Draft Environmental and Social Impact Assessment

Project Number: 49241-001
April 2016

Environmental and Social Impact Assessment of 200 MW WindProject at Village Aspari, District Kurnool, Andhra Pradesh (Annexes)

Mytrah Wind and Solar Power Development Project (India)

Prepared by Voyants Solutions Pvt. Ltd. for the Asian Development Bank.

ANNEXURE I

M VTPL'S EHS POLICY

MYTRAH

CORPORATE SOCIAL ENVIRONMENT HEALTH AND SAFETY POLICY

We, Mytrah Energy (India) Limited are in the business of developing, operating and maintaining Wind power projects with a view to provide Clean and Green energy to the service of the populace.

We, at Mytrah seek for excellence in its corporate goals and visions. We at Mytrah ensure to safeguard this commitment and strive to achieve and sustain excellence in Environment, Social, Occupational Health and Safety performance by ensuring the goals that construct our corporate Social Environmental Health and Safety (SEHS) policy. All Mytrah operations will aspire to achieve the following:

1. We, including our contractors, sub-contractors and other stake holders comply with all the applicable Environmental, Health & Safety laws and regulations.

2. Conducting and carrying out all our operations in an environmentally and socially acceptable and sustainable manner with minimal residual or negative impact on the associated components be it People, Property or Nature.

3. Conducting all our operations in compliance to the relevant laws, regulations and international guidelines and best practices in order to meet our social and environmental contractual obligations to investors, lenders, customers and other relevant stakeholders.

4. Assessing and addressing in the complete life cycle of the project and at all stages of project starting from Planning to Decommissioning, key social, environmental, health and safety related impacts associated with our projects.

5. Developing mutual trust and respect with the neighbouring communities around our project sites through continuous engagement throughout the complete life cycle of the project.

6. Using the most efficient, safest and environment friendly technology in our work processes and systems.

7. Ensuring minimal waste generation from the company's operations and in case of waste generation, either proper disposal of the same

Mytrah Energy (India) Ltd.

Managing Director

8. Developing a work culture of continuous improvement in all our operational and management procedures and processes and monitoring the progress in the same;

9. Prioritising above everything, Health and Safety of our personnel as well as our subcontractor personnel directly contracted by us.

10. Maintaining a tradition of appreciation and respect for Social Environment, Health and Safety concerns as imbibed in the ESHS policy and enabling the same among the employees, contract workers, business partners, sub contractors or any stakeholder attached with the company.

Mytrah Energy (India) Ltd.

Managing Director

ANNEXURE II

M VTPL'S CSR POLICY

MYTRAH ENERGY (INDIA) LIMITED

CORPORATE SOCIAL RESPONSIBILITY (CSR) POLICY

1. Preamble

Mytrah Energy (India) Limited, along with its subsidiaries, which have been set-up as Special Purpose Vehicles (SPVs), hereinafter collectively referred to as "Mytrah") is in the business of setting up of Wind Power Projects across India.

Social Responsibility is a proposition that is aligned with our values and with the Commitment to contribute to energy security of India. We believe that CSR is an essential element of core business. Mytrah derives its inspiration for continued commitment to CSR from the Indian tradition of giving back to community and Gandhiji's Trusteeship concept.

Towards achieving harmony between business interests and our socio-economic and environmental responsibility, a conscious effort is being made to align ourselves with Millennium Development Goals and Schedule VII of the Companies Act 2013.

2. Definitions

i. "Act" means the Companies Act, 2013 and the rules made thereunder, including any modifications, amendments or re-enactment thereof.

ii. "Agency" (or Agencies) means any Section 8 Company or a registered trust/ society/NGO/ institution, performing social services for the benefit of the society and excluding a registered trust/society/ NGO/institution/ Section 8 Company which is formed by the Company or its holding or subsidiary company/companies.

iii. "Board" shall mean the Board of Directors of the Company.

iv. "Company" shall mean Mytrah and wherever the context requires shall signify the Company acting through its Board.

v. "CSR" means Corporate Social Responsibility.

vi. "CSR Annual Plan" shall mean the annual plan detailing the CSR expenditure for the year

vii. "CSR Committee" means the Corporate Social Responsibility Committee constituted by the Board of the Company in accordance with the Act, consisting of three or more directors, out of which at least one Director shall be independent director.

viii. "CSR Expenditure" means all CSR Expenditure of the Company as approved by the Board upon recommendation of the CSR Committee, including the following:-

a) contribution to CSR Projects which shall be implemented and/or executed by the Company;

b) Contribution to CSR Projects (including for corpus as required) which shall be implemented and/or executed by any Agency.

c) Any other contributions covered under Schedule VII to the Act.

ix. "CSR Policy" relates to the CSR outlook of the Company and the activities to be undertaken by the company as specified in Schedule VII to the Act and the expenditure thereon, excluding activities undertaken in pursuance of normal course of business of a company.

3. CSR Strategy:

Mytrah's CSR initiatives are broadly classified into Community, Workplace, Marketplace and Environment. Mytrah considers Community as priority area of intervention and is committed to take up result oriented projects/programmes essentially guided by Needs analysis and Consultations.

Mytrah may also consider undertaking or supporting CSR initiatives beyond its geography and Affirmative Action on matters of national importance based on community need and exigencies including natural disasters etc. involving stakeholders opinion and evaluative process.

3.1 CSR Vision:

To be the catalysts of positive change in the society

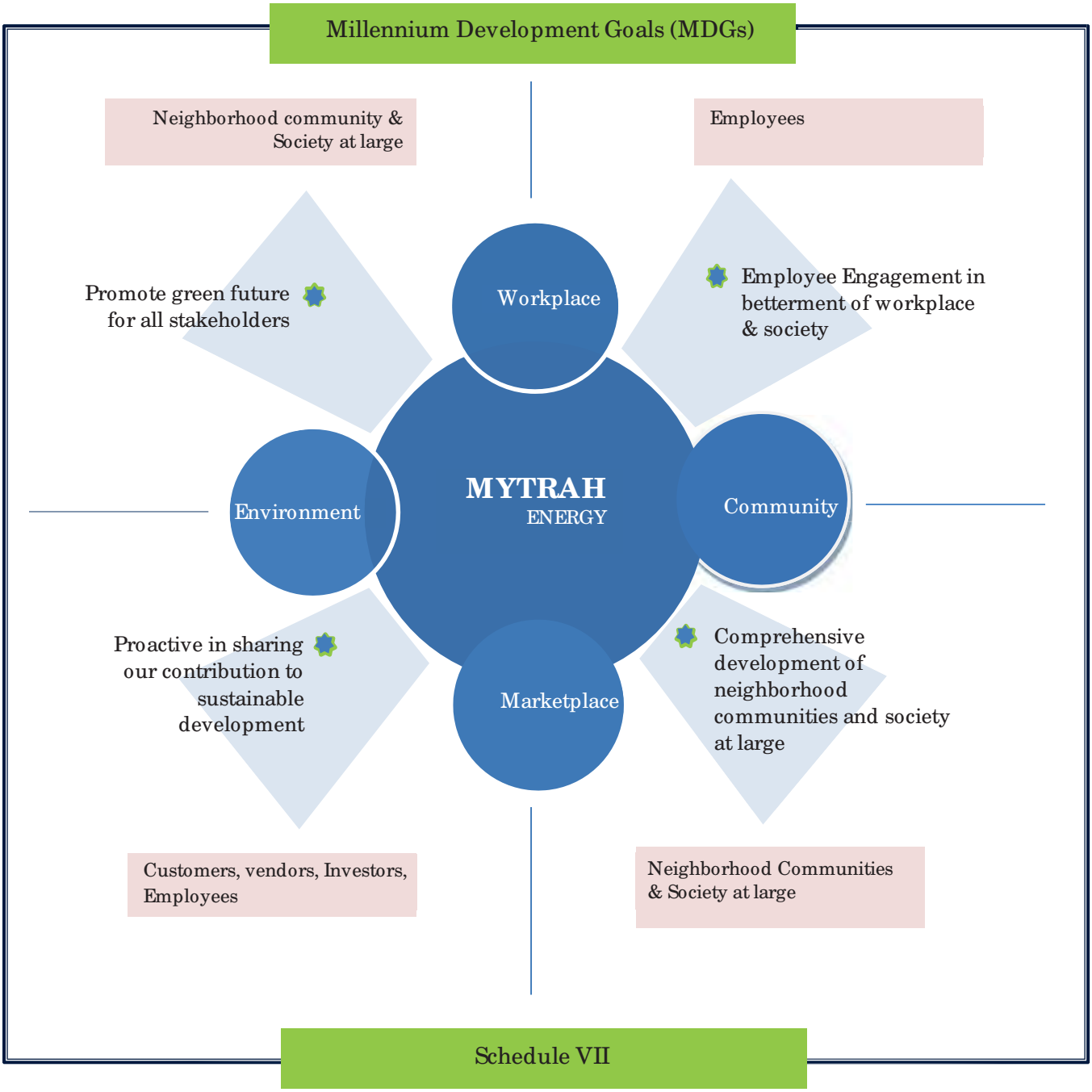
3.2 Mission:

To contribute towards improving the quality of life of our neighborhood communities and society at large following a participatory development-oriented approach

Based on this thought process, the Mytrah CSR policy has been framed to drive planning, implementation and evaluation of initiatives and resources.

4. Corporate Social Responsibility Policy Framework:

CSR POLICY FRAMEWORK



4.1 Mytrah's CSR Policy:

Mytrah is committed to ensuring social wellbeing of the society and communities through its Corporate Social Responsibility (CSR) initiatives. While we will endeavor to achieve our larger objective of community empowerment, our focus will be on

a) Projects or programmes relating to activities specified in Schedule VII to the Act and Millennium Development Goals or
b) Projects or programmes relating to activities undertaken by the board of directors of a Company in pursuance of recommendations of the CSR committee of the Board as per declared CSR policy of the company subject to the condition that such policy will cover subjects enumerated in Schedule VII of the Act.
c) In addition, Mytrah is committed to build a sustainable society and preserving environment through core business and community based initiatives. We endeavor to significantly improve our performance in the areas of energy, fuel and water conservation, green plantation and waste management & recycling. We are committed to promotion of bio-diversity and environment protection in our neighborhood and beyond.

5. Undertaking CSR Activities.

Mytrah will undertake its CSR activities, as approved by the CSR committee, through a trust or such other entity / organization as approved by the CSR committee.

6. Implementation Structure

i. The CSR activities shall be undertaken either directly or through one or more registered trusts or societies or foundations with an established track record in undertaking similar programs or projects.

ii. The Committee shall specify the project or programmes to be undertaken through these entities, the modalities of utilization of funds on such projects and programmes and the monitoring and reporting mechanism.

iii. Additionally, the Company may also collaborate with other entities for undertaking projects or programmes or CSR activities in such a manner that the CSR committees of respective companies are in a position to report separately on such projects or programmes in accordance with the Regulations.

iv. The CSR projects or programmes or Activities will be undertaken in India only

v. Any surpluses arising out of CSR projects or programmes or activities shall not form part of the business profits of the Company.

7. Monitoring mechanism

All projects and programmes will be monitored by the company CSR team as designated by the committee, based on the reports and regular field visits. The monitoring process will cover both programme and financial reviews.

8. Composition, Roles & Responsibilities of the CSR Committee

Keeping in line with section 135 of the Companies Act, 2013 and the rules thereunder (hereinafter referred to as 'the Act'), the Board of Directors of the Company shall form a Corporate Social Responsibility Committee (hereinafter referred to as the 'CSR Committee') headed by an independent director, to *inter alia,* carry out the following functions:-

i. To formulate and recommend to the Board, a Corporate Social Responsibility Policy which shall

indicate the activities to be undertaken by the Company as specified in Schedule VII of the Companies Act, 2013 and rules made thereunder;

ii. To recommend the amount of expenditure to be incurred on the CSR activities.

iii. To monitor the implementation of framework of CSR Policy.

iv. To carry out any other function as mandated by the Board from time to time and / or enforced by any statutory notification, amendment or modification as may be applicable or as may be necessary or appropriate for performance of its duties.

9. Duties of the Board and CSR Committee

I. Board of Directors

The Board shall include in its Report the annual report on CSR Projects as per the format provided in the Annexure to the Rules prescribed under the Companies Act, 2013.

II. CSR Committee

i. The CSR Committee shall monitor the implementation of the CSR Policy and CSR Plan. For this purpose, the CSR Committee shall meet at least twice a year.

ii. In discharge of CSR functions of the Company, the CSR Committee shall be directly responsible to the Board for any act that may be required to be done by the CSR Committee in furtherance of its statutory obligations, or as required by the Board.

iii. The CSR Committee shall place before the Board in May/July every year a responsibility statement of the CSR Committee that the implementation and monitoring of CSR Policy, is in compliance with CSR objectives and Policy of the company for inclusion in the Board's Report.

iv. The CSR Committee shall ensure that the CSR Policy and finalized Annual Plan is displayed on the Company's website.

10. Fund allocation and others:

I. Fund allocation

i. The Company, in every Financial Year, shall endeavor to spend such feasible amount as CSR Expenditure, which shall not be restricted by the statutory limit of a specified percentage of its average net profits of the immediately preceding three Financial Years. However, the aforementioned CSR Expenditure in any Financial Year shall be 2% of Company's average Net profits for the three immediately preceding Financial Years.

ii. The CSR Committee shall prepare a CSR Annual Plan for the above which shall include:

a. Identified CSR Projects

b. Planned outlay (Budget)

c. Implementation Schedules

iii. Total outlay in the CSR Annual Plan shall be approved by the Board upon recommendation by the CSR Committee

iv. In case the Company fails to spend the statutory minimum limit of 2% of Company's average net

profits of the immediately preceding three years, in any given financial year, the Board shall specify the reasons for the same in its report in terms of clause (o) of sub-section (3) of section 134 of the Act.

II. Others

i. The CSR Committee shall ensure that major portion of the CSR expenditure in the Annual Plan shall be for the Projects as per CSR objectives. However, there shall not be any preference given to any particular projects for budgetary allocation and it shall be made purely as per the identified CSR Projects on need basis.

ii. Any surplus arising out of the CSR Projects shall not form a part of the business profit of the Company.

11. Review Periodicity and Amendment:

i. CSR Annual Plan may be revised/modified/amended by the CSR Committee at such intervals as it may deem fit.

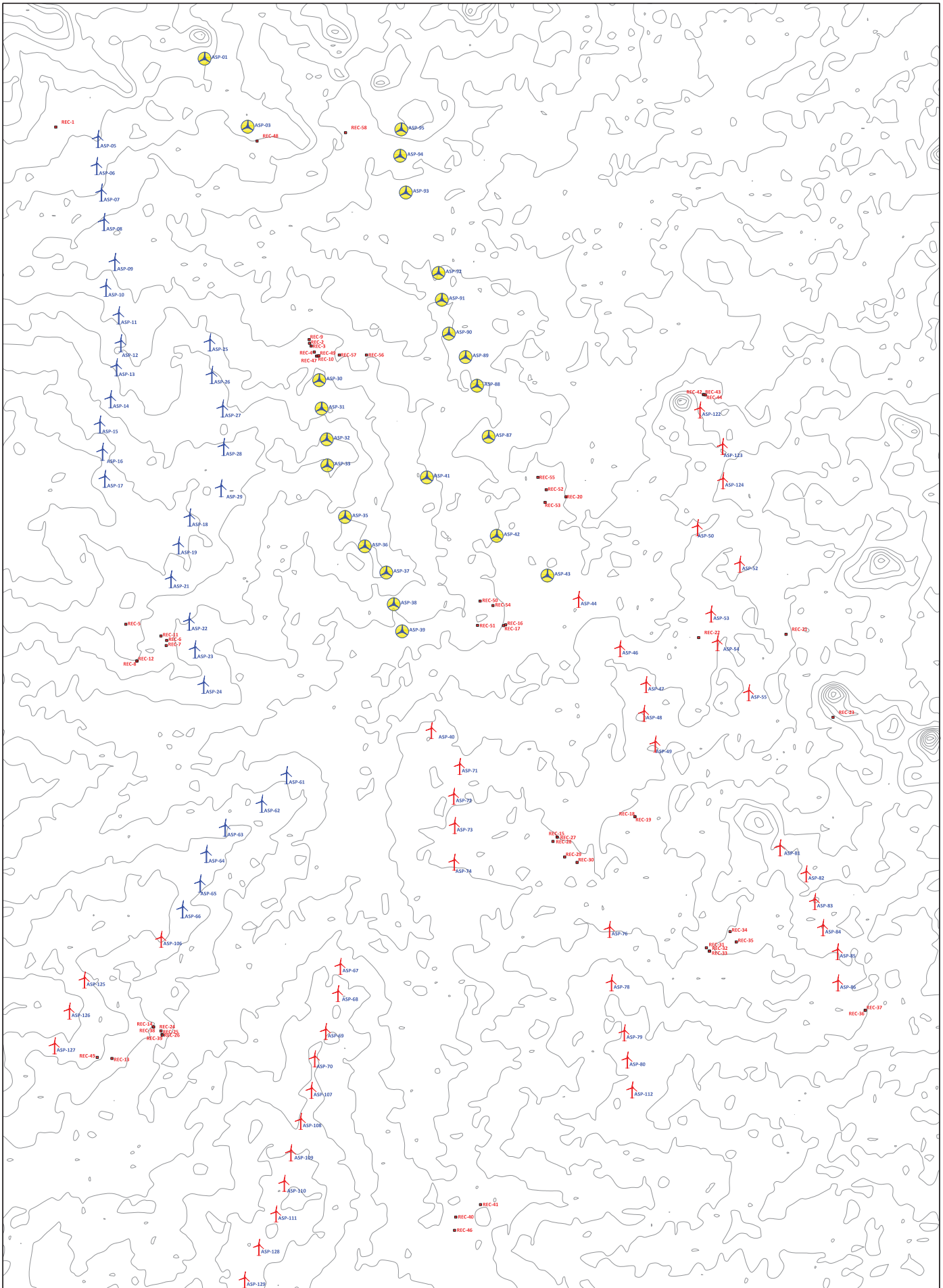
12. INTERVENTION MATRIX FOR THE NEXT 3 YEARS: 2015-18

Internal & External Stakeholders	Strategic Objective	Area of Intervention
Community	To contribute to comprehensive development of neighborhood communities	**Education:** • Support Primary and secondary education in neighborhood Govt. schools and beyond **Health:** • Strengthening service delivery of Govt. hospitals • Preventive and Primary health care at the door step of community **Livelihoods:** • Employability trainings • Additional livelihood opportunities **Sports:** • Promotion of nationally recognized sports
Workplace	To engage employees in betterment of workplace and society	• Reduction of carbon foot print, Natural resource conservation • Fuel, water & energy conservation and Waste Management • Employee participation/contribution in CSR

Internal & External Stakeholders	Strategic Objective	Area of Intervention
Environment	To promote a green future for all stakeholders	• Bio diversity protection & Tree plantation • Energy, fuel and water conservation • Waste Management & recycling
Marketplace	To be proactive in sharing our contribution to sustainable development	• Compliance to Companies Act-2013 • Sharing of CSR news through internal news letter • Reporting to Local administration on CSR

ANNEXURE III

MAP OF RECEPTOR LOCATION



Name of Applicant	Mytrah Energy (India) Ltd	Make/Model	GE / GE-1.7	GE / GE-2.3	SUZLON / S-111	
Name of Site	Aspari	Rating	1700 kW	2300 kW	2100 kW	RECEPTOR
Name of District	Kurnool	Hub Height	80 m	94 m	90 m	GE-1.7 WTG
Name of State	Andhra Pradesh	Rotor Ø	103 m	116 m	111.8 m	GE-2.3 WTG
Wind Farm Capacity	200.5 MW	No. of WTGs	30	44	23	S-111 WTG

MYTRAH

Mytrah Energy (India) Ltd

Micrositing Drawing of 200.5 MW Windfarm at Aspari,Kurnool Dist, Andhra Pradesh

ANNEXURE IV

SHADOW FLICKER ASSESSMENT REPORT

ANNEXURE -IV

Shadow Flicker

Shadow flicker is the term used to describe the effect caused by the shadows cast by moving wind turbine blades when the sun is visible. Shadow flicker occurs when the shadow cast by the moving blades of a wind turbine passes through a window or a door. The effect of the shadow moving around with the blade makes it seem as if a shadow is flickering with each blade passing by (large wind turbines have three blades, so three times per rotation) - comparable to someone turning on and off the light in rapid succession. This can result in alternating changes in light intensity perceived by viewers. Since wind turbines are usually located relatively far from potential shadow receptors.

