	Direct	Indirect		Induced		
Impact Duration	Temporary	Short-term	Long-term		Permanent	
Impact Extent	Local		Regional	International		
Impact Scale	Limited to Project Footprint area, Fatehgarh tehsil, Pokran Tehsil and Jaislamer District					
Frequency	Construction and Operation Phase of the Project					
Likelihood	Likely					
Impact Magnitude	Positive	Negligible	Small		Medium	Large
Resource/Receptor Sensitivity	Low		Medium		High	
Impact Significance	Negligible	Minor		Moderate		Major
	Significance of impact is considered to be Positive					

9.1

THE POWER SCENARIO IN INDIA

India has witnessed unprecedented economic growth over the last decade with real GDP growth of approximately 8.7% in the last five years (7.5% over the last ten years), positioning it amongst the global 'big five' (*Energy Statistics by Central Statistics Office, 2014*). As a consequence of high GDP and the urgency to sustain positive growth, there is surge in energy demand and the need to prospect for new energy reserves and harvest the same. Predictions by the Planning Commission via the Twelfth Five Year Plan document indicate that a total of 669.6 million tonnes of oil equivalent (MTOE) will be reached by 2016-17 and 844 MTOE by 2021-22. This will meet around 71 per cent and 69 per cent of expected energy consumption, with the balance to be met from imports, projected to be about 267.8 MTOE by 2016 - 17 and 375.6 MTOE by 2021 - 22. Coal and natural gas (and their imports) will continue to fuel India's growth with a growing need to harvest energy from renewable sources in environmentally responsible and sustainable manner. India generated about 855 BU of electricity in 2012. As of 2012, India had an installed renewable energy capacity about 24.9 GW. During the Eleventh Five Year Plan, nearly 55,000 MW of new generation capacity was created, yet there continued to be an overall energy deficit of 8.7 per cent and peak shortage of 9.0 per cent. Therefore, resources currently allocated to energy supply are not sufficient for narrowing the gap between energy needs and energy availability.

Figure 9.1 Plan wise Growth of Installed Generating Capacity in India



Source: Energy Statistics, 2014

As of 2014, the total potential for renewable power generation in the country as on 31st March, 2013 is estimated at 94125 MW (refer **Figure 9.1**). This includes wind power potential of 49130 MW (52.2%), SHP (small-hydro power) potential of 19750 MW (20.98%), Biomass power potential of 17,538

MW (18.63%) and 5000 MW (5.31%) from bagasse-based cogeneration in sugar mills.

9.2 ALTERNATIVE SITE LOCATION

Wind energy projects are non-polluting energy generation projects which are site specific and dependent on the availability of wind resource. As per Wind resource mapping and power potential assessment project the option of choosing an alternative area is limited.

9.2.1 Alternate Location for WTGs and Associated Facilities

Within the potential area, there is a possibility as well as flexibility of moving the individual WTG locations (micrositing) to avoid any potential issue like:

- near proximity to third party high voltage transmission lines
- near proximity to another WTG of some other party

In case of any other WTG planned in the same line, the wind resource team redoes the micrositing for even one WTG falling in between the close proximity. As for associated facilities such as transmission lines, access pathways, pooling substation, yards, stores the land department undertakes identification of alternate sites in consultation and joint field visits held with Power Evacuation team, Projects team which are the concerned internal stakeholders. This process has enabled MEIL to choose the best possible alternative to locate the WTGs and other project associated facilities.

The proposed wind power wind farm site has the following location advantages:

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

9.3 ALTERNATE TECHNOLOGY

The wind turbine manufacturer for this Project is Suzlon Energy. Suzlon was established in 1995 is a multinational organization delivering technologically advanced and profitable wind energy solutions for all types of wind regimes, environmental conditions and terrains, both on-shore and off-shore and has installed more than 25 GW across 6 continents. Suzlon designed S9x: 2.1 MW platform of wind turbines to generate higher energy at moderate to low wind speeds. The S97 features a large rotor swept area of 7386 sq.m. with aerodynamically efficient 47.5 m. rotor blades, and the addition of Doubly Fed Induction Generator (DFIG) technology for improved grid compatibility. It also offers a choice of tower heights: 90 meter tubular tower or the unique 120

meter hybrid tower. The WTG used for the proposed Project, S97, is the world's first and tallest lattice – tubular hybrid tower.

Other specifications of the S97 are:

- Innovative 120 m hybrid tower with lattice structure at the base & tubular upper section;
- Increased hub height raises energy output and innovative hybrid design reduces overall weight;
- Large 24 sq. m base enhances stability & strength of the turbine structure;
- Provision of lift and placement of the control panel at the intermediate platform improves operational safety and security;
- Tower conforms to GL 2003 design guidelines.

9.4

ALTERNATE METHODS OF POWER GENERATION

Harnessing wind energy is an eco-friendly process, inexhaustible and possesses a minimal environmental footprint. There are no fuel requirements or large quantities of water for operation of the plant. Wind energy scores over other forms of energy generation as it has a low gestation time: a short lead time is needed to design, install, and start-up (up to a maximum of 2 months after micro-siting, approvals and land purchase) a wind farm. **Table 9.1** elaborates upon the advantages and disadvantages of various power generation systems.