There is anecdotal evidence inter nationally that shadow flicker could lead to stress and headaches. There is also a fear that shadow flicker, especially in the range of 2.5-50 Hertz (2.5-50 cycles per second) could lead to seizures in epileptics and may also scare away livestock.

Shadows will be cast on specific days of the year and will move from one point to another relatively quickly. And certain areas are more susceptible to shadow effects at certain times of the day. Areas to the west of the wind turbine would experience these effects as the sun rises. Areas to the north would experience the effects during the day. Areas to the east would experience these as the sun sets. The shadows cast by the wind turbine blades will be narrow, be of low intensity and move rapidly at the receptor. The closer a receptor is to the wind turbine, the more intense the shadows, as a greater proportion of the sun is blocked by the rotating wind turbine blades.

Although different countries have different guideline document for shadow flickering as shown in Annexure X. i.e Germany and provinces considered Maximum 30 min/day and 30hrs/year worst case scenario, 8 hr/year actual exposure.

All the identified project turbine locations are in general away from the main villages with human settlements. However, few locations were identified to be located close to temporary household or crop storage area, temple and a school. These can be considered as receptors of shadow flickering from project turbines. During the site survey, thirty-three (33) receptors identified within 1km of the project turbines were identified as potential shadow receptors. The details of the shadow receptors are provided in the details of the shadow receptor are provided in the Table below:

Table: 1: Details of Shadow Receptor Locations

Turbine Make / Model - GE/ GE-1.7 (1700 kW)

Capacity - 51 MW (30 x 1700 kW)

S. No.	Turbine Name	Zone	Eastings [m]	Northings [m]	Nearest House/ Structure/ Religious Structure	Distance (in km.)	Direction	Receptor ID considered
1	ASP-05	43P	757261	1711975	Residential Area of Aspari Village	**0.67**	WNW	REC-1

S. No.	Turbine Name	Zone	Eastings [m]	Northings [m]	Nearest House/ Structure/ Religious Structure	Distance (in km.)	Direction	Receptor ID considered
2	ASP-06	43P	757243	1711584	Residential Area of Aspari Village	**0.9**	NW	REC-1
3	ASP-07	43P	757310	1711204	Residential Area of Aspari Village	**1.22**	NW	REC-1
4	ASP-08	43P	757347	1710783	Residential Area of Aspari Village	**1.65**	NNW	REC-1
5	ASP-09	43P	757502	1710209	Residential Area of Aspari Village	**2.2**	NNW	REC-1
6	ASP-10	43P	757375	1709837	Residential Area of Aspari Village	**2.48**	NNW	REC-1
7	ASP-11	43P	757558	1709442	Residential Area of Devnabanda Village	**2.7**	E	REC-1
8	ASP-12	43P	757588	1709041	Residential Area of Devnabanda Village	**2.7**	E	REC-2
9	ASP-13	43P	757527	1708697	Residential Area of Devnabanda Village	**2.82**	E	REC-3
10	ASP-14	43P	757442	1708239	Residential Area of Devnabanda Village	**3**	ENE	REC-4
11	ASP-15	43P	757288	1707875	Residential Area of Joharapuram Village	**2.8**	S	REC-5
12	ASP-16	43P	757326	1707485	Residential Area of Joharapuram Village	**2.4**	S	REC-5
13	ASP-17	43P	757359	1707097	Residential Area of Joharapuram Village	**2**	S	REC-5
14	ASP-18	43P	758578	1706541	Residential Area of	**1.68**	S	REC-6

S. No.	Turbine Name	Zone	Eastings [m]	Northings [m]	Nearest House/ Structure/ Religious Structure	Distance (in km.)	Direction	Receptor ID considered
					Joharapuram Village			
15	ASP-19	43P	758419	1706140	Residential Area of Joharapuram Village	**1.2**	S	REC-6
16	ASP-21	43P	758308	1705654	Residential Area of Joharapuram Village	**0.75**	S	REC-6
17	ASP-22	43P	758570	1705047	Residential Area of Joharapuram Village	**0.35**	WSW	REC-6
18	ASP-23	43P	758653	1704647	Residential Area of Joharapuram Village	**0.45**	WNW	REC-7
19	ASP-24	43P	758778	1704140	Residential Area of Joharapuram Village	**0.81**	WNW	REC-8
20	ASP-25	43P	758867	1709056	Residential Area of Devnabanda Village	**1.43**	E	REC-9
21	ASP-26	43P	758895	1708587	Residential Area of Devnabanda Village	**1.5**	ENE	REC-10
22	ASP-27	43P	759051	1708106	Residential Area of Devnabanda Village	**1.6**	ENE	REC-10
23	ASP-28	43P	759065	1707554	Residential Area of Devnabanda Village	**1.9**	NE	REC-10
24	ASP-29	43P	759028	1706962	Residential Area of Joharapuram Village	**2.2**	SSW	REC-11
25	ASP-61	43P	759968	1702844	Residential Area of	**2.7**	NW	REC-12

S. No.	Turbine Name	Zone	Eastings [m]	Northings [m]	Nearest House/ Structure/ Religious Structure	Distance (in km.)	Direction	Receptor ID considered
					Joharapuram Village			
26	ASP-62	43P	759612	1702434	Residential Area of Joharapuram Village	**2.8**	NW	REC-12
27	ASP-63	43P	759085	1702090	Residential Area of Joharapuram Village	**2.8**	NNW	REC-12
28	ASP-64	43P	758817	1701713	Residential Area of Joharapuram Village	**3**	NNW	REC-12
29	ASP-65	43P	758728	1701288	Cluster of Houses near to Kottala Village	**2.05**	SSW	REC-13
30	ASP-66	43P	758475	1700917	Cluster of Houses near to Kottala Village	**1.63**	SSW	REC-14

Table: 2: Details of Shadow Receptor Locations

Turbine Make/ Model - GE/ GE-2.3 (2300 kW)
Capacity -101.2 MW (44 x 2300 kW)

S. No	Turbine Name	Zone	Eastings [m]	Northings [m]	Nearest House/ Structure/ Religious Structure	Distance (in km.)	Direction	Receptor ID considered
1	ASP-40	43P	762045	1703492	Residential Area of Hosuru Village	2.3	SE	REC-15
2	ASP-44	43P	764159	1705373	Residential Area of Pedda hulti Village	1.08	WSW	REC-16
3	ASP-46	43P	764756	1704668	Residential Area of Pedda hulti Village	1.8	WNW	REC-16
4	ASP-47	43P	765128	1704150	Residential Area of Pedda hulti Village	2.2	WNW	REC-17

S. No	Turbine Name	Zone	Eastings [m]	Northings [m]	Nearest House/ Structure/ Religious Structure	Distance (in km.)	Direction	Receptor ID considered
5	ASP-48	43P	765098	1703738	Residential Area of Hosuru Village	1.3	SE	REC-18
6	ASP-49	43P	765260	1703298	Residential Area of Hosuru Village	1	SSW	REC-19
7	ASP-50	43P	765867	1706402	Residential Area of Chinna hulti Village	1.96	WNW	REC-20
8	ASP-52	43P	766475	1705879	Cluster of Houses near to pattikonda Village	1.1	SSE	REC-21
9	ASP-53	43P	766062	1705165	Single structure	0.3	NNE	REC-21
10	ASP-54	43P	766153	1704752	Single structure	0.3	WNW	REC-22
11	ASP-55	43P	766602	1704033	Residential Area of Pattikonda Village	1.24	E	REC-23
12	ASP-67	43P	760739	1700107	Cluster of Houses near to Kottala Village	2.7	WSW	REC-24
13	ASP-68	43P	760705	1699716	Cluster of Houses near to Kottala Village	2.58	WSW	REC-24
14	ASP-69	43P	760529	1699171	Cluster of Houses near to Kottala Village	2.35	W	REC-25
15	ASP-70	43P	760371	1698780	Cluster of Houses near to Kottala Village	2.23	WNW	REC-26
16	ASP-71	43P	762453	1702975	Residential Area of Hosuru Village	1.68	SE	REC-27
17	ASP-72	43P	762368	1702547	Residential Area of Hosuru Village	1.52	ESE	REC-28
18	ASP-73	43P	762381	1702128	Residential Area of Hosuru Village	1.42	E	REC-28
19	ASP-74	43P	762375	1701603	Residential Area of Hosuru Village	1.5	E	REC-29

S. No	Turbine Name	Zone	Eastings [m]	Northings [m]	Nearest House/ Structure/ Religious Structure	Distance (in km.)	Direction	Receptor ID considered
20	ASP-76	43P	764604	1700636	Residential Area of Hosuru Village	1.16	NNW	REC-30
21	ASP-78	43P	764632	1699870	Residential Area of Hosuru Village	1.49	ENE	REC-31
22	ASP-79	43P	764816	1699152	Residential Area of Hosuru Village	1.76	NE	REC-32
23	ASP-80	43P	764859	1698762	Residential Area of Hosuru Village	2.02	NE	REC-33
24	ASP-81	43P	767051	1701808	Residential Area of Putchakayalamada Village	1.3	SW	REC-34
25	ASP-82	43P	767427	1701435	Residential Area of Putchakayalamada Village	1.3	SW	REC-34
26	ASP-83	43P	767550	1701037	Residential Area of Putchakayalamada Village	1.2	WSW	REC-84
27	ASP-84	43P	767668	1700663	Residential Area of Putchakayalamada Village	1.24	W	REC-35
28	ASP-85	43P	767878	1700318	Residential Area of Ramachandrapuram Village	0.84	SSE	REC-36
29	ASP-86	43P	767882	1699869	Residential Area of Ramachandrapuram Village	0.48	ESE	REC-37
30	ASP-106	43P	758168	1700496	Cluster of Houses near to Kottala Village	1.16	W	REC-38
31	ASP-107	43P	760325	1698327	Cluster of Houses near to Kottala Village	2.3	WNW	REC-39
32	ASP-108	43P	760170	1697883	Cluster of Houses near to Kottala Village	2.39	NW	REC-39

S. No	Turbine Name	Zone	Eastings [m]	Northings [m]	Nearest House/ Structure/ Religious Structure	Distance (in km.)	Direction	Receptor ID considered
33	ASP-109	43P	760030	1697431	Cluster of Houses near to Kottala Village	2.5	NW	REC-39
34	ASP-110	43P	759935	1696993	Cluster of Houses near to Burujula Village	2.49	ESE	REC-40
35	ASP-111	43P	759816	1696554	Cluster of Houses near to Burujula Village	2.58	E	REC-40
36	ASP-112	43P	764928	1698334	Cluster of Houses near to Burujula Village	2.72	WSW	REC-41
37	ASP-122	43P	765902	1708092	Settlement	0.33	N	REC-42
38	ASP-123	43P	766228	1707569	Settlement	0.34	N	REC-43
39	ASP-124	43P	766232	1707077	Settlement	0.88	NNW	REC-44
40	ASP-125	43P	757066	1699910	Settlement	1.36	NNW	REC-44
41	ASP-126	43P	756850	1699465	Cluster of Houses near to Kottala Village	0.68	SSE	REC-45
42	ASP-127	43P	756637	1698966	Cluster of Houses near to Kottala Village	0.58	E	REC-45
43	ASP-128	43P	759570	1696074	Cluster of Houses near to Burujula Village	2.83	E	REC-46
44	ASP-129	43P	759365	1695606	Cluster of Houses near to Burujula Village	3.13	ENE	REC-46

Table: 3: Details of Shadow Receptor Locations
Turbine Make/ Model - SUZLON / S-111 (2100 kW)
Capacity -48.3 MW (23 x 2100 kW)

S. No.	Turbine Name	Zone	Eastings [m]	Northings [m]	Nearest House/ Structure/ Religious Structure	Distance (in km.)	Direction	Receptor ID considered
1	ASP-01	43P	758788	1713250	Residential Area of Devnabanda Village	**0.3**	N	REC-47
2	ASP-03	43P	759407	1712273	Residential Area of	0.25	SSE	REC-48

S. No.	Turbine Name	Zone	Eastings [m]	Northings [m]	Nearest House/ Structure/ Religious Structure	Distance (in km.)	Direction	Receptor ID considered
					Attikalagundu Village			
3	ASP-30	43P	760434	1708636	Residential Area of Devnabanda Village	0.34	N	REC-49
4	ASP-31	43P	760468	1708229	Residential Area of Devnabanda Village	0.73	N	REC-49
5	ASP-32	43P	760543	1707786	Residential Area of Devnabanda Village	1.19	N	REC-49
6	ASP-33	43P	760551	1707413	Residential Area of Devnabanda Village	1.56	N	REC-49
7	ASP-35	43P	760805	1706672	Residential Area of Devnabanda Village	2.29	N	REC-49
8	ASP-36	43P	761089	1706251	Residential Area of Pedda Hulti Village	1.86	ESE	REC-50
9	ASP-37	43P	761397	1705875	Residential Area of Pedda Hulti Village	1.44	ESE	REC-50
10	ASP-38	43P	761504	1705420	Residential Area of Pedda Hulti Village	1.27	E	REC-50
11	ASP-39	43P	761624	1705031	Residential Area of Pedda Hulti Village	1.09	E	REC-51
12	ASP-41	43P	761979	1707240	Residential Area of Chinna Hulti Village	1.73	E	REC-52
13	ASP-42	43P	762982	1706402	Residential Area of Chinna Hulti Village	0.83	NE	REC-53
14	ASP-43	43P	763709	1705832	Residential Area of Pedda Hulti Village	0.9	WSW	REC-54

S. No.	Turbine Name	Zone	Eastings [m]	Northings [m]	Nearest House/ Structure/ Religious Structure	Distance (in km.)	Direction	Receptor ID considered
15	ASP-87	43P	762866	1707824	Residential Area of Chinna Hulti Village	0.93	SE	REC-55
16	ASP-88	43P	762699	1708556	Residential Area of Chinna Hulti Village	1.61	SSE	REC-55
17	ASP-89	43P	762535	1708968	Residential Area of Devanabanda Village	1.41	W	REC-56
18	ASP-90	43P	762295	1709304	Residential Area of Devanabanda Village	1.23	WSW	REC-56
19	ASP-91	43P	762194	1709790	Residential Area of Devanabanda Village	1.3	SW	REC-56
20	ASP-92	43P	762147	1710174	Residential Area of Devanabanda Village	1.57	SW	REC-56
21	ASP-93	43P	761678	1711329	Residential Area of Nalakadoddi Village	1.25	NW	REC-57
22	ASP-94	43P	761596	1711856	Residential Area of Nalakadoddi Village	0.91	WNW	REC-57
23	ASP-95	43P	761612	1712235	Residential Area of Nalakadoddi Village	0.8	W	REC-58

Wind Farm software is used to calculate detailed shadow flicker map across an area of interest with site-specific locations using shadow receptors. We have performed Shadow flicker modelling using EMD's Wind Farm Software version for all WTGs. The project envisages installation of 30 x 1.7 MW (GE-1.7), 44 x 2.3 MW (GE-2.3), 23 x 2.1 MW (S-111 Suzlon) Wind Turbine Generators (WTG).

Impacts

- Distance to wind turbine location - within 10 rotor diameters of site or 900 meters
- Areas most likely to be effected by shadow effects related to position of sun in the sky – locations to the east, west, and north of wind turbine
- Current use of facility (residence, classroom, overnight lodging)
- Areas of cultural and historical significance
- Line of site to wind turbine from windows at site.

During sunset, the shadow source will be at a lower elevation than the wind turbines and will not have an impact. Shadow flicker at each shadow receptor location is calculated every minute of every day throughout the entire year. Shadow receptors can be configured to represent an omni-directional window of a specific size (greenhouse mode) or a window facing a single direction of a specific size (single direction mode). The shadow receptors used in this analysis were configured as single direction-mode receptors representing a 1.5-meter-wide by 1.5-meter-high window.

The inputs for the Windfarm shadow flicker model include the following:

- The geographic locations and characteristics of the proposed WTGs;
- The locations of identified shadow receptors;
- Turbine Model Specifications; and
- Topography was assumed to be flat as a theoretical worst case scenario.

The Windfarm software calculates the position of the sun throughout the day in accordance to the curvature of the earth, the time of year and the project site's position. The software calculates the occurrences of shadow flicker at each of the identified receptor. Analysis was conducted to represent a theoretical worst case scenario, with the following conditions:

- The sun is shining all day, from sunrise to sunset with clear skies;
- There are no obstructing features such as trees and vegetation; and
- The wind turbines are always operating i.e. there is continuous wind of sufficient speed and no maintenance or down time.

The results of the modelling exercise have been presented in Table below:

Table: 4: Details of Shadow Flickers Result

Receptor ID	Annual shadow flicker [hh:mm]	Number of days with flicker	Number of days for which the limit is exceeded	Worst day	Minutes on worst day	Turbines causing flicker
1	no flicker					
2	no flicker					
3	no flicker					
4	no flicker					
5	no flicker					
6	96:00	123	81	18-06-2016	70	17(ASP-22), 18(ASP-23)
7	86:00	106	92	11-01-2016	60	18(ASP-23)
8	no flicker					
9	no flicker					

10	no flicker					
11	69:20	93	73	23-04-2016	60	17(ASP-22)
12	no flicker					
13	no flicker					
14	no flicker					
15	no flicker					
16	no flicker					
17	no flicker					
18	no flicker					
19	no flicker					
20	no flicker					
21	no flicker					
22	75:30	76	69	13-12-2016	80	63(ASP-54)
23	no flicker					
24	no flicker					
25	no flicker					
26	no flicker					
27	no flicker					
28	no flicker					
29	no flicker					
30	no flicker					
31	no flicker					
32	no flicker					
33	no flicker					
34	no flicker					
35	no flicker					
36	no flicker					
37	no flicker					
38	no flicker					
39	no flicker					
40	no flicker					
41	no flicker					
42	no flicker					
43	no flicker					
44	no flicker					
45	no flicker					
46	no flicker					
47	no flicker					
48	no flicker					
49	no flicker					
50	no flicker					
51	no flicker					
52	no flicker					
53	no flicker					
54	no flicker					
55	no flicker					
56	no flicker					

57	no flicker					
58	no flicker					

So as per the analysis WTG number ASP-22,23 & 54 are responsible for shadow flickering effect on receptor 6,7 & 11 respectively.

Receptor 6 is getting shadow flickering from ASP-22 for which the annual shadow flickering is 96 hours and 81 days for which the limit is exceeded.

Receptor 7 is getting shadow flickering from ASP-23 for which the annual shadow flickering is 86 hours and 92 no of days for which limit is exceeded.

Receptor 11 is getting shadow flickering from ASP-22 for 69.20 hours and 73 number of days for which the limit is exceeded.

Table: 5: Receptor Analysis from Windfarm Software for Receptor -6

2.00	Sunrise	Sunset	Turbine ID:17(ASP-22)		Turbine ID:18(ASP-23)	
1.00	6.78	18.01	0.00	0.00	7.50	0.50
2.00	6.79	18.02	0.00	0.00	7.50	0.50
3.00	6.79	18.03	0.00	0.00	7.50	0.50
4.00	6.80	18.04	0.00	0.00	7.50	0.50
5.00	6.80	18.05	0.00	0.00	7.50	0.50
6.00	6.81	18.06	0.00	0.00	7.67	0.33
7.00	6.81	18.07	0.00	0.00	7.67	0.33
8.00	6.82	18.08	0.00	0.00	7.67	0.33
9.00	6.82	18.09	0.00	0.00	7.67	0.33
10.00	6.83	18.10	0.00	0.00	7.67	0.33
11.00	6.83	18.11	0.00	0.00	0.00	0.00
12.00	6.83	18.12	0.00	0.00	0.00	0.00
13.00	6.84	18.13	0.00	0.00	0.00	0.00
14.00	6.84	18.14	0.00	0.00	0.00	0.00
15.00	6.84	18.15	0.00	0.00	0.00	0.00
16.00	6.84	18.16	0.00	0.00	0.00	0.00
17.00	6.85	18.16	0.00	0.00	0.00	0.00
18.00	6.85	18.17	0.00	0.00	0.00	0.00
19.00	6.85	18.18	0.00	0.00	0.00	0.00
20.00	6.85	18.19	0.00	0.00	0.00	0.00
21.00	6.85	18.20	0.00	0.00	0.00	0.00
22.00	6.85	18.21	0.00	0.00	0.00	0.00
23.00	6.85	18.22	0.00	0.00	0.00	0.00
24.00	6.85	18.23	0.00	0.00	0.00	0.00
25.00	6.85	18.24	0.00	0.00	0.00	0.00
26.00	6.85	18.25	0.00	0.00	0.00	0.00
27.00	6.84	18.26	0.00	0.00	0.00	0.00
28.00	6.84	18.27	0.00	0.00	0.00	0.00
29.00	6.84	18.27	0.00	0.00	0.00	0.00
30.00	6.84	18.28	0.00	0.00	0.00	0.00

31.00	6.84	18.29	0.00	0.00	0.00	0.00
32.00	6.83	18.30	0.00	0.00	0.00	0.00
33.00	6.83	18.31	0.00	0.00	0.00	0.00
34.00	6.83	18.31	0.00	0.00	0.00	0.00
35.00	6.82	18.32	0.00	0.00	0.00	0.00
36.00	6.82	18.33	0.00	0.00	0.00	0.00
37.00	6.81	18.34	0.00	0.00	0.00	0.00
38.00	6.81	18.34	0.00	0.00	0.00	0.00
39.00	6.80	18.35	0.00	0.00	0.00	0.00
40.00	6.80	18.36	0.00	0.00	0.00	0.00
41.00	6.79	18.36	0.00	0.00	0.00	0.00
42.00	6.79	18.37	0.00	0.00	0.00	0.00
43.00	6.78	18.38	0.00	0.00	0.00	0.00
44.00	6.77	18.38	0.00	0.00	0.00	0.00
45.00	6.77	18.39	0.00	0.00	0.00	0.00
46.00	6.76	18.40	0.00	0.00	0.00	0.00
47.00	6.75	18.40	0.00	0.00	0.00	0.00
48.00	6.74	18.41	0.00	0.00	0.00	0.00
49.00	6.74	18.41	0.00	0.00	0.00	0.00
50.00	6.73	18.42	0.00	0.00	0.00	0.00
51.00	6.72	18.42	0.00	0.00	0.00	0.00
52.00	6.71	18.43	0.00	0.00	0.00	0.00
53.00	6.70	18.43	0.00	0.00	0.00	0.00
54.00	6.69	18.44	0.00	0.00	0.00	0.00
55.00	6.68	18.44	0.00	0.00	0.00	0.00
56.00	6.67	18.45	0.00	0.00	0.00	0.00
57.00	6.66	18.45	0.00	0.00	0.00	0.00
58.00	6.66	18.45	0.00	0.00	0.00	0.00
59.00	6.65	18.46	0.00	0.00	0.00	0.00
60.00	6.64	18.46	0.00	0.00	0.00	0.00
61.00	6.62	18.47	0.00	0.00	0.00	0.00
62.00	6.61	18.47	0.00	0.00	0.00	0.00
63.00	6.60	18.47	0.00	0.00	0.00	0.00
64.00	6.59	18.48	0.00	0.00	0.00	0.00
65.00	6.58	18.48	0.00	0.00	0.00	0.00
66.00	6.57	18.48	0.00	0.00	0.00	0.00
67.00	6.56	18.49	0.00	0.00	0.00	0.00
68.00	6.55	18.49	0.00	0.00	0.00	0.00
69.00	6.54	18.49	0.00	0.00	0.00	0.00
70.00	6.53	18.50	0.00	0.00	0.00	0.00
71.00	6.51	18.50	0.00	0.00	0.00	0.00
72.00	6.50	18.50	0.00	0.00	0.00	0.00

73.00	6.49	18.51	0.00	0.00	0.00	0.00
74.00	6.48	18.51	0.00	0.00	0.00	0.00
75.00	6.47	18.51	0.00	0.00	0.00	0.00
76.00	6.46	18.51	0.00	0.00	0.00	0.00
77.00	6.44	18.52	0.00	0.00	0.00	0.00
78.00	6.43	18.52	0.00	0.00	0.00	0.00
79.00	6.42	18.52	0.00	0.00	0.00	0.00
80.00	6.41	18.52	0.00	0.00	0.00	0.00
81.00	6.39	18.52	0.00	0.00	0.00	0.00
82.00	6.38	18.53	0.00	0.00	0.00	0.00
83.00	6.37	18.53	0.00	0.00	0.00	0.00
84.00	6.36	18.53	0.00	0.00	0.00	0.00
85.00	6.35	18.53	0.00	0.00	0.00	0.00
86.00	6.33	18.54	0.00	0.00	0.00	0.00
87.00	6.32	18.54	0.00	0.00	0.00	0.00
88.00	6.31	18.54	0.00	0.00	0.00	0.00
89.00	6.30	18.54	0.00	0.00	0.00	0.00
90.00	6.28	18.54	0.00	0.00	0.00	0.00
91.00	6.27	18.55	0.00	0.00	0.00	0.00
92.00	6.26	18.55	0.00	0.00	0.00	0.00
93.00	6.25	18.55	0.00	0.00	0.00	0.00
94.00	6.24	18.55	0.00	0.00	0.00	0.00
95.00	6.22	18.56	0.00	0.00	0.00	0.00
96.00	6.21	18.56	0.00	0.00	0.00	0.00
97.00	6.20	18.56	0.00	0.00	0.00	0.00
98.00	6.19	18.56	0.00	0.00	0.00	0.00
99.00	6.18	18.57	0.00	0.00	0.00	0.00
100.00	6.17	18.57	0.00	0.00	0.00	0.00
101.00	6.15	18.57	0.00	0.00	0.00	0.00
102.00	6.14	18.57	0.00	0.00	0.00	0.00
103.00	6.13	18.58	0.00	0.00	0.00	0.00
104.00	6.12	18.58	0.00	0.00	0.00	0.00
105.00	6.11	18.58	0.00	0.00	0.00	0.00
106.00	6.10	18.58	0.00	0.00	0.00	0.00
107.00	6.09	18.59	0.00	0.00	0.00	0.00
108.00	6.08	18.59	0.00	0.00	0.00	0.00
109.00	6.07	18.59	0.00	0.00	0.00	0.00
110.00	6.06	18.60	0.00	0.00	0.00	0.00
111.00	6.05	18.60	0.00	0.00	0.00	0.00
112.00	6.04	18.60	0.00	0.00	0.00	0.00
113.00	6.03	18.61	0.00	0.00	0.00	0.00
114.00	6.02	18.61	0.00	0.00	0.00	0.00

115.00	6.01	18.61	0.00	0.00	0.00	0.00
116.00	6.00	18.62	0.00	0.00	0.00	0.00
117.00	5.99	18.62	0.00	0.00	0.00	0.00
118.00	5.98	18.62	0.00	0.00	0.00	0.00
119.00	5.97	18.63	0.00	0.00	0.00	0.00
120.00	5.96	18.63	0.00	0.00	0.00	0.00
121.00	5.95	18.63	0.00	0.00	0.00	0.00
122.00	5.95	18.64	0.00	0.00	0.00	0.00
123.00	5.94	18.64	0.00	0.00	0.00	0.00
124.00	5.93	18.65	0.00	0.00	0.00	0.00
125.00	5.92	18.65	0.00	0.00	0.00	0.00
126.00	5.92	18.66	0.00	0.00	0.00	0.00
127.00	5.91	18.66	0.00	0.00	0.00	0.00
128.00	5.90	18.66	0.00	0.00	0.00	0.00
129.00	5.90	18.67	0.00	0.00	0.00	0.00
130.00	5.89	18.67	0.00	0.00	0.00	0.00
131.00	5.88	18.68	0.00	0.00	0.00	0.00
132.00	5.88	18.68	6.67	0.17	0.00	0.00
133.00	5.87	18.69	6.67	0.33	0.00	0.00
134.00	5.87	18.69	6.50	0.50	0.00	0.00
135.00	5.86	18.70	6.50	0.50	0.00	0.00
136.00	5.86	18.70	6.50	0.50	0.00	0.00
137.00	5.85	18.71	6.50	0.67	0.00	0.00
138.00	5.85	18.71	6.50	0.67	0.00	0.00
139.00	5.84	18.72	6.50	0.67	0.00	0.00
140.00	5.84	18.73	6.33	0.83	0.00	0.00
141.00	5.84	18.73	6.33	0.83	0.00	0.00
142.00	5.83	18.74	6.33	0.83	0.00	0.00
143.00	5.83	18.74	6.33	0.83	0.00	0.00
144.00	5.83	18.75	6.33	0.83	0.00	0.00
145.00	5.83	18.75	6.33	0.83	0.00	0.00
146.00	5.82	18.76	6.33	0.83	0.00	0.00
147.00	5.82	18.76	6.33	1.00	0.00	0.00
148.00	5.82	18.77	6.33	1.00	0.00	0.00
149.00	5.82	18.77	6.33	1.00	0.00	0.00
150.00	5.82	18.78	6.33	1.00	0.00	0.00
151.00	5.82	18.79	6.33	1.00	0.00	0.00
152.00	5.82	18.79	6.33	1.00	0.00	0.00
153.00	5.81	18.80	6.33	1.00	0.00	0.00
154.00	5.81	18.80	6.33	1.00	0.00	0.00
155.00	5.81	18.81	6.33	1.00	0.00	0.00
156.00	5.81	18.81	6.33	1.00	0.00	0.00

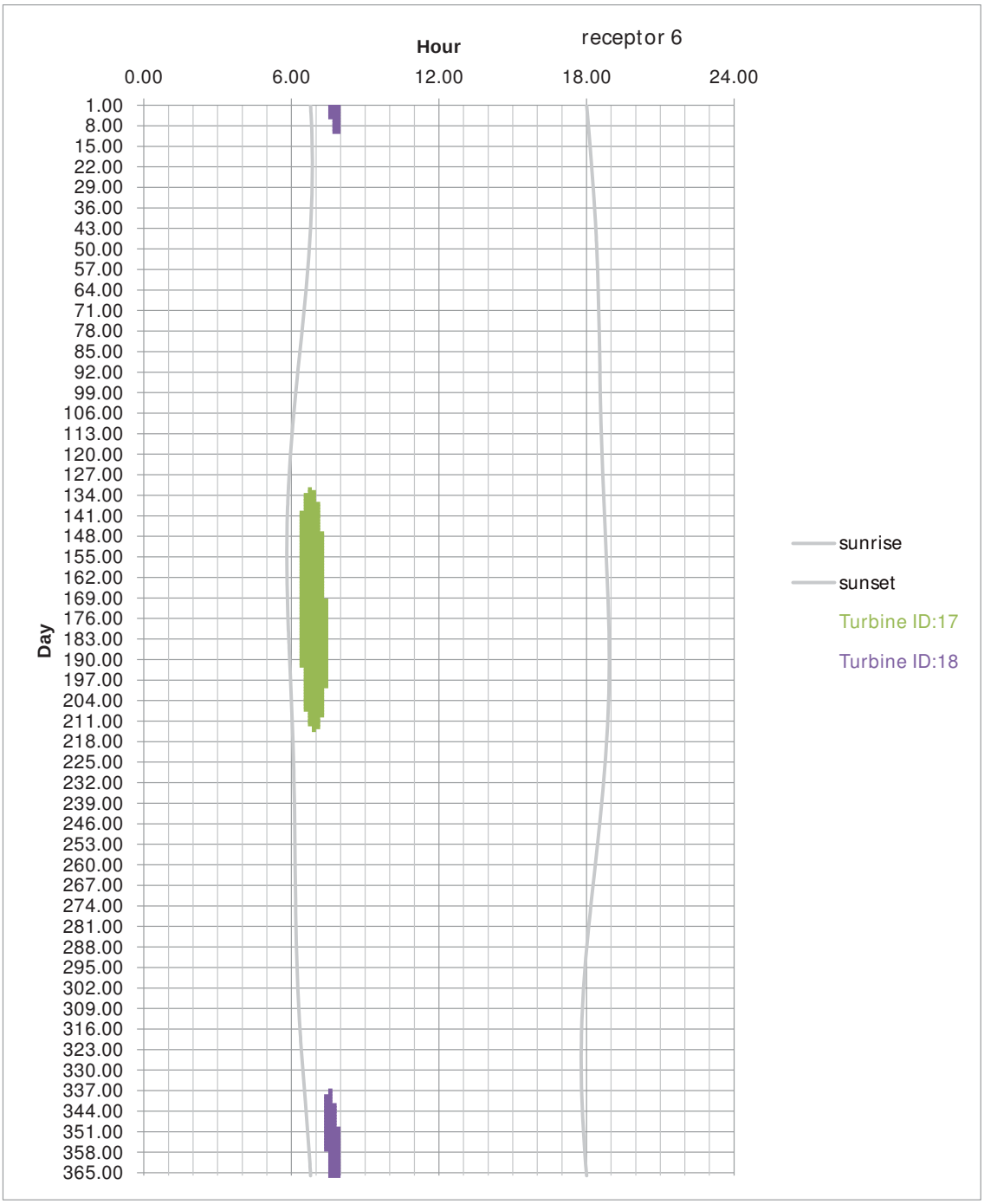
157.00	5.82	18.82	6.33	1.00	0.00	0.00
158.00	5.82	18.82	6.33	1.00	0.00	0.00
159.00	5.82	18.83	6.33	1.00	0.00	0.00
160.00	5.82	18.83	6.33	1.00	0.00	0.00
161.00	5.82	18.84	6.33	1.00	0.00	0.00
162.00	5.82	18.84	6.33	1.00	0.00	0.00
163.00	5.82	18.85	6.33	1.00	0.00	0.00
164.00	5.83	18.85	6.33	1.00	0.00	0.00
165.00	5.83	18.86	6.33	1.00	0.00	0.00
166.00	5.83	18.86	6.33	1.00	0.00	0.00
167.00	5.83	18.87	6.33	1.00	0.00	0.00
168.00	5.84	18.87	6.33	1.00	0.00	0.00
169.00	5.84	18.88	6.33	1.00	0.00	0.00
170.00	5.84	18.88	6.33	1.17	0.00	0.00
171.00	5.84	18.88	6.33	1.17	0.00	0.00
172.00	5.85	18.89	6.33	1.17	0.00	0.00
173.00	5.85	18.89	6.33	1.17	0.00	0.00
174.00	5.86	18.90	6.33	1.17	0.00	0.00
175.00	5.86	18.90	6.33	1.17	0.00	0.00
176.00	5.86	18.90	6.33	1.17	0.00	0.00
177.00	5.87	18.91	6.33	1.17	0.00	0.00
178.00	5.87	18.91	6.33	1.17	0.00	0.00
179.00	5.88	18.91	6.33	1.17	0.00	0.00
180.00	5.88	18.91	6.33	1.17	0.00	0.00
181.00	5.88	18.91	6.33	1.17	0.00	0.00
182.00	5.89	18.92	6.33	1.17	0.00	0.00
183.00	5.89	18.92	6.33	1.17	0.00	0.00
184.00	5.90	18.92	6.33	1.17	0.00	0.00
185.00	5.90	18.92	6.33	1.17	0.00	0.00
186.00	5.91	18.92	6.33	1.17	0.00	0.00
187.00	5.91	18.92	6.33	1.17	0.00	0.00
188.00	5.92	18.92	6.33	1.17	0.00	0.00
189.00	5.92	18.92	6.33	1.17	0.00	0.00
190.00	5.93	18.92	6.33	1.17	0.00	0.00
191.00	5.93	18.92	6.33	1.17	0.00	0.00
192.00	5.94	18.92	6.33	1.17	0.00	0.00
193.00	5.94	18.92	6.50	1.00	0.00	0.00
194.00	5.95	18.92	6.50	1.00	0.00	0.00
195.00	5.95	18.92	6.50	1.00	0.00	0.00
196.00	5.96	18.92	6.50	1.00	0.00	0.00
197.00	5.97	18.92	6.50	1.00	0.00	0.00
198.00	5.97	18.92	6.50	1.00	0.00	0.00

199.00	5.98	18.91	6.50	1.00	0.00	0.00
200.00	5.98	18.91	6.50	0.83	0.00	0.00
201.00	5.99	18.91	6.50	0.83	0.00	0.00
202.00	5.99	18.90	6.50	0.83	0.00	0.00
203.00	6.00	18.90	6.50	0.83	0.00	0.00
204.00	6.00	18.90	6.50	0.83	0.00	0.00
205.00	6.01	18.89	6.50	0.83	0.00	0.00
206.00	6.01	18.89	6.50	0.83	0.00	0.00
207.00	6.01	18.89	6.50	0.83	0.00	0.00
208.00	6.02	18.88	6.67	0.67	0.00	0.00
209.00	6.02	18.88	6.67	0.67	0.00	0.00
210.00	6.03	18.87	6.67	0.50	0.00	0.00
211.00	6.03	18.87	6.67	0.50	0.00	0.00
212.00	6.04	18.86	6.67	0.50	0.00	0.00
213.00	6.04	18.85	6.83	0.33	0.00	0.00
214.00	6.05	18.85	6.83	0.17	0.00	0.00
215.00	6.05	18.84	0.00	0.00	0.00	0.00
216.00	6.05	18.83	0.00	0.00	0.00	0.00
217.00	6.06	18.83	0.00	0.00	0.00	0.00
218.00	6.06	18.82	0.00	0.00	0.00	0.00
219.00	6.07	18.81	0.00	0.00	0.00	0.00
220.00	6.07	18.80	0.00	0.00	0.00	0.00
221.00	6.07	18.80	0.00	0.00	0.00	0.00
222.00	6.08	18.79	0.00	0.00	0.00	0.00
223.00	6.08	18.78	0.00	0.00	0.00	0.00
224.00	6.08	18.77	0.00	0.00	0.00	0.00
225.00	6.09	18.76	0.00	0.00	0.00	0.00
226.00	6.09	18.75	0.00	0.00	0.00	0.00
227.00	6.09	18.74	0.00	0.00	0.00	0.00
228.00	6.10	18.73	0.00	0.00	0.00	0.00
229.00	6.10	18.73	0.00	0.00	0.00	0.00
230.00	6.10	18.72	0.00	0.00	0.00	0.00
231.00	6.10	18.71	0.00	0.00	0.00	0.00
232.00	6.11	18.69	0.00	0.00	0.00	0.00
233.00	6.11	18.68	0.00	0.00	0.00	0.00
234.00	6.11	18.67	0.00	0.00	0.00	0.00
235.00	6.11	18.66	0.00	0.00	0.00	0.00
236.00	6.12	18.65	0.00	0.00	0.00	0.00
237.00	6.12	18.64	0.00	0.00	0.00	0.00
238.00	6.12	18.63	0.00	0.00	0.00	0.00
239.00	6.12	18.62	0.00	0.00	0.00	0.00
240.00	6.12	18.61	0.00	0.00	0.00	0.00

241.00	6.13	18.60	0.00	0.00	0.00	0.00
242.00	6.13	18.58	0.00	0.00	0.00	0.00
243.00	6.13	18.57	0.00	0.00	0.00	0.00
244.00	6.13	18.56	0.00	0.00	0.00	0.00
245.00	6.13	18.55	0.00	0.00	0.00	0.00
246.00	6.13	18.54	0.00	0.00	0.00	0.00
247.00	6.14	18.52	0.00	0.00	0.00	0.00
248.00	6.14	18.51	0.00	0.00	0.00	0.00
249.00	6.14	18.50	0.00	0.00	0.00	0.00
250.00	6.14	18.49	0.00	0.00	0.00	0.00
251.00	6.14	18.47	0.00	0.00	0.00	0.00
252.00	6.14	18.46	0.00	0.00	0.00	0.00
253.00	6.14	18.45	0.00	0.00	0.00	0.00
254.00	6.14	18.43	0.00	0.00	0.00	0.00
255.00	6.15	18.42	0.00	0.00	0.00	0.00
256.00	6.15	18.41	0.00	0.00	0.00	0.00
257.00	6.15	18.40	0.00	0.00	0.00	0.00
258.00	6.15	18.38	0.00	0.00	0.00	0.00
259.00	6.15	18.37	0.00	0.00	0.00	0.00
260.00	6.15	18.36	0.00	0.00	0.00	0.00
261.00	6.15	18.34	0.00	0.00	0.00	0.00
262.00	6.15	18.33	0.00	0.00	0.00	0.00
263.00	6.16	18.32	0.00	0.00	0.00	0.00
264.00	6.16	18.30	0.00	0.00	0.00	0.00
265.00	6.16	18.29	0.00	0.00	0.00	0.00
266.00	6.16	18.28	0.00	0.00	0.00	0.00
267.00	6.16	18.26	0.00	0.00	0.00	0.00
268.00	6.16	18.25	0.00	0.00	0.00	0.00
269.00	6.16	18.24	0.00	0.00	0.00	0.00
270.00	6.16	18.23	0.00	0.00	0.00	0.00
271.00	6.17	18.21	0.00	0.00	0.00	0.00
272.00	6.17	18.20	0.00	0.00	0.00	0.00
273.00	6.17	18.19	0.00	0.00	0.00	0.00
274.00	6.17	18.18	0.00	0.00	0.00	0.00
275.00	6.17	18.16	0.00	0.00	0.00	0.00
276.00	6.17	18.15	0.00	0.00	0.00	0.00
277.00	6.18	18.14	0.00	0.00	0.00	0.00
278.00	6.18	18.13	0.00	0.00	0.00	0.00
279.00	6.18	18.11	0.00	0.00	0.00	0.00
280.00	6.18	18.10	0.00	0.00	0.00	0.00
281.00	6.18	18.09	0.00	0.00	0.00	0.00
282.00	6.19	18.08	0.00	0.00	0.00	0.00