Table 9.1 *Environmental advantages and disadvantages of various power generation systems*

Mode	Disadvantage	Advantage
Thermal Power Plant	<ul style="list-style-type: none"> • High fossil fuel consumption. • Large quantities of water requirement for cooling • High volume of emissions from operation • Accumulation of fly ash (in case of coal powered installations) • Upstream impact from mining and oil exploration • GHG emission estimated as 228gCeq/kWh 	<ul style="list-style-type: none"> • Large scale production potential • Moderate gestation period • Relatively inexpensive • Wider distribution potential
Hydropower Plant	<ul style="list-style-type: none"> • Site specific, dependent on reservoir/river etc. • Downstream impact on flow • Long gestation period • Acute and chronic social and ecological impacts 	<ul style="list-style-type: none"> • GHG emission estimated as low as 1.1gCeq/kWh for run of river projects
Nuclear Power	<ul style="list-style-type: none"> • Availability of fuel source • Hazards associated with radioactive material • High cost of project • Long gestation period • Risk of fallout and meltdown 	<ul style="list-style-type: none"> • Cheaper power generation • GHG emissions as low as 2.5gCeq/kWh

Mode	Disadvantage	Advantage
	scenarios and its impacts on the local populace and environment.	
Wind Power	<ul style="list-style-type: none"> Land requirement of about 2.0 to 2.5 acres per MW Site specific (associated to wind pattern) Expensive installation 	<ul style="list-style-type: none"> Pollution levels are insignificant Inexpensive power generation Inexhaustible source GHG emissions as low as 2.5gCeq/kWh for the Production Chain
Solar Power	<ul style="list-style-type: none"> Large land requirement Site specific to solar insolation Expensive installation Concrete foundation on larger area 	<ul style="list-style-type: none"> Pollution levels are insignificant Inexpensive power generation Inexhaustible source GHG emissions as low as 8.2gCeq/kWh for the Production Chain

Source: International Atomic Energy Agency (IAEA)

9.4.1 Greenhouse Gases (GHG) Emission

As per the estimations of International Atomic Energy Agency (IAEA) the grams of carbon-equivalent (including CO₂, CH₄, N₂O, etc.) per kilowatt-hour of electricity (gCeq/kWh) for wind energy project are low and scores better when compared with other forms of conventional and non-conventional sources of energy. **Table 9.2** highlights the advantages and disadvantages along with GHG emissions that each technology possesses.

Considering various factors such as wind resource potential in the project districts; favourable environmental and social settings; low GHG emissions in the project life cycle; land availability, governmental assistance, and local community's acceptance of wind energy projects over the last decade in the region, wind energy based power generation is the most appropriate alternative.

Table 9.2 Green House Emissions from Different Electricity Production Chains

Technology	Mean tonnes (CO ₂ e/GWh)	Low tonnes (CO ₂ e/GWh)	High tonnes (CO ₂ e/GWh)
Lignite	1054	790	1372
Coal	888	756	1310
Oil	733	547	935
Natural Gas	499	362	891
Solar PV	85	13	731
Biomass	45	10	101
Nuclear	29	2	130
Hydroelectric	26	2	237
Wind	26	6	124

Source: World Nuclear Association (WNA)

9.4.2 Water Consumption

The water requirements for producing the different primary energy carriers vary; also, there are significant differences between the different types of electricity generation. Several evaluation methods are being employed to

assess the footprint of electricity generation through various ways. The methods are often referred to those by the developed regions to compare energy and water uses; where certain measurements and statistics are a common and accepted practice.

Solar and wind power projects have been known to use almost insignificant water, in comparison to nuclear and coal based power projects. Wind farms require small amounts of water are used to clean wind turbine rotor blades in arid climates (where rainfall does not keep the blades clean).

According to the American Wind Energy Association (AWEA), wind therefore uses less than 1/600 as much water per unit of electricity produced as does nuclear, and approximately 1/500 as much as coal. As per AWEA, water consumption (technology gallons/MWh) is as follows: Nuclear – 620; Coal – 490; Oil – 430; Wind – 1; Solar – 30.

9.4.3 **Carbon Offsetting**

Hydro, solar and wind energy projects help in offsetting CO₂ emissions from conventional power generation. According to National Renewable Energy Laboratory, 1 MW of wind energy results in 2600 tons of CO₂ offsetting. In case of MEIL, 50.4 MW can offset approximately 131000 tons CO₂.

9.4.4 **No-Go Alternative**

Per the Load Generation Balance Report, 2014-2015 of CEA, there was a power deficit of 20,864 MW (6.3%) in the Northern region ⁽¹⁾ during the year 2014-2015. For 2013-14 it faced a shortage of 18,583 MW (6.0%) and for 2015-16, the Northern Region is again forecasted to suffer a shortage of 0.4%.

As per the same report, Rajasthan faced a shortage of 0.3% in actual power demand in the year 2013-14 and 0% in 2014-15. Further, the state is forecasted to have an excess of power in 2015-16 as shown in **Table 9.3**.

Table 9.3 Actual Power Supply Position in Rajasthan during 2014-2015 and Anticipated Power Supply Position in 2015-2016

Details	2014-15		2015-16	
	Energy (MU)	Peak (MW)	Energy (MU)	Peak (MW)
Requirement	65,717	10,642	72,132	11,000
Availability	65,310	10,642	74,470	11,128
Surplus (+/-) Deficit	-407	0	2,338	128
Surplus (+/-) Deficit %	-0.6%	0	3.2	1.2

Source: Load Generation Balance Report (2015-2015), CEA

It is evident from the discussion and **Table 9.3** that while Rajasthan is moving towards self-sufficiency in power generation, the Northern region is likely to remain in power deficit. Under these circumstances the state of Rajasthan,

(1) Northern region consists of State grids of Delhi, Rajasthan, Haryana, Himachal Pradesh, Jammu & Kashmir, Punjab, Uttarakhand and Uttar Pradesh.

apart from satisfying own power needs, can also turn into an exporter of electricity, thereby increasing state revenue.