283.00	6.19	18.07	0.00	0.00	0.00	0.00
284.00	6.19	18.06	0.00	0.00	0.00	0.00
285.00	6.19	18.04	0.00	0.00	0.00	0.00
286.00	6.20	18.03	0.00	0.00	0.00	0.00
287.00	6.20	18.02	0.00	0.00	0.00	0.00
288.00	6.20	18.01	0.00	0.00	0.00	0.00
289.00	6.21	18.00	0.00	0.00	0.00	0.00
290.00	6.21	17.99	0.00	0.00	0.00	0.00
291.00	6.21	17.98	0.00	0.00	0.00	0.00
292.00	6.22	17.97	0.00	0.00	0.00	0.00
293.00	6.22	17.96	0.00	0.00	0.00	0.00
294.00	6.22	17.95	0.00	0.00	0.00	0.00
295.00	6.23	17.94	0.00	0.00	0.00	0.00
296.00	6.23	17.93	0.00	0.00	0.00	0.00
297.00	6.24	17.92	0.00	0.00	0.00	0.00
298.00	6.24	17.91	0.00	0.00	0.00	0.00
299.00	6.25	17.91	0.00	0.00	0.00	0.00
300.00	6.25	17.90	0.00	0.00	0.00	0.00
301.00	6.26	17.89	0.00	0.00	0.00	0.00
302.00	6.26	17.88	0.00	0.00	0.00	0.00
303.00	6.27	17.87	0.00	0.00	0.00	0.00
304.00	6.27	17.87	0.00	0.00	0.00	0.00
305.00	6.28	17.86	0.00	0.00	0.00	0.00
306.00	6.28	17.85	0.00	0.00	0.00	0.00
307.00	6.29	17.85	0.00	0.00	0.00	0.00
308.00	6.29	17.84	0.00	0.00	0.00	0.00
309.00	6.30	17.83	0.00	0.00	0.00	0.00
310.00	6.31	17.83	0.00	0.00	0.00	0.00
311.00	6.31	17.82	0.00	0.00	0.00	0.00
312.00	6.32	17.82	0.00	0.00	0.00	0.00
313.00	6.33	17.81	0.00	0.00	0.00	0.00
314.00	6.33	17.81	0.00	0.00	0.00	0.00
315.00	6.34	17.81	0.00	0.00	0.00	0.00
316.00	6.35	17.80	0.00	0.00	0.00	0.00
317.00	6.36	17.80	0.00	0.00	0.00	0.00
318.00	6.36	17.80	0.00	0.00	0.00	0.00
319.00	6.37	17.79	0.00	0.00	0.00	0.00
320.00	6.38	17.79	0.00	0.00	0.00	0.00
321.00	6.39	17.79	0.00	0.00	0.00	0.00
322.00	6.40	17.79	0.00	0.00	0.00	0.00
323.00	6.40	17.79	0.00	0.00	0.00	0.00
324.00	6.41	17.78	0.00	0.00	0.00	0.00

325.00	6.42	17.78	0.00	0.00	0.00	0.00
326.00	6.43	17.78	0.00	0.00	0.00	0.00
327.00	6.44	17.78	0.00	0.00	0.00	0.00
328.00	6.45	17.78	0.00	0.00	0.00	0.00
329.00	6.46	17.78	0.00	0.00	0.00	0.00
330.00	6.47	17.79	0.00	0.00	0.00	0.00
331.00	6.47	17.79	0.00	0.00	0.00	0.00
332.00	6.48	17.79	0.00	0.00	0.00	0.00
333.00	6.49	17.79	0.00	0.00	0.00	0.00
334.00	6.50	17.79	0.00	0.00	0.00	0.00
335.00	6.51	17.80	0.00	0.00	0.00	0.00
336.00	6.52	17.80	0.00	0.00	0.00	0.00
337.00	6.53	17.80	0.00	0.00	7.50	0.17
338.00	6.54	17.80	0.00	0.00	7.50	0.17
339.00	6.55	17.81	0.00	0.00	7.33	0.33
340.00	6.56	17.81	0.00	0.00	7.33	0.33
341.00	6.57	17.82	0.00	0.00	7.33	0.33
342.00	6.58	17.82	0.00	0.00	7.33	0.50
343.00	6.59	17.83	0.00	0.00	7.33	0.50
344.00	6.60	17.83	0.00	0.00	7.33	0.50
345.00	6.61	17.84	0.00	0.00	7.33	0.50
346.00	6.62	17.84	0.00	0.00	7.33	0.50
347.00	6.63	17.85	0.00	0.00	7.33	0.50
348.00	6.63	17.86	0.00	0.00	7.33	0.50
349.00	6.64	17.86	0.00	0.00	7.33	0.50
350.00	6.65	17.87	0.00	0.00	7.33	0.67
351.00	6.66	17.88	0.00	0.00	7.33	0.67
352.00	6.67	17.88	0.00	0.00	7.33	0.67
353.00	6.68	17.89	0.00	0.00	7.33	0.67
354.00	6.69	17.90	0.00	0.00	7.33	0.67
355.00	6.70	17.91	0.00	0.00	7.33	0.67
356.00	6.71	17.92	0.00	0.00	7.33	0.67
357.00	6.71	17.92	0.00	0.00	7.33	0.67
358.00	6.72	17.93	0.00	0.00	7.50	0.50
359.00	6.73	17.94	0.00	0.00	7.50	0.50
360.00	6.74	17.95	0.00	0.00	7.50	0.50
361.00	6.74	17.96	0.00	0.00	7.50	0.50
362.00	6.75	17.97	0.00	0.00	7.50	0.50
363.00	6.76	17.98	0.00	0.00	7.50	0.50
364.00	6.77	17.99	0.00	0.00	7.50	0.50
365.00	6.77	18.00	0.00	0.00	7.50	0.50
366.00	6.78	18.01	0.00	0.00	7.50	0.50



Receptor Analysis from Windfarm Software for Receptor -7

1.0	Sunrise	Sunset	Turbine ID:18(ASP-23)	
1.0	6.8	18.0	7.2	0.8
2.0	6.8	18.0	7.2	0.8
3.0	6.8	18.0	7.2	0.8
4.0	6.8	18.0	7.2	0.8
5.0	6.8	18.0	7.2	0.8
6.0	6.8	18.1	7.2	0.8
7.0	6.8	18.1	7.2	0.8
8.0	6.8	18.1	7.2	0.8
9.0	6.8	18.1	7.2	0.8
10.0	6.8	18.1	7.2	0.8
11.0	6.8	18.1	7.2	1.0
12.0	6.8	18.1	7.2	1.0
13.0	6.8	18.1	7.2	1.0
14.0	6.8	18.1	7.2	1.0
15.0	6.8	18.1	7.2	1.0
16.0	6.8	18.2	7.2	1.0
17.0	6.8	18.2	7.2	1.0
18.0	6.8	18.2	7.2	1.0
19.0	6.8	18.2	7.2	1.0
20.0	6.8	18.2	7.2	1.0
21.0	6.8	18.2	7.2	1.0
22.0	6.8	18.2	7.2	1.0
23.0	6.8	18.2	7.3	0.8
24.0	6.8	18.2	7.3	0.8
25.0	6.8	18.2	7.3	0.8
26.0	6.8	18.2	7.3	0.8
27.0	6.8	18.3	7.3	0.8
28.0	6.8	18.3	7.3	0.8
29.0	6.8	18.3	7.3	0.8
30.0	6.8	18.3	7.3	0.8
31.0	6.8	18.3	7.3	0.8
32.0	6.8	18.3	7.3	0.8
33.0	6.8	18.3	7.3	0.8
34.0	6.8	18.3	7.3	0.8
35.0	6.8	18.3	7.3	0.8
36.0	6.8	18.3	7.3	0.8
37.0	6.8	18.3	7.5	0.5
38.0	6.8	18.3	7.5	0.5
39.0	6.8	18.4	7.5	0.5
40.0	6.8	18.4	7.5	0.5
41.0	6.8	18.4	7.5	0.5

42.0	6.8	18.4	7.5	0.5
43.0	6.8	18.4	7.7	0.2
44.0	6.8	18.4	0.0	0.0
45.0	6.8	18.4	0.0	0.0
46.0	6.8	18.4	0.0	0.0
47.0	6.8	18.4	0.0	0.0
48.0	6.7	18.4	0.0	0.0
49.0	6.7	18.4	0.0	0.0
50.0	6.7	18.4	0.0	0.0
51.0	6.7	18.4	0.0	0.0
52.0	6.7	18.4	0.0	0.0
53.0	6.7	18.4	0.0	0.0
54.0	6.7	18.4	0.0	0.0
55.0	6.7	18.4	0.0	0.0
56.0	6.7	18.4	0.0	0.0
57.0	6.7	18.5	0.0	0.0
58.0	6.7	18.5	0.0	0.0
59.0	6.6	18.5	0.0	0.0
60.0	6.6	18.5	0.0	0.0
61.0	6.6	18.5	0.0	0.0
62.0	6.6	18.5	0.0	0.0
63.0	6.6	18.5	0.0	0.0
64.0	6.6	18.5	0.0	0.0
65.0	6.6	18.5	0.0	0.0
66.0	6.6	18.5	0.0	0.0
67.0	6.6	18.5	0.0	0.0
68.0	6.5	18.5	0.0	0.0
69.0	6.5	18.5	0.0	0.0
70.0	6.5	18.5	0.0	0.0
71.0	6.5	18.5	0.0	0.0
72.0	6.5	18.5	0.0	0.0
73.0	6.5	18.5	0.0	0.0
74.0	6.5	18.5	0.0	0.0
75.0	6.5	18.5	0.0	0.0
76.0	6.5	18.5	0.0	0.0
77.0	6.4	18.5	0.0	0.0
78.0	6.4	18.5	0.0	0.0
79.0	6.4	18.5	0.0	0.0
80.0	6.4	18.5	0.0	0.0
81.0	6.4	18.5	0.0	0.0
82.0	6.4	18.5	0.0	0.0
83.0	6.4	18.5	0.0	0.0

84.0	6.4	18.5	0.0	0.0
85.0	6.3	18.5	0.0	0.0
86.0	6.3	18.5	0.0	0.0
87.0	6.3	18.5	0.0	0.0
88.0	6.3	18.5	0.0	0.0
89.0	6.3	18.5	0.0	0.0
90.0	6.3	18.5	0.0	0.0
91.0	6.3	18.5	0.0	0.0
92.0	6.3	18.5	0.0	0.0
93.0	6.2	18.6	0.0	0.0
94.0	6.2	18.6	0.0	0.0
95.0	6.2	18.6	0.0	0.0
96.0	6.2	18.6	0.0	0.0
97.0	6.2	18.6	0.0	0.0
98.0	6.2	18.6	0.0	0.0
99.0	6.2	18.6	0.0	0.0
100.0	6.2	18.6	0.0	0.0
101.0	6.2	18.6	0.0	0.0
102.0	6.1	18.6	0.0	0.0
103.0	6.1	18.6	0.0	0.0
104.0	6.1	18.6	0.0	0.0
105.0	6.1	18.6	0.0	0.0
106.0	6.1	18.6	0.0	0.0
107.0	6.1	18.6	0.0	0.0
108.0	6.1	18.6	0.0	0.0
109.0	6.1	18.6	0.0	0.0
110.0	6.1	18.6	0.0	0.0
111.0	6.0	18.6	0.0	0.0
112.0	6.0	18.6	0.0	0.0
113.0	6.0	18.6	0.0	0.0
114.0	6.0	18.6	0.0	0.0
115.0	6.0	18.6	0.0	0.0
116.0	6.0	18.6	0.0	0.0
117.0	6.0	18.6	0.0	0.0
118.0	6.0	18.6	0.0	0.0
119.0	6.0	18.6	0.0	0.0
120.0	6.0	18.6	0.0	0.0
121.0	6.0	18.6	0.0	0.0
122.0	5.9	18.6	0.0	0.0
123.0	5.9	18.6	0.0	0.0
124.0	5.9	18.6	0.0	0.0
125.0	5.9	18.7	0.0	0.0

126.0	5.9	18.7	0.0	0.0
127.0	5.9	18.7	0.0	0.0
128.0	5.9	18.7	0.0	0.0
129.0	5.9	18.7	0.0	0.0
130.0	5.9	18.7	0.0	0.0
131.0	5.9	18.7	0.0	0.0
132.0	5.9	18.7	0.0	0.0
133.0	5.9	18.7	0.0	0.0
134.0	5.9	18.7	0.0	0.0
135.0	5.9	18.7	0.0	0.0
136.0	5.9	18.7	0.0	0.0
137.0	5.9	18.7	0.0	0.0
138.0	5.8	18.7	0.0	0.0
139.0	5.8	18.7	0.0	0.0
140.0	5.8	18.7	0.0	0.0
141.0	5.8	18.7	0.0	0.0
142.0	5.8	18.7	0.0	0.0
143.0	5.8	18.7	0.0	0.0
144.0	5.8	18.7	0.0	0.0
145.0	5.8	18.8	0.0	0.0
146.0	5.8	18.8	0.0	0.0
147.0	5.8	18.8	0.0	0.0
148.0	5.8	18.8	0.0	0.0
149.0	5.8	18.8	0.0	0.0
150.0	5.8	18.8	0.0	0.0
151.0	5.8	18.8	0.0	0.0
152.0	5.8	18.8	0.0	0.0
153.0	5.8	18.8	0.0	0.0
154.0	5.8	18.8	0.0	0.0
155.0	5.8	18.8	0.0	0.0
156.0	5.8	18.8	0.0	0.0
157.0	5.8	18.8	0.0	0.0
158.0	5.8	18.8	0.0	0.0
159.0	5.8	18.8	0.0	0.0
160.0	5.8	18.8	0.0	0.0
161.0	5.8	18.8	0.0	0.0
162.0	5.8	18.8	0.0	0.0
163.0	5.8	18.8	0.0	0.0
164.0	5.8	18.9	0.0	0.0
165.0	5.8	18.9	0.0	0.0
166.0	5.8	18.9	0.0	0.0
167.0	5.8	18.9	0.0	0.0

168.0	5.8	18.9	0.0	0.0
169.0	5.8	18.9	0.0	0.0
170.0	5.8	18.9	0.0	0.0
171.0	5.8	18.9	0.0	0.0
172.0	5.8	18.9	0.0	0.0
173.0	5.9	18.9	0.0	0.0
174.0	5.9	18.9	0.0	0.0
175.0	5.9	18.9	0.0	0.0
176.0	5.9	18.9	0.0	0.0
177.0	5.9	18.9	0.0	0.0
178.0	5.9	18.9	0.0	0.0
179.0	5.9	18.9	0.0	0.0
180.0	5.9	18.9	0.0	0.0
181.0	5.9	18.9	0.0	0.0
182.0	5.9	18.9	0.0	0.0
183.0	5.9	18.9	0.0	0.0
184.0	5.9	18.9	0.0	0.0
185.0	5.9	18.9	0.0	0.0
186.0	5.9	18.9	0.0	0.0
187.0	5.9	18.9	0.0	0.0
188.0	5.9	18.9	0.0	0.0
189.0	5.9	18.9	0.0	0.0
190.0	5.9	18.9	0.0	0.0
191.0	5.9	18.9	0.0	0.0
192.0	5.9	18.9	0.0	0.0
193.0	5.9	18.9	0.0	0.0
194.0	5.9	18.9	0.0	0.0
195.0	6.0	18.9	0.0	0.0
196.0	6.0	18.9	0.0	0.0
197.0	6.0	18.9	0.0	0.0
198.0	6.0	18.9	0.0	0.0
199.0	6.0	18.9	0.0	0.0
200.0	6.0	18.9	0.0	0.0
201.0	6.0	18.9	0.0	0.0
202.0	6.0	18.9	0.0	0.0
203.0	6.0	18.9	0.0	0.0
204.0	6.0	18.9	0.0	0.0
205.0	6.0	18.9	0.0	0.0
206.0	6.0	18.9	0.0	0.0
207.0	6.0	18.9	0.0	0.0
208.0	6.0	18.9	0.0	0.0
209.0	6.0	18.9	0.0	0.0

210.0	6.0	18.9	0.0	0.0
211.0	6.0	18.9	0.0	0.0
212.0	6.0	18.9	0.0	0.0
213.0	6.0	18.9	0.0	0.0
214.0	6.0	18.8	0.0	0.0
215.0	6.0	18.8	0.0	0.0
216.0	6.1	18.8	0.0	0.0
217.0	6.1	18.8	0.0	0.0
218.0	6.1	18.8	0.0	0.0
219.0	6.1	18.8	0.0	0.0
220.0	6.1	18.8	0.0	0.0
221.0	6.1	18.8	0.0	0.0
222.0	6.1	18.8	0.0	0.0
223.0	6.1	18.8	0.0	0.0
224.0	6.1	18.8	0.0	0.0
225.0	6.1	18.8	0.0	0.0
226.0	6.1	18.8	0.0	0.0
227.0	6.1	18.7	0.0	0.0
228.0	6.1	18.7	0.0	0.0
229.0	6.1	18.7	0.0	0.0
230.0	6.1	18.7	0.0	0.0
231.0	6.1	18.7	0.0	0.0
232.0	6.1	18.7	0.0	0.0
233.0	6.1	18.7	0.0	0.0
234.0	6.1	18.7	0.0	0.0
235.0	6.1	18.7	0.0	0.0
236.0	6.1	18.7	0.0	0.0
237.0	6.1	18.6	0.0	0.0
238.0	6.1	18.6	0.0	0.0
239.0	6.1	18.6	0.0	0.0
240.0	6.1	18.6	0.0	0.0
241.0	6.1	18.6	0.0	0.0
242.0	6.1	18.6	0.0	0.0
243.0	6.1	18.6	0.0	0.0
244.0	6.1	18.6	0.0	0.0
245.0	6.1	18.5	0.0	0.0
246.0	6.1	18.5	0.0	0.0
247.0	6.1	18.5	0.0	0.0
248.0	6.1	18.5	0.0	0.0
249.0	6.1	18.5	0.0	0.0
250.0	6.1	18.5	0.0	0.0
251.0	6.1	18.5	0.0	0.0

252.0	6.1	18.5	0.0	0.0
253.0	6.1	18.4	0.0	0.0
254.0	6.1	18.4	0.0	0.0
255.0	6.1	18.4	0.0	0.0
256.0	6.1	18.4	0.0	0.0
257.0	6.1	18.4	0.0	0.0
258.0	6.1	18.4	0.0	0.0
259.0	6.2	18.4	0.0	0.0
260.0	6.2	18.4	0.0	0.0
261.0	6.2	18.3	0.0	0.0
262.0	6.2	18.3	0.0	0.0
263.0	6.2	18.3	0.0	0.0
264.0	6.2	18.3	0.0	0.0
265.0	6.2	18.3	0.0	0.0
266.0	6.2	18.3	0.0	0.0
267.0	6.2	18.3	0.0	0.0
268.0	6.2	18.3	0.0	0.0
269.0	6.2	18.2	0.0	0.0
270.0	6.2	18.2	0.0	0.0
271.0	6.2	18.2	0.0	0.0
272.0	6.2	18.2	0.0	0.0
273.0	6.2	18.2	0.0	0.0
274.0	6.2	18.2	0.0	0.0
275.0	6.2	18.2	0.0	0.0
276.0	6.2	18.2	0.0	0.0
277.0	6.2	18.1	0.0	0.0
278.0	6.2	18.1	0.0	0.0
279.0	6.2	18.1	0.0	0.0
280.0	6.2	18.1	0.0	0.0
281.0	6.2	18.1	0.0	0.0
282.0	6.2	18.1	0.0	0.0
283.0	6.2	18.1	0.0	0.0
284.0	6.2	18.1	0.0	0.0
285.0	6.2	18.0	0.0	0.0
286.0	6.2	18.0	0.0	0.0
287.0	6.2	18.0	0.0	0.0
288.0	6.2	18.0	0.0	0.0
289.0	6.2	18.0	0.0	0.0
290.0	6.2	18.0	0.0	0.0
291.0	6.2	18.0	0.0	0.0
292.0	6.2	18.0	0.0	0.0
293.0	6.2	18.0	0.0	0.0