As the wind farm is a part of the proposed power supply in 2015-16, in the scenario of no wind farm project, the State Government will not be able to promise self-sufficiency in electricity supply, let alone selling electricity to Northern region.

9.5

CONCLUSION

Further to the above mentioned reasons, it would be significant to conclude that:

- The Project will be environment friendly with minimal greenhouse gas emissions;
- It is the most feasible and choice of power generation in the state; and
- It will contribute towards the state of Rajasthan attaining self-sufficiency in power supply and generating a revenue stream through sale of excess electricity to power-deficient states in the Northern region.

The Community engagement and Grievance redressal management are important components of any project implementation. Over the duration of a project lifecycle, there can be numerous instances of conflicts, allegations and dissatisfaction arising from the project activities or because of the human capital involved in the project. Some of the common areas of grievance include timely payment of wages and compensation, job security, failure to fulfil commitments, poor management of construction activities leading to disturbances to private property or accidents due to inappropriate planning of vehicle movement.

In order to manage these risks, MEIL needs an internal mechanism to allow prior to approaching the formal legal mode of solutions. Presently, MEIL does not have a formal grievance redressal mechanism in place for external stakeholders. Since the project is part of a larger project being developed by Suzlon, the Suzlon O&M team will be required to be a part of the Grievance redressal mechanism put in place.

The site visit has established that presently, Suzlon has a dedicated Land and Liaising team, whose members deal with the local community and have developed a rapport with them. In addition, the discussion with the Suzlon's site CSR Manager brought to light that Suzlon CSR orchestrates developmental activities in the villages, viz. Skill Training for youth, Vocational courses for women, providing Veterinary services and organising Health camps in the villages through various implementation partner agencies like IL&FS, Hindustan Latex Family Planning Promotion Trust (HLFPPT) and a NGO called GRAVIS

Suzlon, through MEIL, has shared a CSR-Grievance Mechanism, which broadly covers the company's CSR mission and timelines of different events/reviews. As per the stakeholder consultations and Suzlon's CSR – Grievance mechanism made available to ERM, it is understood that presently the local community is communicating any concern/grievance to the project through meetings with project representatives, which are termed as "360 degree participatory review of project strategy" by Suzlon. The grievances shared are reportedly noted and addressed by Suzlon representatives. For the remaining project lifecycle, a formal grievance redressal mechanism has been put in place for the project.

10.1**OBJECTIVES OF THE GRIEVANCE REDRESSAL MECHANISM**

The primary objective of the mechanism shall be to provide an accessible mechanism to the stakeholders of the project and resolve any social and environmental related grievances. For this purpose, a Grievance Redressal

Cell (GRC) shall be established, to resolve non-judicial disputes arising out of various matters related to the implementation of the ESMP, as well as other aspects of the project, as deemed fit to be raised before the GRC.

10.2 COMPOSITION OF THE GRC

The GRC will be driven internally by the Suzlon and MEIL Project teams and shall have representation from the following teams to ensure fair and timely solution to the grievances:

- MEIL Project Manager
- 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.

10.3 FUNCTIONING OF THE GRC FOR GRIEVANCE REDRESSAL

The GRC meetings will be held on a regular basis (atleast monthly) at the Project's site office. The key responsibilities of the GRC shall be as follows:

- Receive, review, consider and resolve grievances related to the social and environmental aspects of the project;
- Entertain grievances of indirectly affected persons and/or persons affected during project implementation;
- Resolve grievances within a maximum period of two weeks at the GRC level and communication of the resolution to the aggrieved party;
- The GRC shall not engage in any review of the legal standing of an "awardee" nor shall deal with any matters pending in the court of law;
- Arrive at decisions through consensus, failing which resolution will be based on majority vote. Any decision made by the GRC must be within the purview of Environmental Management Plan, Corporate EHS and Social Policies or any such documents of relevance of that matter;

- In case the grievance relates to environmental monitoring results or engineering matters, the GRC will validate the information available to it, as provided by the Suzlon's Project management team/ environmental monitoring team. However, GRC will not be in a position to question the validity of the data provided to it.
- If needed, may undertake field visits to verify and review the issues, disputes or other relevant matters

10.4

PROCESS OF RECEIVING AND ADDRESSING GRIEVANCES

The mechanism for grievance redressal will allow for grievances/ complaints to be received in written or verbal form. For this purpose, complaint registers will be maintained at the security gates of the wind farm site office. Complaint drop boxes will also be established in the community, in consultation with the local stakeholders. In addition to this, the stakeholders will also have access to the GRC contact details and will be able to record their grievances in a verbal manner.

The GRC will open the drop boxes and register the applications on a weekly basis. On receipt of any complaint, the GRC shall give an acknowledgment to the complainant with date, time and venue of hearing his/her grievance. The GRC shall prepare a brief note on the grievance for discussion on scheduled date. On the given date, the GRC shall hear the complainant and give its decision. A written copy of decision shall be provided to the complainant. If the complainant is satisfied with the decision, an acknowledgement of same shall be obtained from him on the decision copy and the case shall be closed.