294.0	6.2	17.9	0.0	0.0
295.0	6.2	17.9	0.0	0.0
296.0	6.2	17.9	0.0	0.0
297.0	6.2	17.9	0.0	0.0
298.0	6.2	17.9	0.0	0.0
299.0	6.2	17.9	0.0	0.0
300.0	6.3	17.9	0.0	0.0
301.0	6.3	17.9	0.0	0.0
302.0	6.3	17.9	0.0	0.0
303.0	6.3	17.9	0.0	0.0
304.0	6.3	17.9	7.2	0.2
305.0	6.3	17.9	7.0	0.5
306.0	6.3	17.9	7.0	0.5
307.0	6.3	17.8	7.0	0.5
308.0	6.3	17.8	7.0	0.5
309.0	6.3	17.8	7.0	0.5
310.0	6.3	17.8	7.0	0.5
311.0	6.3	17.8	6.8	0.8
312.0	6.3	17.8	6.8	0.8
313.0	6.3	17.8	6.8	0.8
314.0	6.3	17.8	6.8	0.8
315.0	6.3	17.8	6.8	0.8
316.0	6.3	17.8	6.8	0.8
317.0	6.4	17.8	6.8	0.8
318.0	6.4	17.8	6.8	0.8
319.0	6.4	17.8	6.8	0.8
320.0	6.4	17.8	6.8	0.8
321.0	6.4	17.8	6.8	0.8
322.0	6.4	17.8	6.8	0.8
323.0	6.4	17.8	6.8	0.8
324.0	6.4	17.8	6.8	0.8
325.0	6.4	17.8	6.8	0.8
326.0	6.4	17.8	6.8	0.8
327.0	6.4	17.8	6.8	0.8
328.0	6.4	17.8	6.8	0.8
329.0	6.5	17.8	6.8	1.0
330.0	6.5	17.8	6.8	1.0
331.0	6.5	17.8	6.8	1.0
332.0	6.5	17.8	6.8	1.0
333.0	6.5	17.8	6.8	1.0
334.0	6.5	17.8	6.8	1.0
335.0	6.5	17.8	6.8	1.0

336.0	6.5	17.8	6.8	1.0
337.0	6.5	17.8	7.0	0.8
338.0	6.5	17.8	7.0	0.8
339.0	6.5	17.8	7.0	0.8
340.0	6.6	17.8	7.0	0.8
341.0	6.6	17.8	7.0	0.8
342.0	6.6	17.8	7.0	0.8
343.0	6.6	17.8	7.0	0.8
344.0	6.6	17.8	7.0	0.8
345.0	6.6	17.8	7.0	0.8
346.0	6.6	17.8	7.0	0.8
347.0	6.6	17.9	7.0	0.8
348.0	6.6	17.9	7.0	0.8
349.0	6.6	17.9	7.0	0.8
350.0	6.7	17.9	7.0	0.8
351.0	6.7	17.9	7.0	0.8
352.0	6.7	17.9	7.0	0.8
353.0	6.7	17.9	7.0	0.8
354.0	6.7	17.9	7.0	0.8
355.0	6.7	17.9	7.0	0.8
356.0	6.7	17.9	7.2	0.7
357.0	6.7	17.9	7.2	0.7
358.0	6.7	17.9	7.2	0.8
359.0	6.7	17.9	7.2	0.8
360.0	6.7	18.0	7.2	0.8
361.0	6.7	18.0	7.2	0.8
362.0	6.8	18.0	7.2	0.8
363.0	6.8	18.0	7.2	0.8
364.0	6.8	18.0	7.2	0.8
365.0	6.8	18.0	7.2	0.8
366.0	6.8	18.0	7.2	0.8

Table: 6: Receptor Analysis from Windfarm Software for Receptor -11

1.0	sunrise	sunset	Turbine ID:17(ASP-22)	
1.0	6.8	18.0	0.0	0.0
2.0	6.8	18.0	0.0	0.0
3.0	6.8	18.0	0.0	0.0
4.0	6.8	18.0	0.0	0.0
5.0	6.8	18.0	0.0	0.0
6.0	6.8	18.1	0.0	0.0
7.0	6.8	18.1	0.0	0.0

8.0	6.8	18.1	0.0	0.0
9.0	6.8	18.1	0.0	0.0
10.0	6.8	18.1	0.0	0.0
11.0	6.8	18.1	0.0	0.0
12.0	6.8	18.1	0.0	0.0
13.0	6.8	18.1	0.0	0.0
14.0	6.8	18.1	0.0	0.0
15.0	6.8	18.1	0.0	0.0
16.0	6.8	18.2	0.0	0.0
17.0	6.8	18.2	0.0	0.0
18.0	6.8	18.2	0.0	0.0
19.0	6.8	18.2	0.0	0.0
20.0	6.8	18.2	0.0	0.0
21.0	6.8	18.2	0.0	0.0
22.0	6.8	18.2	0.0	0.0
23.0	6.8	18.2	0.0	0.0
24.0	6.8	18.2	0.0	0.0
25.0	6.8	18.2	0.0	0.0
26.0	6.8	18.2	0.0	0.0
27.0	6.8	18.3	0.0	0.0
28.0	6.8	18.3	0.0	0.0
29.0	6.8	18.3	0.0	0.0
30.0	6.8	18.3	0.0	0.0
31.0	6.8	18.3	0.0	0.0
32.0	6.8	18.3	0.0	0.0
33.0	6.8	18.3	0.0	0.0
34.0	6.8	18.3	0.0	0.0
35.0	6.8	18.3	0.0	0.0
36.0	6.8	18.3	0.0	0.0
37.0	6.8	18.3	0.0	0.0
38.0	6.8	18.3	0.0	0.0
39.0	6.8	18.4	0.0	0.0
40.0	6.8	18.4	0.0	0.0
41.0	6.8	18.4	0.0	0.0
42.0	6.8	18.4	0.0	0.0
43.0	6.8	18.4	0.0	0.0
44.0	6.8	18.4	0.0	0.0
45.0	6.8	18.4	0.0	0.0
46.0	6.8	18.4	0.0	0.0
47.0	6.8	18.4	0.0	0.0
48.0	6.7	18.4	0.0	0.0
49.0	6.7	18.4	0.0	0.0

50.0	6.7	18.4	0.0	0.0
51.0	6.7	18.4	0.0	0.0
52.0	6.7	18.4	0.0	0.0
53.0	6.7	18.4	0.0	0.0
54.0	6.7	18.4	0.0	0.0
55.0	6.7	18.4	0.0	0.0
56.0	6.7	18.4	0.0	0.0
57.0	6.7	18.5	0.0	0.0
58.0	6.7	18.5	0.0	0.0
59.0	6.6	18.5	0.0	0.0
60.0	6.6	18.5	0.0	0.0
61.0	6.6	18.5	0.0	0.0
62.0	6.6	18.5	0.0	0.0
63.0	6.6	18.5	0.0	0.0
64.0	6.6	18.5	0.0	0.0
65.0	6.6	18.5	0.0	0.0
66.0	6.6	18.5	0.0	0.0
67.0	6.6	18.5	0.0	0.0
68.0	6.5	18.5	0.0	0.0
69.0	6.5	18.5	0.0	0.0
70.0	6.5	18.5	0.0	0.0
71.0	6.5	18.5	0.0	0.0
72.0	6.5	18.5	0.0	0.0
73.0	6.5	18.5	0.0	0.0
74.0	6.5	18.5	0.0	0.0
75.0	6.5	18.5	0.0	0.0
76.0	6.5	18.5	0.0	0.0
77.0	6.4	18.5	0.0	0.0
78.0	6.4	18.5	0.0	0.0
79.0	6.4	18.5	0.0	0.0
80.0	6.4	18.5	0.0	0.0
81.0	6.4	18.5	0.0	0.0
82.0	6.4	18.5	0.0	0.0
83.0	6.4	18.5	0.0	0.0
84.0	6.4	18.5	0.0	0.0
85.0	6.3	18.5	0.0	0.0
86.0	6.3	18.5	0.0	0.0
87.0	6.3	18.5	0.0	0.0
88.0	6.3	18.5	0.0	0.0
89.0	6.3	18.5	0.0	0.0
90.0	6.3	18.5	0.0	0.0
91.0	6.3	18.5	0.0	0.0

92.0	6.3	18.5	0.0	0.0
93.0	6.2	18.6	0.0	0.0
94.0	6.2	18.6	0.0	0.0
95.0	6.2	18.6	0.0	0.0
96.0	6.2	18.6	0.0	0.0
97.0	6.2	18.6	6.8	0.2
98.0	6.2	18.6	6.7	0.5
99.0	6.2	18.6	6.7	0.5
100.0	6.2	18.6	6.7	0.5
101.0	6.2	18.6	6.7	0.5
102.0	6.1	18.6	6.5	0.8
103.0	6.1	18.6	6.5	0.8
104.0	6.1	18.6	6.5	0.8
105.0	6.1	18.6	6.5	0.8
106.0	6.1	18.6	6.5	0.8
107.0	6.1	18.6	6.5	0.8
108.0	6.1	18.6	6.5	0.8
109.0	6.1	18.6	6.5	0.8
110.0	6.1	18.6	6.5	0.8
111.0	6.0	18.6	6.5	0.8
112.0	6.0	18.6	6.5	0.8
113.0	6.0	18.6	6.5	0.8
114.0	6.0	18.6	6.3	1.0
115.0	6.0	18.6	6.3	1.0
116.0	6.0	18.6	6.3	1.0
117.0	6.0	18.6	6.3	1.0
118.0	6.0	18.6	6.3	1.0
119.0	6.0	18.6	6.3	1.0
120.0	6.0	18.6	6.3	1.0
121.0	6.0	18.6	6.3	1.0
122.0	5.9	18.6	6.3	1.0
123.0	5.9	18.6	6.3	1.0
124.0	5.9	18.6	6.3	1.0
125.0	5.9	18.7	6.5	0.8
126.0	5.9	18.7	6.5	0.8
127.0	5.9	18.7	6.5	0.8
128.0	5.9	18.7	6.5	0.7
129.0	5.9	18.7	6.5	0.7
130.0	5.9	18.7	6.5	0.7
131.0	5.9	18.7	6.5	0.7
132.0	5.9	18.7	6.5	0.7
133.0	5.9	18.7	6.5	0.7

134.0	5.9	18.7	6.5	0.7
135.0	5.9	18.7	6.5	0.7
136.0	5.9	18.7	6.5	0.7
137.0	5.9	18.7	6.5	0.7
138.0	5.8	18.7	6.7	0.3
139.0	5.8	18.7	6.7	0.3
140.0	5.8	18.7	6.7	0.3
141.0	5.8	18.7	6.7	0.3
142.0	5.8	18.7	6.8	0.2
143.0	5.8	18.7	0.0	0.0
144.0	5.8	18.7	0.0	0.0
145.0	5.8	18.8	0.0	0.0
146.0	5.8	18.8	0.0	0.0
147.0	5.8	18.8	0.0	0.0
148.0	5.8	18.8	0.0	0.0
149.0	5.8	18.8	0.0	0.0
150.0	5.8	18.8	0.0	0.0
151.0	5.8	18.8	0.0	0.0
152.0	5.8	18.8	0.0	0.0
153.0	5.8	18.8	0.0	0.0
154.0	5.8	18.8	0.0	0.0
155.0	5.8	18.8	0.0	0.0
156.0	5.8	18.8	0.0	0.0
157.0	5.8	18.8	0.0	0.0
158.0	5.8	18.8	0.0	0.0
159.0	5.8	18.8	0.0	0.0
160.0	5.8	18.8	0.0	0.0
161.0	5.8	18.8	0.0	0.0
162.0	5.8	18.8	0.0	0.0
163.0	5.8	18.8	0.0	0.0
164.0	5.8	18.9	0.0	0.0
165.0	5.8	18.9	0.0	0.0
166.0	5.8	18.9	0.0	0.0
167.0	5.8	18.9	0.0	0.0
168.0	5.8	18.9	0.0	0.0
169.0	5.8	18.9	0.0	0.0
170.0	5.8	18.9	0.0	0.0
171.0	5.8	18.9	0.0	0.0
172.0	5.8	18.9	0.0	0.0
173.0	5.9	18.9	0.0	0.0
174.0	5.9	18.9	0.0	0.0
175.0	5.9	18.9	0.0	0.0

176.0	5.9	18.9	0.0	0.0
177.0	5.9	18.9	0.0	0.0
178.0	5.9	18.9	0.0	0.0
179.0	5.9	18.9	0.0	0.0
180.0	5.9	18.9	0.0	0.0
181.0	5.9	18.9	0.0	0.0
182.0	5.9	18.9	0.0	0.0
183.0	5.9	18.9	0.0	0.0
184.0	5.9	18.9	0.0	0.0
185.0	5.9	18.9	0.0	0.0
186.0	5.9	18.9	0.0	0.0
187.0	5.9	18.9	0.0	0.0
188.0	5.9	18.9	0.0	0.0
189.0	5.9	18.9	0.0	0.0
190.0	5.9	18.9	0.0	0.0
191.0	5.9	18.9	0.0	0.0
192.0	5.9	18.9	0.0	0.0
193.0	5.9	18.9	0.0	0.0
194.0	5.9	18.9	0.0	0.0
195.0	6.0	18.9	0.0	0.0
196.0	6.0	18.9	0.0	0.0
197.0	6.0	18.9	0.0	0.0
198.0	6.0	18.9	0.0	0.0
199.0	6.0	18.9	0.0	0.0
200.0	6.0	18.9	0.0	0.0
201.0	6.0	18.9	0.0	0.0
202.0	6.0	18.9	0.0	0.0
203.0	6.0	18.9	0.0	0.0
204.0	6.0	18.9	7.0	0.2
205.0	6.0	18.9	6.8	0.3
206.0	6.0	18.9	6.8	0.3
207.0	6.0	18.9	6.8	0.3
208.0	6.0	18.9	6.8	0.3
209.0	6.0	18.9	6.7	0.7
210.0	6.0	18.9	6.7	0.7
211.0	6.0	18.9	6.7	0.7
212.0	6.0	18.9	6.7	0.7
213.0	6.0	18.9	6.7	0.7
214.0	6.0	18.8	6.7	0.7
215.0	6.0	18.8	6.7	0.7
216.0	6.1	18.8	6.7	0.7
217.0	6.1	18.8	6.7	0.7

218.0	6.1	18.8	6.7	0.8
219.0	6.1	18.8	6.5	1.0
220.0	6.1	18.8	6.5	1.0
221.0	6.1	18.8	6.5	1.0
222.0	6.1	18.8	6.5	1.0
223.0	6.1	18.8	6.5	1.0
224.0	6.1	18.8	6.5	1.0
225.0	6.1	18.8	6.5	1.0
226.0	6.1	18.8	6.5	1.0
227.0	6.1	18.7	6.5	1.0
228.0	6.1	18.7	6.5	1.0
229.0	6.1	18.7	6.5	1.0
230.0	6.1	18.7	6.5	1.0
231.0	6.1	18.7	6.5	1.0
232.0	6.1	18.7	6.5	1.0
233.0	6.1	18.7	6.5	1.0
234.0	6.1	18.7	6.5	1.0
235.0	6.1	18.7	6.5	1.0
236.0	6.1	18.7	6.5	0.8
237.0	6.1	18.6	6.5	0.8
238.0	6.1	18.6	6.5	0.8
239.0	6.1	18.6	6.5	0.8
240.0	6.1	18.6	6.5	0.8
241.0	6.1	18.6	6.5	0.8
242.0	6.1	18.6	6.5	0.8
243.0	6.1	18.6	6.5	0.8
244.0	6.1	18.6	6.5	0.8
245.0	6.1	18.5	6.5	0.7
246.0	6.1	18.5	6.7	0.5
247.0	6.1	18.5	6.7	0.5
248.0	6.1	18.5	6.7	0.5
249.0	6.1	18.5	6.7	0.3
250.0	6.1	18.5	6.8	0.2
251.0	6.1	18.5	0.0	0.0
252.0	6.1	18.5	0.0	0.0
253.0	6.1	18.4	0.0	0.0
254.0	6.1	18.4	0.0	0.0
255.0	6.1	18.4	0.0	0.0
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257.0	6.1	18.4	0.0	0.0
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261.0	6.2	18.3	0.0	0.0
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288.0	6.2	18.0	0.0	0.0
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291.0	6.2	18.0	0.0	0.0
292.0	6.2	18.0	0.0	0.0
293.0	6.2	18.0	0.0	0.0
294.0	6.2	17.9	0.0	0.0
295.0	6.2	17.9	0.0	0.0
296.0	6.2	17.9	0.0	0.0
297.0	6.2	17.9	0.0	0.0
298.0	6.2	17.9	0.0	0.0
299.0	6.2	17.9	0.0	0.0
300.0	6.3	17.9	0.0	0.0
301.0	6.3	17.9	0.0	0.0

302.0	6.3	17.9	0.0	0.0
303.0	6.3	17.9	0.0	0.0
304.0	6.3	17.9	0.0	0.0
305.0	6.3	17.9	0.0	0.0
306.0	6.3	17.9	0.0	0.0
307.0	6.3	17.8	0.0	0.0
308.0	6.3	17.8	0.0	0.0
309.0	6.3	17.8	0.0	0.0
310.0	6.3	17.8	0.0	0.0
311.0	6.3	17.8	0.0	0.0
312.0	6.3	17.8	0.0	0.0
313.0	6.3	17.8	0.0	0.0
314.0	6.3	17.8	0.0	0.0
315.0	6.3	17.8	0.0	0.0
316.0	6.3	17.8	0.0	0.0
317.0	6.4	17.8	0.0	0.0
318.0	6.4	17.8	0.0	0.0
319.0	6.4	17.8	0.0	0.0
320.0	6.4	17.8	0.0	0.0
321.0	6.4	17.8	0.0	0.0
322.0	6.4	17.8	0.0	0.0
323.0	6.4	17.8	0.0	0.0
324.0	6.4	17.8	0.0	0.0
325.0	6.4	17.8	0.0	0.0
326.0	6.4	17.8	0.0	0.0
327.0	6.4	17.8	0.0	0.0
328.0	6.4	17.8	0.0	0.0
329.0	6.5	17.8	0.0	0.0
330.0	6.5	17.8	0.0	0.0
331.0	6.5	17.8	0.0	0.0
332.0	6.5	17.8	0.0	0.0
333.0	6.5	17.8	0.0	0.0
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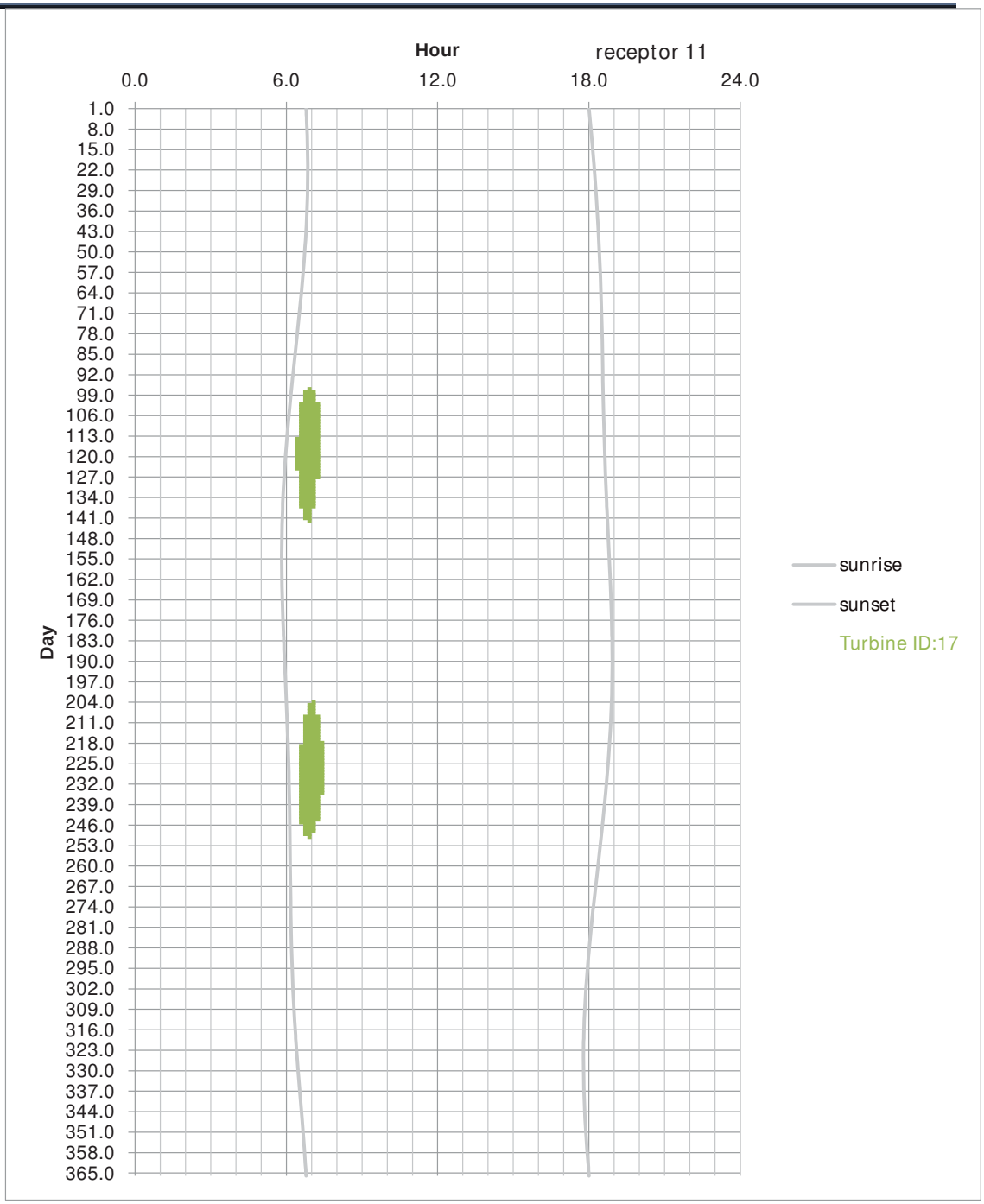
335.0	6.5	17.8	0.0	0.0
336.0	6.5	17.8	0.0	0.0
337.0	6.5	17.8	0.0	0.0
338.0	6.5	17.8	0.0	0.0
339.0	6.5	17.8	0.0	0.0
340.0	6.6	17.8	0.0	0.0
341.0	6.6	17.8	0.0	0.0
342.0	6.6	17.8	0.0	0.0
343.0	6.6	17.8	0.0	0.0