While every effort shall be made to resolve the complaint amicably, if the complainant is not satisfied with the outcome of GRC's decision, he or she can opt for any grievance redress forum available at the administrative level or any other arbitration mechanism with mutual agreement. If these alternative mechanisms of resolution of conflict fail, then the aggrieved person may take legal recourse. However, every effort shall be made to resolve the case amicably without resorting to legal course of action. While the process continues, a proper documentation of the records shall be maintained by the project company, pertaining to each of the grievance in a proper grievance register or record.

This section presents the Environmental and Social Management Plan (ESMP) for proposed wind farm of MEIL. The purpose of this ESMP is to specify the standards and controls required to manage and monitor environmental and social impacts during construction and operation phase. To achieve this, the ESMP identifies potential adverse impacts from the planned activities and outlines mitigation measures required to reduce the likely negative effects on the physical, natural and social environment. This is in accordance to IFC Performance Standards 1 which emphasizes the importance of managing social and environmental performance through the lifecycle of the Project.

11.1 THE COMPANY'S ORGANIZATIONAL STRUCTURE

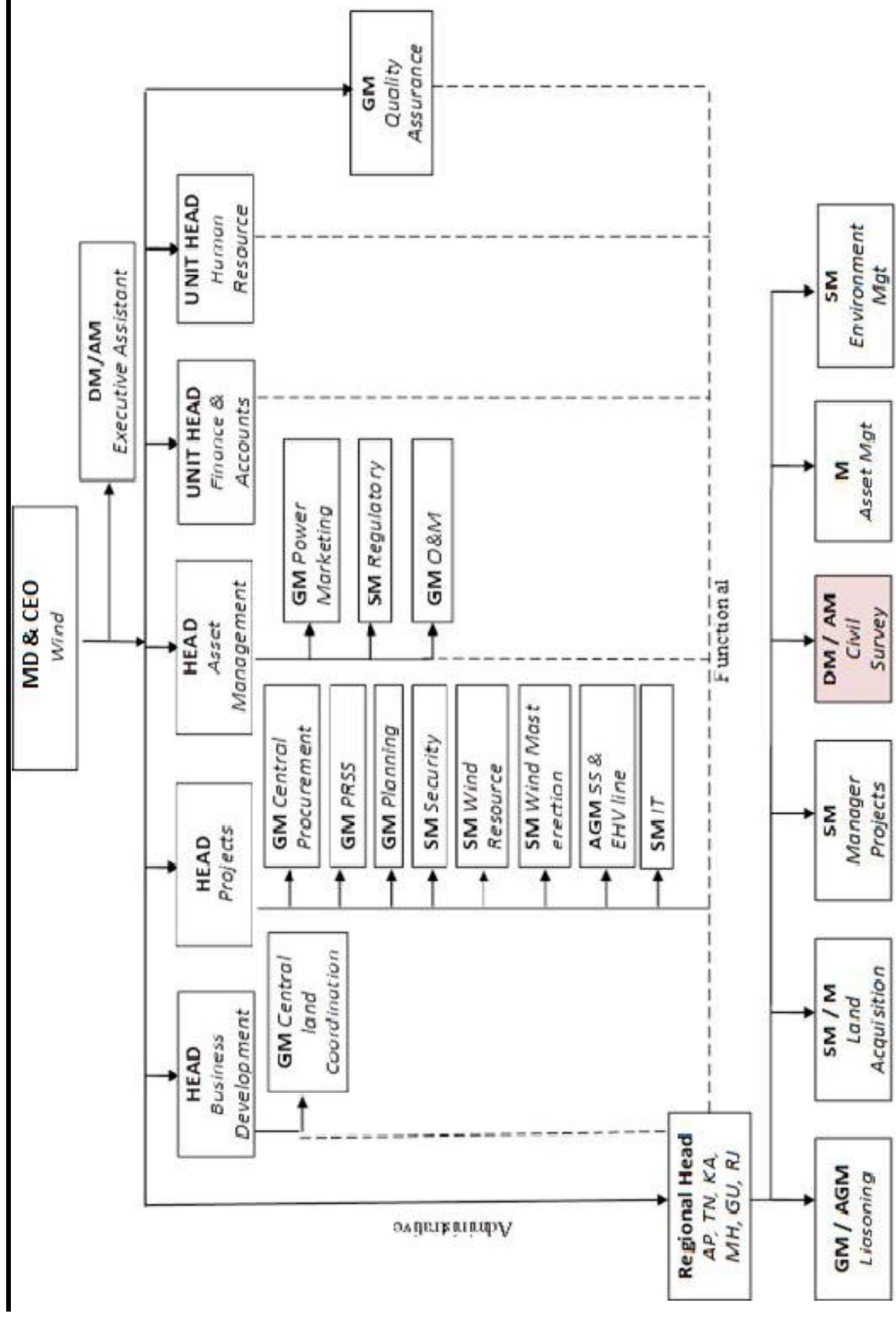
To ensure the efficacy of Environmental and social management plan, certain institutional mechanism with well-defined roles and responsibilities is essential for effective implementation of identified mitigation measures both during construction and operation phases.

The organizational structure for environmental management at proposed wind farm is defined below and is subject to change depending on staffing allowance and budgets and will be reviewed on an annual basis to ensure that effective environmental management is accomplished.

11.1.1 SUZLON Management

SUZLON has put an organisational structure in place with roles and responsibility for each of the verticals identified at the Bhesada site. The following **Figure 11.1** provides a schematic representation of the organizational structure of Suzlon at site. The site organization structure can be referred from **Figure 2.7**.