344.0	6.6	17.8	0.0	0.0
345.0	6.6	17.8	0.0	0.0
346.0	6.6	17.8	0.0	0.0
347.0	6.6	17.9	0.0	0.0
348.0	6.6	17.9	0.0	0.0
349.0	6.6	17.9	0.0	0.0
350.0	6.7	17.9	0.0	0.0
351.0	6.7	17.9	0.0	0.0
352.0	6.7	17.9	0.0	0.0
353.0	6.7	17.9	0.0	0.0
354.0	6.7	17.9	0.0	0.0
355.0	6.7	17.9	0.0	0.0
356.0	6.7	17.9	0.0	0.0
357.0	6.7	17.9	0.0	0.0
358.0	6.7	17.9	0.0	0.0
359.0	6.7	17.9	0.0	0.0
360.0	6.7	18.0	0.0	0.0
361.0	6.7	18.0	0.0	0.0
362.0	6.8	18.0	0.0	0.0
363.0	6.8	18.0	0.0	0.0
364.0	6.8	18.0	0.0	0.0
365.0	6.8	18.0	0.0	0.0
366.0	6.8	18.0	0.0	0.0


Hour
receptor 11
0.0
6.0
12.0
18.0
24.0
Day
1.0
8.0
15.0
22.0
29.0
36.0
43.0
50.0
57.0
64.0
71.0
78.0
85.0
92.0
99.0
106.0
113.0
120.0
127.0
134.0
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148.0
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225.0
232.0
239.0
246.0
253.0
260.0
267.0
274.0
281.0
288.0
295.0
302.0
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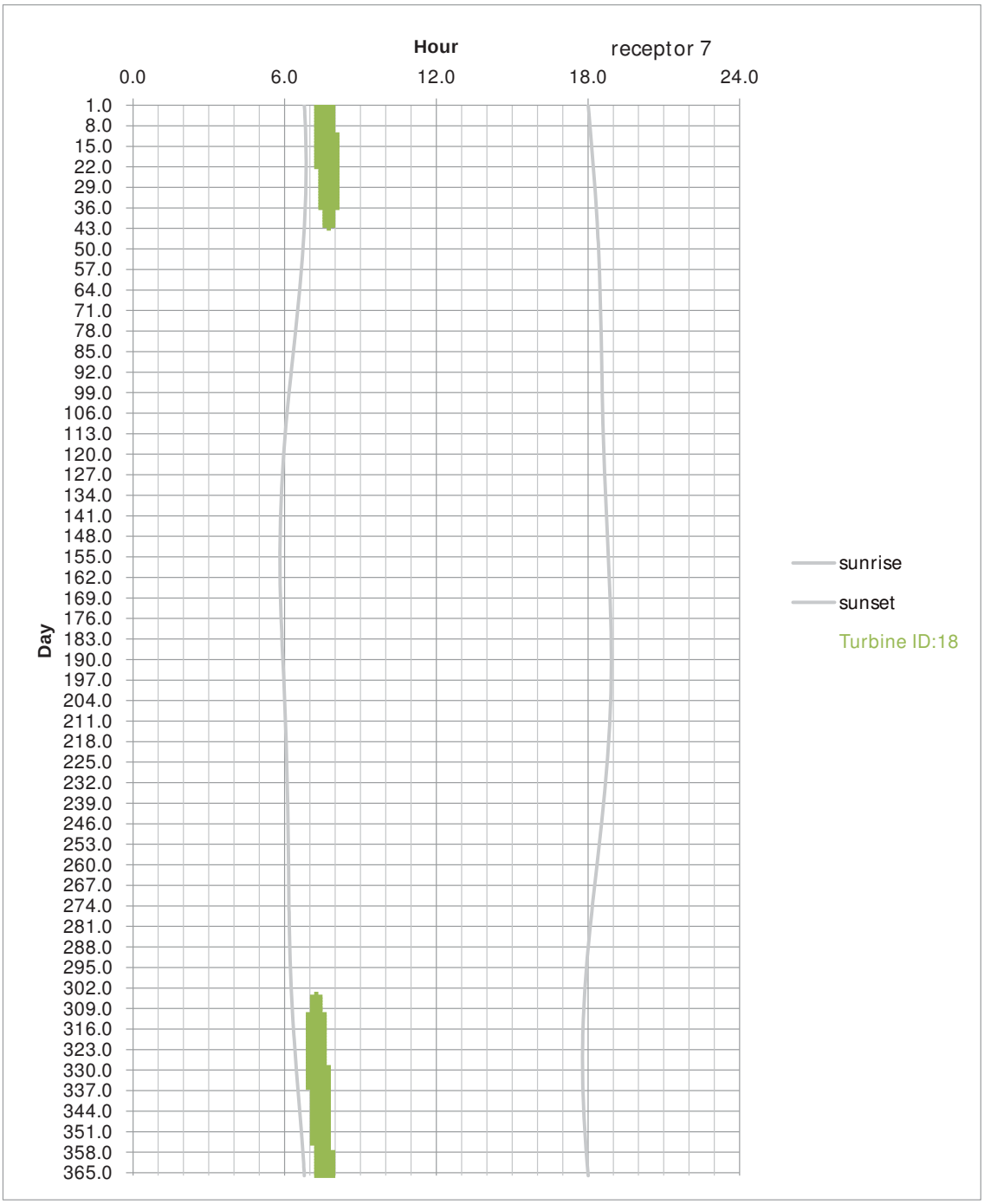
sunrise
sunset
Turbine ID:17



For receptor -6 and 7 shadow flickering is prominent is winter season i.e December and January while for receptor 11 it is more prominent in the month April, July and august. As discussed earlier, no national, state, county, or local standards exist for frequency or duration of shadow flicker from wind turbines. However, international regulations, studies, and guidelines from IFC Environmental,

Health, and Safety Guidelines for Wind Energy, Europe and Australia have suggested 30 hours of shadow flicker per year and 30 minutes of shadow flicker per day as the threshold of significant impact, or the point at which shadow flicker is commonly perceived as an annoyance. Accordingly, the above threshold parameters were used in this analysis to evaluate potential shadow flicker impacts on the farm houses present in near vicinity of the WTG locations.

Turbine number ASP-54 is causing flicker. There are 76 number of days with flickers and 69 number of days for which limit is exceeded. Worse day for ASP-54 was 13/12/2016.

As seen in above table, shadow hours per year for the receptors are within the threshold limits i.e. 30 hours per year. The maximum number of shadow days per year for receptors. Thus impact of the proposed project due to shadow flickering effect is insignificant for all the WTGs except ASP-54.

In India at present there is no standard in case of non- forest land diversion for Wind power projects. However as per Ministry of Enviornment and Forests (MoEF) guidelines, a minimum distance of 300 m is recommended between windmill and highway or village habitation.

Weather conditions at the site, such as bright sunshine, will greatly enhance the occurance and intensity of shadow flicker, whrereas cloud density, haze or fog will cause a reduction. Receptors further away from the turbines which may have experienced a shadow flicker effect under bright sunshine conditions will as a result of these weather conditions, expereince either no effect or one which is greatly reduced in intensity.

The distance between receptors and turbines has a large effect on the intensity of shadow flicker. Shadow flicker intensity can be defined as the difference in brightness between the presence and absence of a shadow at any given location. This study does not examine variations in intensity but rather the occurance in number of hours shadow flicker may occur, whether or not this is clearly distinct or barely noticeable.

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 meterological, natural light and geomatrical conditions for the generation of shadow flicker. The assessment does not account for trees ot other obstructions that intervene between receptors and turbine during times when effect may occur. The assessment calculation is therefore an over estimation in the probability of effects. It should also be noted that for shadow effects ot occur, properties need to be occupied, with blinds or curtains open and views to the wind turbine unobstructed. However for the purpose of assessment, it has been assumed that all worst –case circumtances apply.

Impact Significance of Shadow Flickering –

Impact	Shadow flickering during the operation phase
Impact Nature	Negative
Impact Type	Direct
Impact Duration	Long term
Impact Extent	Local

Impact scale	Within 350 m from the WTGs on the receptors located in the SE-NE and SW-NW orientation from the WTGs
Frequency	During sunny days
Impact Magnitude	Medium
Vulnerrability of social Receptors	No major settlement is within 350 m from the WTGs. However scattered hutments are located within the impact zone.
Impact Significance	Considering the overall impact magnitude and vulnerability of social receptors, the impact significance is assessed as minor

Mitigation Measures

A control system would be employed' as part of the wider turbine control systems to calculate, in real time, whether shadow flicker may affect a property, based on pre-programmed co-ordinates for the properties and wind turbines, and the intensity of sunlight, as measured by a device attached to a turbine tower. When the control system calculates that the sunlight is bright enough to cast a shadow, and that a turbine shadow falls on a property, it automatically shuts the turbine down, re-starting it when the shadow has moved away from the property. In the highly unlikely event that shadow flicker is experienced at properties other than those identified in this assessment, these would be investigated by Lancaster University or an independent third party, and if a complaint is found to be justified additional control measures of the types identified above will be implemented. A programme of monitoring will also ensure the effectiveness of the proposed mitigation and allow for it to be adapted to allow for any inaccuracies in the calculation.

The orientation of Turbines no. ASP-22, ASP-23 and ASP-54 will be revised in such a manner that overall shadow flicker impact remains within suggested threshold standard of 30 hours of shadow flicker per year and 30 minutes of shadow flicker per day. However, optimise use of the turbine will also be kept in mind while revising the orientation of above three turbines. Probability of open space / window on other side of the residential property and vegetative shield shall also be checked, so that, overall psychological impact of the shadow flicker may get reduced.

ANNEXURE V

PHOTO DOCUMENT OF THE SITE

Photo log: Plants [Mytrah Energy (India) Ltd.]

	
Euphorbia nerifolia	***Euphorbia antiquorum***
	
Balanites aegyptiaca	***Aegle marmelos***
	
Cissus woodrowii	***Aristolochia indica***
	
Cassia auriculata	***Carissa spinarum***

	
Tribulus terrestris	***Acalypha capitata***
	
Abrus precatorius	***Hemidesmus indicus***
	
Cyanotis sp.	***Aerva javanica***
	
Daemea extensa	***Evolvulus alsinoides***

	
Tephrosia purpurea	***Rivea ornata***
	
Hibiscus subdariffa	***Lagascea mollis***
	
Ocimum canuum	***Caralluma adscendens***
	
Portulaca quadrifida	***Sesamum indicum***

	
Arundinella pumila	***Perotis indica***
	
Chloris barbata	***Clerodendrum multiflorum***
	
Rhus mysorensis	***Dodonea viscosa***
	
Achyranthes aspera	***Polycarpea corymbosa***

Annexure V B: Photolog of Fauna

	
Indian Silver bill	Black shouldered kite
	
Laughing dove	Red Vented Bulbul
	
Green bee eater	Black drongo

	
Purple Sunbird	Red wattled lapwing

Annexure V C: Photo log of Social Survey

	
FGD in the Village Joharapuram	FGD in the Village Aspari
	
FGD in the Village Nalka Doddi	Consultation with School Teacher in the Village Nalka Doddi

	
Consultation with PAPs in the Village Devanabanda	Consultation with PAps in the Village
	
View of Proposed Project Site in the Village Rajulamandgiri	View of Proposed Project Site in the Village Rajulamandgiri

	
Picture of Open Drainage System in the Village of the study Area	Picture of a Church

Annexure V D: Photographs of Aspari Site

	
View of Proposed Project Site in the Village Rajulamandgiri	View of Proposed Project Site in the Village Rajulamandgiri
	
Location of Sub-station in the village Juturu	Location of Sub-station in the village Juturu

	
Location of WTGs in the Village Aspari	Location of WTGs in the Village Rajulamandgiri

ANNEXURE VI

ON SITE EMERGENCY PREPAREDNESS PLAN

1. INTRODUCTION

It is an accepted fact that no matter how well a process is controlled and safeguarded by instruments and process safety procedures, it is inevitable that there is a residual risk, which is capable of causing a variety of emergencies. Such emergencies could be the result of malfunction or non-observance of operating instructions. It could at times, be the consequences of acts outside the control of people. Hence the need to prepare an ON-SITE EMERGENCY PLAN (OEP) for dealing with incidents which may still occur and are likely to affect Health, Safety, Life, Property and Environment both at site and in the immediate neighborhood. An OEP mitigates effects of a major accident / emergency, when these effects are contained within the boundary of the site.

An emergency is a situation, which may cause serious injury, loss of life, damage to property, environmental pollution etc., due to major accident, fire / explosion or any other calamity.

This plan is guideline for employees, contractors, visitors etc., also informs about prompt rescue operations, medical treatment, co-ordination and communication among various internal & external members. For an OEP, speed is the essence. The plan should be such that it would avoid any confusion, panic during emergency at site.

Mytrah Management will plan into practice during an emergency .Mock drills and rehearsal will be conducted periodically (once in 6 months) to ensure of all those connected with implementation of the plan. The Mytrah management will also upgrade the plan continuously consistent with the changes in facilities and the manpower structure within the site.

Any change of the guideline shall be approved by the Director and Head Asset Management.

The management shall have the overriding right to withdraw and / or amend the guideline at its own discretion as it deems fit from time to time. The decision of the management shall be final and binding.

2. General Emergency Situations:

Fire at Work Places		Crane /Structure Toppled	
Falling from Height		Snake Bite	
Electric Shock		Earth Quake	
Lightning/ Thunderstorm		Road Accident	

3. OBJECTIVES

The overall objectives of an Emergency preparedness are:

a. To control the emergency, localize it and if possible, terminate it
b. To avoid confusion / panic and to handle the emergency with clear instructions
c. To minimize the effects of the incidence on people and property and also to minimize the damage to the environment in and around our premises.
d. To preserve records and take appropriate steps to prevent recurrence
e. To restore normalcy.

4. SCOPE

All site function including Project and O&M

5. DEFINITIONS

a. **Emergency:** Undesired and imposed hazardous situation, which can cause LOSS in the form of injuries and property damage.
b. **On-Site Emergency:** Emergency inside the site boundaries which demands the stoppage of all activities and total or partial evacuation.
c. **Off-Site Emergency:** Emergency which spills outside the site boundaries and affects neighboring areas and general public. Information to regulatory bodies and seeking help from them.
d. **Assembly Point:** Safe area for the assembly of persons requiring evacuation after accounting for the missing persons. This is done through a **Head count.**
e. **Emergency Exits:** Passages and walkways ending to Assemble point.

6. IDENTIFICATION OF EMERGENCIES

Sr. No.	NATURE OF EMERGENCIES
1.	Incidents: • Fire • Panel blast (Power panel / Capacitor & flash cover • Health Emergency inside WFC • Collapse of structure & Crane • Road incident • Electrocution • Electrical flash over (HT line) • Crane / Vehicle topple (Plain Road, Turn, Hill)
2.	Environmental Emergencies: • Flood • Thunderstorm • Lightning • Cyclone • Earth quake • Insect & Snake Bite

7. IDENTIFICATION OF HAZARDOUS AREAS

Sr. NO.	ACTIVITY	HAZARDOUS ASPECTS
1.	Working at height	Any emergency during height work activity
2.	U.G. operation/ Hot work & Power tool s application	Electrical shock, Electrocution/Fire
3.	Crane functions	Any major/minor incident / Electrical shock, Electrocution
4.	Men/Material transportation by Vehicles	Road incident
5.	Civil Construction work/Blasting	Any major / minor accident / Fire Activity

6.	Electrical Construction & Commissioning work	Any major / minor incident / Electrical shock, Electrocution
7.	WEC-Tower installation / Machine Instal ation / Electrical & Commissioning work / De-installation work	Any major / minor incident / Electrical shock, Electrocution / Fire
8.	Service, Substation, External electrical activities.	Any major / minor incident / Electrical shock, Electrocution
9.	Handling & Storage of Diesel, Petrol, kerosene or other Lubricants / Chemica s / Transformer oil.	Fire
10.	Preparation of food	Food poisoning

8. FACILITIES / EQUIPMENTS FOR EMERGENCIES

a. Emergency Control Centre (ECC)

Emergency Control center is arranged in Container / First aid center / Site offices/Substation as per the availability of resources at sites.

List of Equipment's shall be provided in ECCs.

Sr. No.	Items
1	On site Emergency plan
2.	Material Safety Data Sheet (MSDS)
3.	Rescue kit (Applicable for WTG)
4.	Stretcher
5.	Barricade tape
6.	PPE Electrical gloves (HT), Goggles etc.
7.	First Aid Box
8.	Fire Extinguishers
9.	Earth rod
10.	Emergency Contact numbers display board

b. **Fire Fighting Facilities**

Different types of fire extinguishers are strategically located at Site locations. Containers, Site offices, Substation, WTGs, etc. Periodical firefighting training shall be provided for Site personnel.

c. **Medical facilities**

First aid boxes are available at Site Containers, Offices, Substation, WTG locations, 4 wheelers and Guest houses. The stock of First Aid material shall be replenished by a designated person. In case of emergencies, the affected personnel can also be transported to near-by hospital. Periodical First Aid training is provided to all site personnel.

d. **Rescue System**

Periodical training for rescue is provided for Site personnel (technician & Engineers). Rescue kit shall be available at site office for rescue operation. During emergency, ambulance or available vehicle at site can be used for transport the injured persons to the First aid center or nearby hospital.

9. INCIDENT REPORTING

Anybody seeing an incident situation shall report to his colleagues / site in charge / team leader / department giving his identity.

9. COMMUNICATION FACILITIES

a **Emergency Contact Display Board**

Emergency Contact Display Board shall be provided in the project office area for immediate contact of key personnel. (Internal key personnel, nearby hospital, Fire stations, Ambulance details).

b. Emergency exit plan displayed at respective locations as per the applicability.

Emergency Contact Display Board:

Contact Person	Phone No
• Site Supervisor/Engineer(Team Leader) Mr. Suseran	9515113952
• Site In charge Mr. A.S.K. Reddy	09000014001
• Safety Officer Mr. Nishant S. Nair	9000948784
• Ambulance Service GE	7288845665
• District Govt. Hospital RMJR Hospital (Pattikonda)	7885327477
• Nearest Hospital ·	
• Fire Station Patti konda.	08512-252299,
• Police Station Aspari	08512252387
• HR /FMS Site Contact Person Sandeep Balakrishna	07847179581
• Department HOD Mr. Suranjan Sarkar	09000979140

b. External communication

Site is very well connected with corporate office through Mobile.

c. **Internal communication**

Site is very well connected with internal by way of Mobiles

10. ROLES & RESPONSIBILITY OF PERSONNEL

a. Contractor workmen / wind sites Technician

I. Anybody seeing an incident / abnormal fire situation shall report to his colleagues / site in charge / team leader/department and giving his identity.