Figure 11.1



11.1.2

Roles and responsibilities of EHS Department

Suzlon's Project Management is a line function, requiring the active participation of all levels of management and supervision. The line management will be given professional support by the site HSE team. It is the overall responsibility of Suzlon's Project Management team to commit and ensure that safety is appropriately addressed and complied with in the project. Employees at all levels are affected and governed by the HSE Plan and shall therefore accept responsibility for acting in a responsible manner. Individual HSE roles and responsibilities, along with task and target shall be distributed to the individuals for action, as described below:

Site Project Head:

- Overall responsible for safe operations & protection of environment.
- Supplement Site HSE inspections & relevant HSE Induction training at jobsites in co- ordination with HSE
- Investigate all accidents & recommend preventive actions at sites
- Monitor all HSE activities & co-ordinate with Clients, Site In charges, Regional Heads and HSE Engineers
- Organize campaigns, competitions & other special emphasis programs to promote HSE at workplace

HSE Engineer / Officer

- Provide necessary advice, information and support in the effective implementation of the HSE Management System requirements and this HSE plan
- Monitor HSE legal requirement & assist site team for compliance.
- Updating the HSE Plan to the requirements of the activities being carried out when there is a revision
- Plan and conduct Internal HSE training programs, initiate drive to promote HSE awareness and performance.
- Ensures WP system is followed as per Suzlon HSE system.
- Carry out HSE inspection of Work Area, Work Method, etc. as per the OHSAS requirement.

11.2

INSPECTION, MONITORING AND AUDIT

Inspection and monitoring of the environmental and social impacts of the Project activities will increase the effectiveness of ESMP. Through the process of inspection and auditing, MEIL and Suzlon's Project Management team will ensure that the conditions stipulated in various permits are complied. The inspection and audits will be done by the project identified EHS staff and any other external agencies identified. The entire process of inspections and audits should be documented. The inspection and audit findings are to be implemented by the site In-charge in their respective areas.

11.3

REPORTING AND DOCUMENTATION

Suzlon's Project Management team will develop and implement a programme of regular reporting through the stages of the project lifecycle. The personnel delegated EHS roles shall be required to fully comply with the monitoring programme in terms of timely submissions of reports as per acceptable level of detail. Reporting will be done in form of environmental check list, incident record register, training records, and environmental and social performance reports (weekly, monthly, quarterly, half yearly, yearly etc.).

11.3.1

External Reporting and Communication

The personnel delegated for EHS roles shall be responsible for ensuring that the communication with the regulatory agencies and stakeholders is maintained as per the requirement. All complaints and enquiries are to be appropriately dealt with and records be maintained as discussed in **Section 10**. All communication made to the regulatory agencies shall also be reported to MEIL's corporate EHS head.

11.3.2

Internal Reporting and Communication

Internally, the personnel delegated for EHS roles will share inspection and audit findings with their suggested measures regularly to the senior management of Suzlon and MEIL for their consideration. The same are also to be communicated within the staff working on the project. To maintain an open communication between the staff and management on EHS and social issues the followings are being used:

- Team Briefings;
- On-site work group meetings;
- Work Specific Instructions;

11.3.3

Documentation

Documentation is an important step in the implementation of the ESMP. Suzlon's Project Management team will establish a documentation and record keeping system in keeping with their ESMS, to ensure recording and updating of documents as discussed in the ESMP. Responsibilities have to be assigned to relevant personnel for ensuring that the ESMP documentation system is maintained and that document control is ensured through access by and distribution to, identified personnel in form of the following:

- Master Environment Management System document;
- Legal Register;
- Operation control procedures;
- Work instructions;
- Incident reports;
- Emergency preparedness and response procedures;
- Training records;
- Monitoring reports;

- Auditing reports; and
- Complaints register and issues attended/closed.

11.3.4 ESMP Review and Amendments

The ESMP acts as an environment and social management tool which needs to be periodically reviewed to address changes in the organization, process or regulatory requirements.

Following a review, Site in charge in coordination with personnel delegated EHS will be responsible for making the amendments in the ESMP and seeking approval from the Regional and Corporate heads. The amended ESMP will be communicated to all the staff on the project.

11.4 TRAINING PROGRAMME AND CAPACITY BUILDING

Training is needed for effective implementation of ESMP. The training programme will ensure that all concerned members of the team understand the following aspects:

- Purpose of management plan for the project activities;
- Requirements of the management plan and specific Action Plans;
- Understanding of the sensitive environmental and social features within and surrounding the project areas; and
- Aware of the potential risks from the Project activities.

The corporate EHS head of MEIL and Suzlon through designated personnel will ensure that Environmental health and safety induction training and job specific trainings are identified and given to the concerned personnel for construction activities and during operations of the wind farm.

Also general environmental awareness will be increased among the project's team to encourage the implementation of environmentally sound practices and compliance requirements of the project activities. This will help in minimising adverse environmental impacts, compliance with the applicable regulations and standards, and achieving performance beyond compliance. The same level of awareness and commitment will be imparted to the contractors and sub-contractors prior to the commencement of the project.

11.5 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

This section outlines the potential adverse impacts, mitigation measures, monitoring and management responsibilities during construction and operation phases of the Project.