I. Do evacuation if possible by using available emergency equipment's or call colleagues or other personnel for assistance / help / need of rescue device.

b. **Team Leader / Engineer / Contract Supervisor**

I. Provide proper guidance to contract workmen / technician for evacuation

II. Inform to Site in charge / HOD about evacuation.

c. **Site In charge / Head Operation**

I On receiving information, inform to site key personnel for evacuation.

II Reach emergency spot and arrange required help for evacuation..

III Co-ordinate with admin department for external agency help (Ambulance, Fire brigades etc.)

IV Inform to functional head / Site EMS / EMS and HR head.

d. **Head Operations**: On receiving information from Site in charge / Site representative arrange required support

I Depute technical expert if required.

II. Inform to Director and Head Asset Management if required.

e. **EMS /HR Head** : They shall co-ordinate and arrange the following:

I. Collect head count if required.
II. Transport arrangement
III. Additional security if required
IV. Food /Water or any other welfare facility.
V. Liaise with outside agencies like Hospitals, Fire brigades, Ambulance etc for referral.

I. Security

I. Follow instruction from EMS / HR Head
II. Allow only authorized personnel in the emergency area
III. Make entries of men, material & vehicle entering and leaving form emergency area.

11. MOCK DRILL

Success of an OEP depends on planned and unplanned MOCK DRILLS, if conducted regularly. MOCK drill helps all employees to get familiarized with the OEP and also check the accuracy of their roles.

Procedure for Mock Drills (planned):

a. Inform all employees about MOCK DRILLS
b. Fix a date and location of the emergency site for MOCKDRILL
c. MOCKDRILLS will be monitored by observers giving due importance to response time and proper procedure (Who would be senior officers not involved in the exercise).
d. All members would follow instructions as per OEP.
e. After emergency clear the all employees shall return to their respective work place and take the supervisor's instructions.

Such mock drills shall be documented. (Annexure 2 & 3)

12. ASSEMPLY POINT

Assembly points shall be identified in the project site, service offices, for assembly of persons during emergency. A board is to be provided for easy identification of assembly point, wherever feasible.

13. Do's and Don'ts

a. Do's

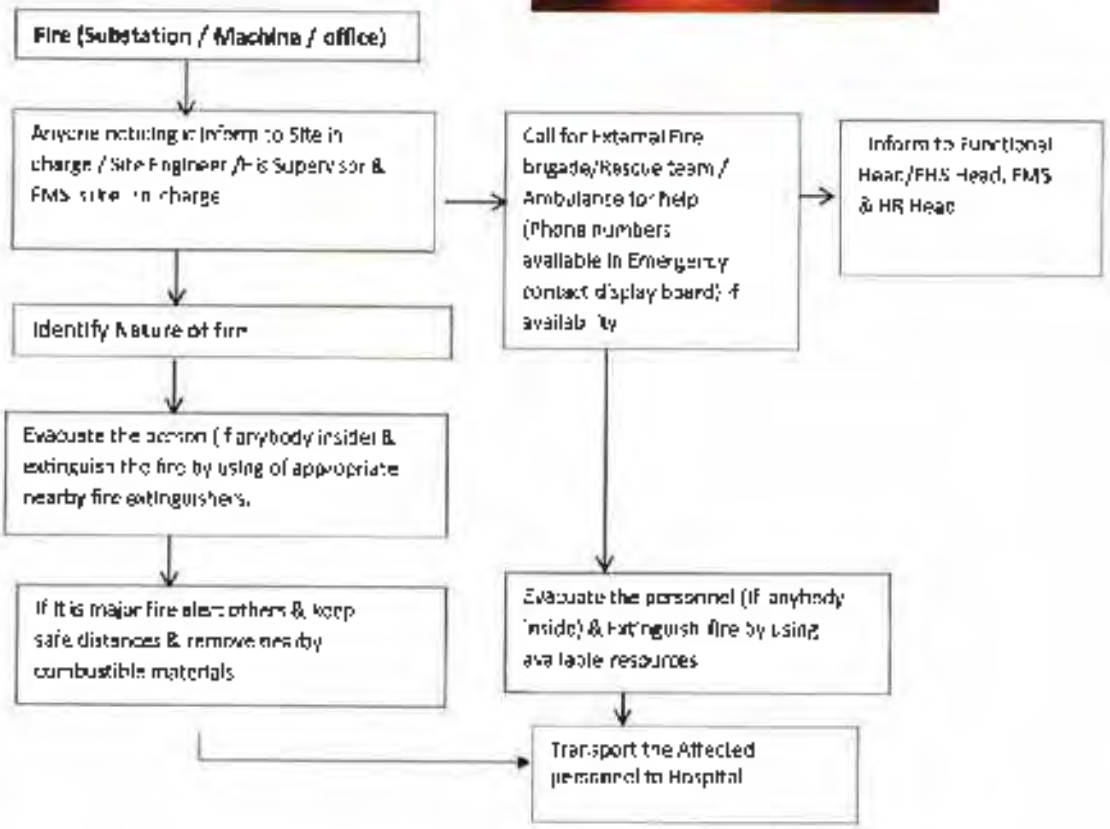
I. On seeing an incident / abnormal fire / situation shall report to concern person.
II. Do evacuation or need help for evacuation, follow supervisor instructed
III. Assembled in assembled point if required.
IV. Take head count if required.

b. Don'ts

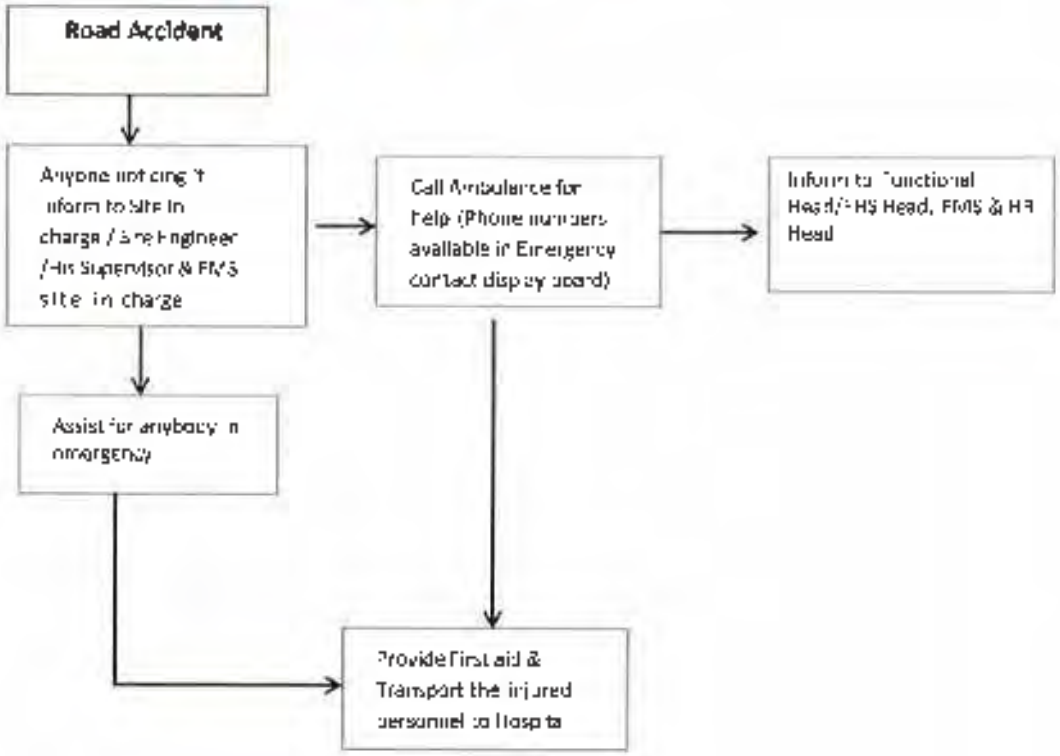
I. Do not panic
II. Do not communicate with any external agency, unless instructed
III. Do not spread rumors
IV. Do not keep any telephone engaged for a long time
V. Do not approach the emergency site as a spectator.

14. PROCEDURE STEPS FOR HANDLING EMERGENCIES

Fire at workplace



Road Accident



NOC

Health Emergency (Including Injury) inside WTG/Substation

Health Emergency (Including Injury) Inside WEC:

Anyone noticing it Inform to Site in charge / Site Engineer /His Supervisor & EMS site in charge
Use rescue device available in location/ container/ office (if required)

Call Ambulance (if required).

Inform to Functional Head/HoS Head, EMS & HR Head

If injured person is not capable, another person to do rescue in which they trained.

Provide First aid & Transport the injured personnel to Hospital

Electrical Accident

Electrical Accident

Anyone noticing it inform to Site In charge / Site Engineer /His Supervisor & EMS site in charge
Use rescue device available in location/ container/ office/Substation (If required)

Inform to Substation and get the line clearance (if required)

Call Ambulance for help (if required).

Inform to Functional Head/EHS Head, EMS & HR Head

Cut on power supply/Remove the person from emergency spot by using non conductive material (Act only if you known about power supply area and

Whether injured is Conscious / Unconscious

Provide First aid (CPR) to the injured / transport to Hospital

Collapse of structure / Crane

Collapse of Structure / Crane

Anyone noticing it inform to Site In-charge / Site Engineer /His Supervisor & EMS site in charge
Use rescue device available in location/ container/

→ Call Ambulance for help (If required).

→ Inform to Functional Head/EHS Head, EMS & HR Head

↓ Evacuate the personnel if anybody

↓ Arrange skilled team/lifting equipment for restore normal condition.

↓ Provide First aid to the injured/Transport to hospital

Crane / Vehicle Toppled (Plain Road, Hill)

Crane / Vehicle Toppled

→ Anyone noticing it inform to Site In charge / Site Engineer /HS Supervisor & EMS site in charge

→ Call Ambulance for help (if required).

→ Inform to Substation, if it fall on Power lines and get clearance for evacuation

→ Inform to Functional Head/EHS Head, EMS & HR Head

→ Evacuate the personnel if anybody

→ Arrange skilled team/lifting equipment's to restore normal condition

→ Provide First aid to the injured/Transport to hospital

Lightning strike while working in WTG/Substation

Lightning in WEC/Substation

Anyone noticing it inform to Site in charge / Site Engineer /His Supervisor & EMS site In charge

If any Health Emergency (Injury)

Call Ambulance for help (If required), Foundation

Inform to Functional Head/EHS Head, EMS & HR Head

Stop the activity and return on safe location/offices

Whether injured is Conscious /Unconscious

If injured person is not capable, another person do rescue in which they are trained.

Provide First aid to the injured/ Transport to hospital

Thunder storm / Cyclone while working on WTG

Thunder Storm/Cyclone

Anyone noticing it inform to Site in charge / Site Engineer / His Supervisor & EMS site in charge

Arrange Vehicle/Medical Aid (If Required)

Inform to Functional Head/HHS Head, EMS & HR Head

Shut down the WEC and stay inside WEC till Thunder storm / cyclone is over

Flood (Offices / Substations / WTG)

Flood (Offices, Substation, WTG)

- Due to incessant rains
- Due to increased flow in river
- Due to disturbance in the sea

Anyone noticing it inform to Site In charge / Site Engineer /His Supervisor & EMS site in charge

Arrange Vehicle / Medical Aid (If required).

Inform to Functional Head/EHS Head, EMS & HR Head

Shut down Machine / Isolate the power if required.

Move man/material to be salvaged to elevated area

Provide First Aid to the injured/Transport to hospital.

Earth Quake

Earth Quake

Anyone noticing / sensing it inform to other co leagues who are working in vicinity

Inform to Site in charge / Site Engineer /His Supervisor & FMS site in charge

Inform to Functional Head/EHS Head, HMS & HR Head.

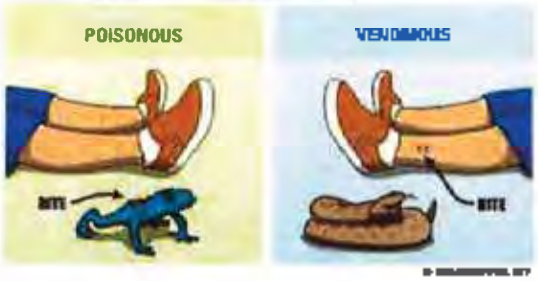
Shut down WTG/Substation (if required)

Arrange Vehicle /Call for Ambulance / rescue team (if required)

Run to the open space safe enough away from WTG/Transmission line/Structure / High rise building

Provide First Aid to the Injured/Transport to hospital.

Insect or Snake Bite



Insect or Snake Bite

↓

Anyone noticing it inform to Site in-charge / Site Engineer /H.S Supervisor & EMS site in-charge

→ Arrange vehicle / call for Ambulance (if required) → inform to Functional Head/EHS Head, EMS & HR Head

↓

Inform to other people to avoid going at place of this happening

↓

Give First Aid/ taking the affected person to hospital

ANNEXURE VII

SAMPLE DOCUMENT OF LAND PURCHASE

भारतीय गैर न्यायिक

एक सौ रुपये

Rs. 100

रु. 100

ONE HUNDRED RUPEES

सत्यमेव जयते

भारत INDIA

INDIA NON JUDICIAL

A-1116
C-1097

ఆంధ్రప్రదేశ్ आन्ध्र प्रदेश ANDHRA PRADESH

Sl.No. 2221 Date 27/06/15

Sold To Mytrah Energy (India) Limited Hyderabad.

For Whom Self

BT 916637

H.L. Narayana Rao
Licensed Stamp Vendor
L.No. 11 ... 597/J,1981
R.No. ...
Address: S ... O ... Premises
... ASPARI ...

SALE DEED

This DEED OF SALE is executed at Aspari on this 13th day of August, 2015:

BY

Sri. T.Ajit Pavan Kumar Yadav, S/o Sanjeevaiah, aged about 24 Years, Occupation: agriculture; R/o H.No.5-91, B.C Colony, Aspari Village & Mandal, Kurnool District; (hereinafter referred to as the "VENDOR" which term shall mean and include his legal heirs, successors, legal representatives, executors, administrators, successors and assignees, etc.,) of the FIRST PART.

IN FAVOUR OF

M/s MYTRAH ENERGY (INDIA) LIMITED, a company incorporated under the provisions of the Companies Act, 1956, having its registered office at 8001, Q-City, Sy.No. 109, Nanakramguda, Gachibowli, Hyderabad-500032, represented by its authorized signatory **Mr. A. Srinivasa Rao,** R/o Kurnool (hereinafter referred to as "VENDEE", which expression

1. T. Ajit Pavan Kumar Yadav

1006/2015

Presentation Endorsement:

Presented in the Office of the Joint Sub-Registrar, Aspari along with the Photographs & Thumb Impressions as required Under Section 32-A of Registration Act, 1908 and fee of Rs. 21400/- paid between the hours of 4 and 5 on the 13th day of AUG, 2015 by Sri A.Sreenivasa Rao

Execution admitted by (Details of all Executants/Claimants under Sec 32A):

Sl No	Code	Thumb Impression	Photo	Address	Signature/Ink Thumb Impression
1	CL			M/S MYTRAH ENERGY (INDIA) LIMITED HYDERABAD (A.SREENIVASA RAO) S/O. A.GOPAL RAO RAGHAVENDRA NAGAR KALLUR, KURNOOL DIST	
2	EX			T.AJIT PAVAN KUMAR YADAV S/O. SANJEEVAIAH H NO 5 81,BC COLONY ASPARI, KURNOOL DIST	

Identified by Witness:

Sl No	Thumb Impression	Photo	Name & Address	Signature
1			G.PVANA KUMAR S/O RAMBHUPAL REDDY KRISHNA NAGAR KURNOOL	
2			B.KRISHNAKANTH S/O B.NARASIMHARAJU ASPARI	

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13th day of August,2015

Signature of JOINT SUBREGISTRAR309 Aspari

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shall, unless it be repugnant to the context or meaning thereof, include its successors-in-title and permitted assigns) of the SECOND PART.

(Hereinafter, the "VENDOR" and "VENDEE" collectively be referred to as the "Parties" and individually as the "Party").

WHEREAS:

A) The above VENDOR is seized and possessed of, or otherwise entitled all that piece and parcel of land/property admeasuring to an extent of Ac.20-40 Cents in Sy.No.428 situated at Aspari Village & Mandal, Kurnool District. The VENDOR acquired the said property by virtue of registered sale deed document number 20/2008 dated 22.01.2008 registered in the office of Sub-Registrar, Aspari; and the Revenue Divisional Officer, Adoni issued the Title deed No.565836 with patta No.1607 in favour of the Vendor and the Tahsildar, Aspari issued pattadar passbook No.565826 with patta No.1607 in favour of the Vendor. Thus, the Vendor has become rightful owner and possessor of the above mentioned land/property and the Vendor has offered to sell his land to an extent of Ac.04-00 Cents in Sy.No.428, out of total land admeasuring Ac.20-40 Cents in Sy.No.428; situated at Aspari Village & Mandal, Kurnool District to the VENDEE (Hereinafter referred to as the "**Schedule Property**") and which is more fully described in the Schedule annexed hereto.

B) The VENDOR is absolute owner and in peaceful possession and enjoyment of the Schedule Property. The VENDOR has represented that VENDOR has got absolute rights, title, interest, and physical possession, enjoyment of the Schedule Property as mentioned hereinafter.

C) The VENDOR has agreed to sell the Schedule Property i.e., land admeasuring to an extent of Ac.04-00 Cents in Sy.No.428 for his family necessities and bonafide requirements for a total sale consideration of **Rs.21,40,000/-(Rupees Twenty One Lakh Forty Thousand Only)** and the VENDEE has agreed to purchase the same.

D) And whereas the VENDOR has agreed to execute this deed of sale and sell and further to convey all his rights, title and interests of all kinds or description whatsoever that the VENDOR does have in respect of the Schedule Property together with all the rights, title, interest, easements, appurtenances thereto, freehold rights in the Schedule Property underneath and the VENDEE has agreed to purchase the same for a total sale consideration of **Rs.21,40,000/-(Rupees Twenty One Lakh Forty Thousand Only)** in accordance with the terms and conditions mentioned herein in this Sale Deed.

IN CONSIDERATION OF THE ABOVE, NOW THIS SALE DEED IS WITNESSETH AS FOLLOWS:

1. That the VENDOR has already received an amount of Rs.5,000/ (Rupees Five Thousand Only) on 02.07.2015 in cash from the Vendee towards advance and today

I. T. Ajit Pawan Kumar Yadav

Endorsement:

Description of Fee/Duty	In the Form of					
	Stamp Papers	Challan u/s 41of IS Act	Cash	Stamp Duty u/s 16 of IS act	DD/BC/ Pay Order	Total
Stamp Duty	100	107000	0		0	107100
Transfer Duty	NA	32100	0		0	32100
Reg. Fee	NA	21400	0		0	21400
User Charges	NA	100	0		0	100
Total	100	150600	0		0	160700

Rs. 139100/- towards Stamp Duty including T.D under Section 41 of I.S. Act, 1899 and Rs. 21400/- towards Registration Fees on the chargeable value of Rs. 2140000/- was paid by the party through Challan/BC/Pay Order No ,1168 dated ,13-AUG-15.

Date

13th day of August,2015

Signature of Registering Officer

Aspari

Certificate of Registration

Registered as document no. 1006 of 2015 of Book-1 and assigned the identification number 1 - 1304 - 1006 - 2015 for Scanning on 13-AUG-15 .

Registering Officer

Aspari

(S.Mohammed Rafee)

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the Vendor has received balance sale consideration **Rs.21,35,000/-(Rupees Twenty One Lakh Thirty Five Thousand Only)** vide Demand Draft No "521460", dated 31.07.2015 drawn on Kotak Mahindra Bank, Sardar Patel Road Branch, Hyderabad; hence, Vendor has received total sale consideration of **Rs.21,40,000/-(Rupees Twenty One Lakh Forty Thousand Only)** from the VENDEE towards the Sale of Schedule Property which is full and final Sale consideration in respect of the Schedule Property.

2. That the VENDOR doth hereby sell, transfer and convey all his rights, titles and interests in the Schedule Property unto the VENDEE absolutely and forever.

3. That since entire sale consideration has already been received by the VENDOR; the actual vacant physical possession of the Schedule Property has been handed over to the VENDEE on this day and at the time of execution and registration of this Sale Deed absolutely and forever.

4. That the VENDOR shall have no objection whatsoever, if the necessary mutation in the relevant records of the authorities concerned in respect of the Schedule Property is effected in favour of VENDEE and this sale deed by itself shall be deemed and construed to grant the NO Objection Certificate by the VENDOR in favour of the VENDEE for all intents and purposes.