The purpose of ESMP is to:

- List all suggested mitigation measures and control technologies, safeguards identified through the ESIA process;
- Provide an institutional mechanism with well-defined roles and responsibilities for ensuring that measures identified in ESIA designed to mitigate potentially adverse impacts, are implemented;
- Provide Project monitoring program for effective implementation of the mitigation measures and ascertain efficacy of the environmental management and risk control systems in place; and
- Assist in ensuring compliance with all relevant legislations at local, state and national level for the Project.

In order to minimize adverse impacts during different phases of project lifecycle, mitigation measures, monitoring plan and responsibilities for its implementation are given in **Table 11.1** and

Table 11.2 below:

Please note the ESMP has mainly focussed on impacts with minor and moderate impacts, for the impacts with negligible significance mitigation measures have already been captured under impacts section and minimal monitoring should be sufficient.

Table 11.1 *Environmental and Social Management Plan for Project Bhesada – Construction phase*

S. N.	Environment/Social Parameters/Project Activities	Impacts/Issue	Mitigation Measures	Responsibility for ensuring implementation of the suggested mitigation	Means of Verification that mitigation has been met	Timelines /frequency of Monitoring	Responsibility for implementation of monitoring	Supervision responsibility	Reporting Requirements
1.1	Land Use								
1.1.1	Change in Land use- Land disturbance to be restricted to the footprint	Change in land use	<ul style="list-style-type: none"> Construction activities should be restricted to designated area. Waste should not be allowed to litter in and around the project area The land use in and around the permanent project facilities will not be disturbed. 	EPC Contractor - Suzlon	Site inspection	Weekly	EHS - Suzlon	EHS - MEIL	Internal Verification Report to EHS Manager
1.1.2	Restoration of disturbed area to original form to the extent possible after completion of construction work	Change in land use	<ul style="list-style-type: none"> On completion of construction activities, land used for temporary facilities will be restored to the extent possible 	EPC Contractor - Suzlon	Visual Assessment	Monthly	EHS - Suzlon	EHS - MEIL	Monthly Progress Report
1.2	Land and Soil								
1.2.1	Improper management of solid wastes	Soil contamination	<ul style="list-style-type: none"> Municipal domestic waste generated at site to be segregated onsite The construction contractors will ensure daily collection and weekly disposal of construction waste generated debris, concrete, metal cuttings wastes, waste/used oil etc.; 	EPC Contractor - Suzlon	Site Inspection; Record Keeping; Visual Assessment	Monthly	EHS - Suzlon	EHS - MEIL	Monthly Progress Report

S. N.	Environment/Social Parameters/Project Activities	Impacts/Issue	Mitigation Measures	Responsibility for ensuring implementation of the suggested mitigation	Means of Verification that mitigation has been met	Timelines /frequency of Monitoring	Responsibility for implementation of monitoring	Supervision responsibility	Reporting Requirements
			<ul style="list-style-type: none"> The municipal waste from the labour camp will be routed through proper collection and handover to local municipal body for further disposal 						
1.2.2	Improper management of hazardous waste	Soil Contamination	<ul style="list-style-type: none"> Hazardous waste will be properly labelled, stored onsite at a location provided with impervious surface, shed and secondary containment system as per in accordance to Hazardous Wastes Rules, 2008 Ensure routinely disposal of hazardous waste through approved vendors and records are properly documented; Disposal of hazardous wastes will be done strictly as per the conditions of authorisation granted by RSPCB; The hazardous wastes will be disposed of through approved vendors in accordance to Hazardous Wastes Rules, 2008. 	EPC Contractor - Suzlon	Site Inspection; Record Keeping; Visual Assessment	Monthly	EHS - Suzlon	EHS - MEIL	Monthly Progress Report
1.2.3	Impacts due to leaks and spills	Soil Contamination	<ul style="list-style-type: none"> Spill control kits will be used to contain and clean small spills and leaks Ensure oil/ lubricants are stored on impervious floor in the storage area having 	EPC Contractor - Suzlon	Site Inspection; Record Keeping; Visual Assessment	Monthly	EHS - Suzlon	EHS - MEIL	Monthly Progress Report

S. N.	Environment/Social Parameters/Project Activities	Impacts/Issue	Mitigation Measures	Responsibility for ensuring implementation of the suggested mitigation	Means of Verification that mitigation has been met	Timelines /frequency of Monitoring	Responsibility for implementation of monitoring	Supervision responsibility	Reporting Requirements
			secondary containment <ul style="list-style-type: none"> The sewage generated onsite will be treated and disposed through septic tanks and soak pits as per specifications given in IS 2470: 1995 (Part I and II). Transport vehicles and equipment shall undergo regular maintenance to avoid any oil leakages Unloading and loading protocols should be prepared for diesel, oil and used oil respectively and workers trained to prevent/contain spills and leaks. 						
1.2.4	Decommissioning activity	Soil contamination	<ul style="list-style-type: none"> The vehicular movement during decommissioning activities should be restricted to the designated route path; The demolition/ dismantling waste should not be left over in the project area and to be collected and stored at designated area only for further segregation and disposal. 	EPC Contractor - Suzlon	Site Inspection; Record Keeping; Visual Assessment	Monthly	EHS - Suzlon	EHS - MEIL	Monthly Progress Report
1.3	Water Resource and Quality								
1.3.1	Water Conservation Contamination due	Loss of water Resource	<ul style="list-style-type: none"> Construction Labour deputed onsite to be sensitized about water conservation and 	Suzlon	Site Inspection; Training	Monthly	EHS - Suzlon	EHS - MEIL	Monthly Progress Report

S. N.	Environment/Social Parameters/Project Activities	Impacts/Issue	Mitigation Measures	Responsibility for ensuring implementation of the suggested mitigation	Means of Verification that mitigation has been met	Timelines /frequency of Monitoring	Responsibility for implementation of monitoring	Supervision responsibility	Reporting Requirements
	to unmanaged release of sanitary waste water.	Site and Ground water Contamination	<p>encouraged for optimal use of water</p> <ul style="list-style-type: none"> The provisions of septic tank and soak pits will be provided (as per specifications given in IS 2470 1995 Part I and Part II) onsite for treatment and disposal of sewage, thereby minimizing the impacts of wastewater discharge. Planning of toilets, soak pits and septic tanks, waste collection areas should be away from natural drainage channels; Ensure proper cover and stacking of loose construction material at Batching plant site and WTG's site to prevent surface runoff and contamination of receiving water body; Use of licensed contractors for management and disposal of waste and sludge; Labourers will be given training towards proactive use of designated areas/bins for waste disposal and encouraged for use of toilets. Open defecation and 		records; Visual Assessment				

S. N.	Environment/Social Parameters/Project Activities	Impacts/Issue	Mitigation Measures	Responsibility for ensuring implementation of the suggested mitigation	Means of Verification that mitigation has been met	Timelines /frequency of Monitoring	Responsibility for implementation of monitoring	Supervision responsibility	Reporting Requirements
			<ul style="list-style-type: none"> random disposal of sewage will be strictly restricted Regular inspection for identification of water leakages and preventing wastage of water from water supply tankers. For construction uses, the low quality water will be blended with fresh water Recycle and reuse of water to the extent possible. 						
1.4	Impact on Air Quality								
1.4.1	Dust emissions from construction activities	Impact on Air quality	<ul style="list-style-type: none"> Preventive measures such as storage of construction material in sheds, covering of construction materials during transportation will be undertaken, for reducing dust as part of the embedded controls. Emissions from the emergency DG set and other stationary machines will be controlled by ensuring that the engines are always properly tuned and maintained. Minimize stockpiling by coordinating excavations, spreading, re-grading and compaction activities; 	EPC Contractor - Suzlon	Site Inspection; Record Keeping; Visual Assessment	Weekly	EHS - Suzlon	EHS - MEIL	Internal verification report to EHS Manager

S. N.	Environment/Social Parameters/Project Activities	Impacts/Issue	Mitigation Measures	Responsibility for ensuring implementation of the suggested mitigation	Means of Verification that mitigation has been met	Timelines /frequency of Monitoring	Responsibility for implementation of monitoring	Supervision responsibility	Reporting Requirements
			<ul style="list-style-type: none"> Speed of vehicles on site will be limited to 10-15 km/hr which will help in minimizing fugitive dust emissions due to vehicular movement; Cease or phase down work if excess fugitive dust is observed. Investigate the source of dust and ensure proper suppression measures; Proper maintenance of engines and use of vehicles with Pollution Under Control (PUC) Certificate; and Idling of vehicles and equipment will be prevented as part of periodical monitoring and auditing program, seek and review data pertaining to accidents and incidents involving vehicle fleets of the project. 						
1.5	Ambient noise			EPC Contractor - Suzlon	Site Inspection; Visual Assessment	Monthly	EHS - Suzlon	EHS - MEIL	Monthly Progress Report
1.5.1	Noise from construction activities, transportation, DG sets	Increased noise levels	<ul style="list-style-type: none"> All the noise generating equipment such as DG sets, batching plant etc. will be located away from village settlement. 						
1.6	Ecology and Biodiversity								
1.6.1	Construction activities	Impact on habitat, disturbance to	<ul style="list-style-type: none"> It is suggested to start the project in phased manner; Construction activities should 	EPC Contractor - Suzlon	Site Inspection; Training	Monthly	EHS - Suzlon	EHS - MEIL	Monthly Progress Report

S. N.	Environment/Social Parameters/Project Activities	Impacts/Issue	Mitigation Measures	Responsibility for ensuring implementation of the suggested mitigation	Means of Verification that mitigation has been met	Timelines /frequency of Monitoring	Responsibility for implementation of monitoring	Supervision responsibility	Reporting Requirements
		fauna and flora	<p>be avoided during night time (6.00 pm to 6.00 am) where several species of wildlife are active;</p> <ul style="list-style-type: none"> • Good housekeeping should be followed for construction activities, waste packaging material should be properly disposed; • Efforts should be made to minimize construction noise; • Labour movement should be restricted between construction camps and construction sites; • Proper training shall be provided to construction staff for handling of reptilian species; • Camp and kitchen waste should be collected and disposed in a manner that it does not attract wild animals; • Excavated areas shall be barricaded; • General awareness regarding wildlife should be enhanced through trainings, posters etc. among the staff and labourers; • Proper sanitation facilities should be provided at the labour camps; and • Anti -poaching/ hunting 		records; Visual Assessment by experts				

S. N.	Environment/Social Parameters/Project Activities	Impacts/Issue	Mitigation Measures	Responsibility for ensuring implementation of the suggested mitigation	Means of Verification that mitigation has been met	Timelines /frequency of Monitoring	Responsibility for implementation of monitoring	Supervision responsibility	Reporting Requirements
			<p>policy should be strictly enforced.</p> <ul style="list-style-type: none"> A minimum possible number of routes should be authorized for use during construction by the labourers and staff, speed limit of the vehicles plying in these routes should be kept 20-25 km/hr to avoid road kill; Where natural drainage crossing is envisaged at approach roads, culverts should be provided for crossing of herpetofaunal species; 						
1.7	Community Health and Safety								
1.7.1	Community Health & Safety	Impact on community	<ul style="list-style-type: none"> As part of the stakeholder engagement and information disclosure process, the community will be provided with an understanding of the activities to be undertaken and the precautions taken for safety As part of stakeholder engagement, the project will also propagate health awareness amongst the community; The traffic movement for the project in the area will be regulated to ensure road and 	Suzlon	Site Inspection; Training records; Visual Assessment	Monthly	EHS - Suzlon	EHS - MEIL	Monthly Progress Report

S. N.	Environment/Social Parameters/Project Activities	Impacts/Issue	Mitigation Measures	Responsibility for ensuring implementation of the suggested mitigation	Means of Verification that mitigation has been met	Timelines /frequency of Monitoring	Responsibility for implementation of monitoring	Supervision responsibility	Reporting Requirements
			<ul style="list-style-type: none"> pedestrian (including livestock) safety The workers (both regular and contractual) on the project will be provided with trainings on the Health and Safety policy in place, and their role in the same and refresher courses will be provided throughout the life of the project Put in place a grievance mechanism to allow for the workers and community members to report any concern or grievance related to project activities The disaster management cell of the district and the nearest fire-service station should be involved in preparedness for emergency situation; Company should get adequate third party insurance cover to meet the financial loss to any third party due to such emergencies. 						
1.8	Occupational Health and Safety								
1.8.1	Health & Safety	Impact on Health and safety of the	<ul style="list-style-type: none"> The workers (both regular and contractual) on the project will be provided with trainings on 	Suzlon	Record Keeping	Monthly	EHS - Suzlon	EHS - MEIL	Monthly Progress Report

S. N.	Environment/Social Parameters/Project Activities	Impacts/Issue	Mitigation Measures	Responsibility for ensuring implementation of the suggested mitigation	Means of Verification that mitigation has been met	Timelines /frequency of Monitoring	Responsibility for implementation of monitoring	Supervision responsibility	Reporting Requirements
		workers	<p>the Health and Safety policy in place, and their role in the same and refresher courses will be provided throughout the life of the project</p> <ul style="list-style-type: none"> Establish a grievance redressal mechanism in place, to allow for the employees and workers to report any concern or grievance related to work activities Put in place measures to reduce the risk of prevalence of diseases, including undertaking health awareness amongst the workers, avoiding presence of unsanitary conditions and better facilities in the wind farm site, such as safe drinking water, proper waste collection and disposal etc. 						
1.9	Social Parameters			EPC Contractor - Suzlon	Site Inspection; Visual Assessment	Monthly	EHS - MEIL	EHS - MEIL	Monthly Progress Report
1.9.1	Land Procurement	Impact on community	<ul style="list-style-type: none"> The compensation paid for loss of the private land should commensurate with full replacement value of the acquired land. Replacement value could be determined as current market rate of the acquired land plus transaction cost involved in buying same quantum of land in surrounding areas 						

S. N.	Environment/Social Parameters/Project Activities	Impacts/Issue	Mitigation Measures	Responsibility for ensuring implementation of the suggested mitigation	Means of Verification that mitigation has been met	Timelines /frequency of Monitoring	Responsibility for implementation of monitoring	Supervision responsibility	Reporting Requirements
			<ul style="list-style-type: none"> Project should record compensation detail that must include number of affected persons and losses category that are identified/being identified and compensated by the project; Identify vulnerable family among the project affected families and give them priority for any income generation opportunities generated in project cycle. Vulnerable family could be defined as person becoming landless or marginal farmer in post land acquisition phase, women headed households, families who were completely dependent upon revenue land for their sustenance etc. 						
1.9.2	Long-term Employment Opportunities in unskilled and semi-skilled and housekeeping tasks	Impact on Economic Opportunities	<ul style="list-style-type: none"> The sourcing of local labour wherever possible should be made obligatory for the sub-contractors and in all major procurement activities Preference should be given to the vulnerable population in the AoI The project proponent will establish a mechanism to 	Suzlon	Visual Observation, Site Visit, Review of Audit report	Monthly	Community Relations Manager MEIL	EHS - MEIL	Internal Verification Report to EHS Manager

S. N.	Environment/Social Parameters/Project Activities	Impacts/Issue	Mitigation Measures	Responsibility for ensuring implementation of the suggested mitigation	Means of Verification that mitigation has been met	Timelines /frequency of Monitoring	Responsibility for implementation of monitoring	Supervision responsibility	Reporting Requirements
			audit subcontractors and suppliers with respect to compliance of utilizing local labour and resources.						
1.9.3	Labour Rights and Welfare	Impacts on Labours	<ul style="list-style-type: none"> Suzlon to establish a grievance redressal mechanism in place, to allow for the employees and workers to report any concern or grievance related to work activities There should be adequate arrangement of toilet facility at construction site for construction workers and other staff deployed at site; Suzlon to establish a monthly monitoring and regular auditing mechanism for monitoring their sub-contractors and suppliers with respect to compliance to the applicable reference framework, in terms of resources, migrant workers, child labour and forced labour, health and safety, payment of wages, labour welfare measures etc. 	Suzlon and MEIL	Monitoring visits, Visual Observation, Record Review	Monthly	EHS - MEIL	EHS - MEIL	Monthly Progress Report