5. That the VENDOR hereby assures, represents and covenants with the VENDEE as follows:

   a) The VENDOR hereby transfers, conveys, grants and sells to VENDEE all rights, title and interest of the VENDOR in and over the Schedule Property TO HAVE AND TO HOLD absolutely and forever the Schedule Property TOGETHER WITH all appurtenances and easement rights thereto, free from all encumbrances, and the VENDEE shall peaceably enjoy the same without any letting, or hindrance or obstruction by the VENDOR or by any one claiming under, through or in trust for them.

   b) The VENDOR assures the VENDEE that excepting him no one else has any right, title or interest in the said Schedule Property which is his absolute property and that the same is free from all encumbrances, charges, liens, maintenance/tenancy claim or attachment of any court and has not been notified for acquisition by the State or Central Government or any other authority under the Acquisition Act, or any other special legislation and the sale to the VENDEE does not contravene any law, rules or regulations. The VENDOR further covenants with the VENDEE that there are no civil or criminal proceedings or no injunction or any suit disputing the title is pending in any court of law in respect of the Schedule Property.

   c) That there is no subsisting agreement for sale in respect of the Schedule Property hereby sold to the VENDEE and the same has not been transferred

L. T. Jagat Pawan Kumar Yadav

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in any manner whatsoever, in favour of any other person or persons. That the VENDOR represent that there is no court or judicial proceedings pending, or threatened to be initiated on the said Schedule Property.

d) All the relevant documents in original in respect of the Schedule Property have been handed over by the VENDOR to the VENDEE. That, the VENDOR hereby further agrees to sign all such papers, forms, applications, affidavits, undertakings, memorandums etc., whichever is necessary for transferring the Schedule Property in favour of the VENDEE in the concerned department/s. Further, the VENDOR at his cost, is willing to execute and coordinate to sign the necessary papers, forms, applications, affidavits, undertakings, memorandums etc., whichever is necessary for the purpose of mutation or any other purpose whatsoever in order to ensure the clear and marketable title and the perfection of the title to the Scheduled Property in the name of VENDEE or its successors/affiliates.

e) The VENDOR covenants with the VENDEE that he will indemnify and keep indemnified the VENDEE against all claims, actions, proceedings, losses, damages, costs and expenses, which the VENDEE may sustain or being put to on account of any defect in the title of the VENDOR in the said Schedule Property or any claim preferred by any interested party over the Schedule Property in any manner whatsoever.

f) The VENDOR assures the VENDEE that he will execute such further document/s as the VENDEE may require at his cost and expense for effectively assigning to it of the Schedule Property hereby sold.

g) The VENDOR has put the VENDEE in possession of the Schedule Property simultaneously with the execution of this Deed of Sale. That the VENDOR undertakes to have the said Schedule Property mutated in favour of the VENDEE in Revenue Records and other concerned authorities, otherwise, the VENDEE can also get the said Schedule Property mutated in its own name in Revenue Records and other concerned authorities on the basis of this Sale Deed for its certified true copy and for which the VENDOR shall coordinate and ensure that the mutation to get completed in favour of the VENDEE.

h) All property and other taxes, charges, fees, penalties, fines, water and electricity charges and whatsoever as may be levied and/or incurred for or on the Schedule Property or any part thereof for the period ending with the date of execution of this Sale Deed, shall be borne and be payable by the VENDOR even if a demand for the same is received thereafter and from the date of execution of this sale deed by the VENDEE and thereafter the VENDEE will be responsible for the payment of the same.

i) The VENDOR hereby declares that the VENDOR has not received any notice under the Land Acquisition Act, Gram Panchayat Act, Epidemic Diseases Act.

1. T. Jyothi Prasanna Kumar Reddy

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Defense of India Act or any other statutory enactments or any other public Act declaring, any part of the Schedule Property to have been acquired or requisitioned for any purpose or being declared as excess under any law in force in the hands of the VENDOR or its predecessor-in-title.

j) The VENDOR further declares that, the Schedule Property is not an assigned land or Government Land and so will not come under the purview of the A.P. Assigned Lands (Prohibition of Transfer) Act 1977 as applicable.

k) The VENDOR hereby confirm and assured the VENDEE that the Schedule Property neither belongs to tribal community nor it falls under the prohibitions of such transactions relating to Tribal as per the applicable laws. Further, the Schedule Property has not been provided nor is being proposed to give/submit as a compensatory afforestation in view of allotment of forest land to the Government authority including Forest Department.

6. The market value of the Schedule Property conveyed under this sale deed is **Rs.21,40,000/-(Rupees Twenty One Lakh Forty Thousand Only)** and a sum of Rs.1,39,110/- towards the stamp duty including Transfer duty, a sum of Rs.21,400/- towards Registration Charges, and Rs.100/- towards User Charges, which comes to total an amount of Rs.1,60,600/-. (Rupees One Lakh Sixty Thousand six Hundred Only) has been paid and remitted in State Bank of India, Aspari, Branch through Challan No: 1168 , dated: 13.08.2015.

1. T. Ajit Pavan Kumar Yadav

SCHEDULE OF PROPERTY

All that piece and parcel of dry land admeasuring an extent of **Ac.04-00 Cents** in Sy.No.428, out of total land admeasuring, Ac.20-40 Cents in Sy.No.428; situated at Aspari Village & Mandal, Kurnool District, and within the Sub-Registrar Office of Aspari and Registration District of Kurnool.

Bounded by:

NORTH: Remaining land belongs to T.Ajit Pavan Kumar Yadav
SOUTH: Land belongs to [illegible]
EAST : Remaining land belongs to T.Ajit Pavan Kumar Yadav
WEST : Land belongs to T. Ajit Pavan Kumar Yadav

T. Ajit Pavan Kumar Yadav

1. T. Ajit Pavan Kumar Yadav

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RULE–3STATEMENT

Statement regarding the market value prevention under rule 3 of the Government prevention of under valuation of instrument, 1975.

Sl.No.	Village name	Survey Number	Extent in Ac – Cents	Market Value per Acre	Total Market Value
1	Asposi	128	04-00	Rs.5,35,000/-	Rs.21,40,000/-

Total Extent: Ac.04-00 Cents

DECLARATION

That the VENDOR hereby declare that there are no Mango Trees/ Betel Leaf Gardens or any such other Gardens and that there are no Mines or Quarries ponds etc., in the Schedule Property and if so on being transferred it will be liable for Prosecution under Law besides the payment of deficit stamp duty.

IN WITNESS WHEREOF the PARTIES hereto have signed and executed this Sale Deed, on the day, month and year first above written in the presence of the following witnesses:

T. Ajit Pavan Kumar yadav

(T.Ajit Pavan Kumar Yadav)
VENDOR
Signature/Thumb Impression

A Srinivasa Rao

VENDEE
Authorized Signatory
(A. Srinivasa Rao)

MYTRAH ENERGY (INDIA) LIMITED HYDERABAD

Witnesses:

1. B. K. Kranth (B. Kaushik Kanth s/o B. Naresh (nke Raju) 23 years Asposi (v) & (m) H.No: 5-63/1 BC colony
2. G. Pavan Kumar (G. Pavan kumar s/o G. Rambhupal Reddy) 21 years (Kamol)

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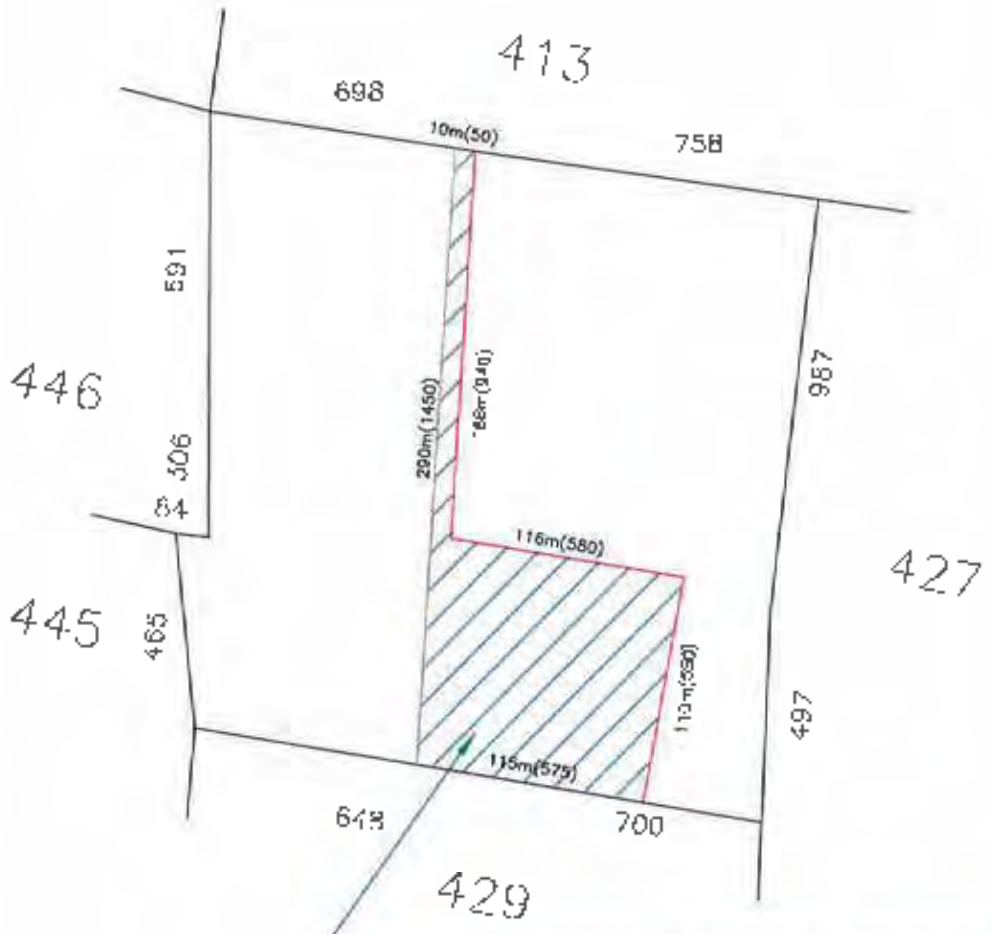
VILLAGE	ASPARI	SY.NO.
MANDAL	ASPARI	428
DISTRICT	KURNOOL	

N



Land of T.Ajith Pavan kumar yadv

I-T. Ajith Pavan Kumar Yadav

TOTAL EXTENT- 20.40 Ac

PROCURED EXTENT- 4.00 Ac

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भारत सरकार
GOVERNMENT OF INDIA

T PAVAN KUMAR
DOB: 07/[illegible]/1991
Male

6658 7195 4377

ఆధార్ - ఆధారం – సామాన్యమానవుడి హక్కు

भारतीय विशिष्ट पहचान प्राधिकरण
UNIQUE IDENTIFICATION AUTHORITY OF INDIA

Address:
S/O Sanjeevaiah, 5-91,
B C COLONY, ASPARI,
Aspari, Aspari, Kurnool,
Andhra Pradesh, 518347

Aadhaar - Aam Aadmi ka Adhikar

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భారత ప్రభుత్వం

GOVERNMENT OF INDIA

Alluri Srinivasa Rao

Year of Birth : 1965

/ Male

2797 6374 7830

ఆధార్ - సామాన్యుని హక్కు

భారత విశిష్ట గుర్తింపు ప్రాధికార సంస్థ

UNIQUE IDENTIFICATION AUTHORITY OF INDIA

Address:

S/O Alluri Gopal Rao

[illegible]

[illegible]

[illegible]

Aadhaar - Saamanyuni Hakku

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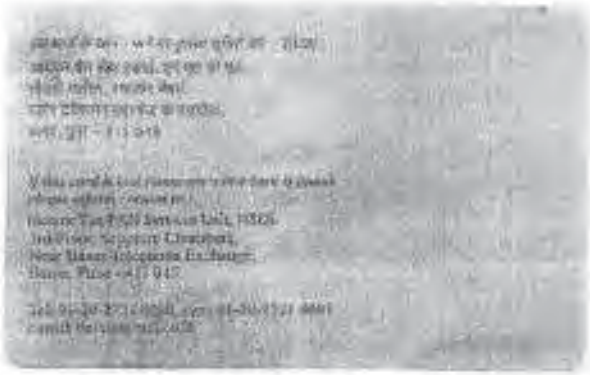
आयकर विभाग
INCOME TAX DEPARTMENT
भारत सरकार
GOVT. OF INDIA
MYTRAH ENERGY (INDIA) LIMITED
12/11/2009
Permanent Account Number
AADCM2895C



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8339 5623 5894
– సామాన్యుని హక్కు
8339 5623 5894


9541 6437 6493
ఆధార్ - సామాన్యుని హక్కు
Address: S/O G Ramabhupal Reddy 78/3E, New Krishna Nagar, Near Old M.R.O.Office, Kothur, Kothur, KNL-camp-B, Kurnool, Andhra Pradesh, 518002

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ANNEXURE VIII

WIND POLICY OF ANDHRA PRADESH

GOVERNMENT OF ANDHRA PRADESH
ABSTRACT

ENERGY, INFRASTRUCTURE & INVESTMENT DEPARTMENT - Development of Wind Power in Andhra Pradesh – Andhra Pradesh Wind Power Policy, 2015 - Orders – Issued.

ENERGY, INFRASTRUCTURE & INVESTMENT (PR.II) DEPARTMENT

G.O.MS.No. 9 Dated:13.02.2015

Read the following:

1. G.O.Ms.No.48, Energy (Res) Deptt., dated 11.04.2008.
2. G.O.Ms.No.99, Energy (Res) Deptt., dated 09.08.2008.
3. From the VC&MD, NREDCAP, Hyderabad Lr.No.NREDCAP / WE/Govt./2014, dated 25.09.2014.

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ORDER :

In order to promote Wind Power Projects, the Government of Andhra Pradesh have issued orders formulating Andhra Pradesh Wind Power Policy, 2012 vide references 1st and 2nd read above. The operative period of policy was 5 years and it expired in April, 2013, Considering, the good wind power potential existing in the State and to achieve 4000 MW capacity addition through wind power during the next 5 years period, there is a need to bring out comprehensive wind power policy.

2. Government, after detailed discussions on the proposal vide reference 3rd cited with various stakeholders viz., APTRANSCO., APDISCOMs, NREDCAP Wind Power Developers and Associations etc., hereby issue the Wind Power Policy, 2015 as mentioned below:

PREAMBLE

India is amongst the largest wind power markets in the world. Wind power is already economical in comparison to conventional power sources and Andhra Pradesh has a huge wind power potential that is yet to be harnessed. The wind power potential in the combined state of Andhra Pradesh as estimated by the National Institute of Wind Energy (NIWE) , formerly known as Centre for Wind Energy Technology (C-WET) is around14,497 MW at 80 m level with maximum potential existing in the districts of Ananthapur, Kadapa, Kurnool, Chittoor and Nellore districts.

The Government of Andhra Pradesh has earlier issued “Wind Power Policy”, vide G.O.Ms.No.48 dated 11.04.2008 and G.O.Ms.No.99 dated 09.09.2008, to promote wind power projects. Since the policy operative period was for five (5) years, the policy expired in April, 2013. Taking into consideration the rising power requirements of the State post bifurcation and clean energy considerations, the government of Andhra Pradesh is keen to promote wind power generation in a big way.

OBJECTIVES:

1. To encourage, develop and promote wind power generation in the State with a view to meet the growing demand for power in an environmentally and economically sustainable manner.

2. To attract private investment to the State for the establishment of large wind power projects.

3. To promote investments for setting up manufacturing facilities in the State, which can generate gainful local employment.

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1 Operative Period

The policy shall come into operation with effect from the date of issuance and shall remain applicable for a period of five (5) years and/ or shall remain in force till such time a new policy is issued.

Wind power projects that are commissioned during the operative period shall be eligible for the incentives declared under this policy, for a period of ten (10) years from the date of commissioning – unless the period is specifically mentioned for any incentive.

2 Eligible Developers

All registered companies, Joint Venture Companies, Central and State power generation/ distribution companies and public / private sector wind power developers will be eligible for setting up of wind power projects, either for the purpose of captive/group captive use and/or for selling of electricity to the utilities or third parties, in accordance with the Electricity Act-2003, as amended from time to time.

The entity desiring to set up wind power project(s), either for sale of power and/ or for captive use/group captive use of power within or outside the State, shall inform the Nodal Agency as per the para (9) of this policy.

3 Category of Wind Power Projects

Category I	Projects set up in government/revenue lands or forest areas or assigned lands and also in private lands selling power within the state.
Category II	Projects set up for captive use or group captive use /3rd party sale within or outside the state.
Category III	Sale of power at average power purchase cost and availing Renewable Energy Certificate (REC)

Category I: Projects set up in government / revenue lands or forest areas or assigned lands and also in private lands selling power within the State

Power generated from the wind power projects installed entirely or partly on government/ revenue land or forest areas shall be for sale within the State only.

The Govt. of A.P. may consider proposals for allotment of revenue land if available - at the wind power potential areas on first come first serve basis- based on recommendation of NREDCAP, as per the provisions of New Land Allotment Policy announced by the Government vide G.O. Ms. No: 571, Dt: 14-09-2012 of Revenue (Assignment-I) Dept.

To facilitate faster execution of projects, the district collector shall handover advance possession of land including pathways to NREDCAP and the land shall be allotted in the joint name of NREDCAP and the Developer. The concerned district collector after taking into account all the necessary undertakings of land proposal shall permit the developer to start the construction. NREDCAP shall withdraw its rights from the land once the project gets commissioned.

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In case of forest areas, the developers shall submit the application through the Nodal Agency to the forest department, to consider for allotment as per the guidelines/regulations laid down by the forest department from time to time.

If the wind farm is set up in private land then the Eligible Developer shall procure the land from the landholder on their own.

Category II: Captive use or group captive use /direct sale to 3rd party sale within the State/States other than A.P. State

The State will promote wind power producers to set up wind power projects with no cap on capacity for captive use/group captive or sale of power to 3rd party within the State/States other than Andhra Pradesh. These projects will also qualify for Renewable Energy Certificates (RECs) subject to applicable regulations/ guidelines issued by the appropriate commission.

Category III: Projects under Renewable Energy Certificate Mechanism

The State will promote wind power producers to set up wind power projects with no cap on capacity for sale through Renewable Energy Certificate (REC) mechanism. The wind power producers will be required to apply for accreditation to the State Accreditation Agency and thereafter to Central Agency for registration and issuance of RE certificate under REC mechanism as per order/regulations of the appropriate commission. The power generated from these power projects shall be purchased by APDiscoms at pooled cost of power purchase as determined by APERC from time to time.

4 Capacity Allotment

The wind power projects shall be allowed in the areas notified by MNRE or in the areas where wind monitoring studies have been undertaken by MNRE/NIWE/NREDCAP/GoAP. In case wind resource assessment studies are proposed to be undertaken by the private developers, the capacity allotment will be considered only on submission of the wind data validation report of NIWE. The area applied for development of wind farm shall be clearly marked on a topo-sheet and google Map with the proposed capacity to be developed in that area.

NREDCAP shall be responsible for capacity allotment for upto 40 MW and to recommend capacity allotment beyond 40 MW to Government of AP.

5 Wind Resource Assessment studies in Private Sector

Permission for carrying out Wind Resource Assessment (WRA)and subsequent development at self-identified locations by the private entities will be given by the Nodal Agency on a **first come first serve basis** and will be governed by MNRE circular no. 51/9/2007-WE dated 20.06.2008 for wind measurement & subsequent development by private sector.

The applicant needs to clearly demarcate the project boundaries in a topo-sheet (scale 1:50000) where it is proposed to conduct the WRA study. All applications received will be scrutinised to ensure that the site identified has not been allotted to any other entity for WRA study as on the application date or is not within 5km radius from NIWE/NREDCAP proven or on-going wind masts as on the application date. Such WRA studies shall be completed within 24 months from date of signing of MoU with NREDCAP.

Contd.. 4

After completion of wind monitoring exercise, the applicant will be provided an exclusive period of 180 days from the expiry date of MOU to get the data authenticated by NIWE and make an application for capacity allotment. If the project is not applied for capacity allotment, the permission granted for private WRA study shall be cancelled. The applicant is also required to provide an undertaking to NREDCAP, with a copy to NIWE, indicating that NIWE can share the data to NREDCAP for subsequent/additional capacity allotments in the proposed (or balance) area.

6 Solar and Wind Hybrid Power Projects

To enable better utilization of common infrastructure and related facilities, solar and wind hybrid power projects shall be encouraged in the State. The tariff for such solar projects shall be as determined by APERC.

7 Repowering

The wind power developers will be encouraged to install higher capacity and improved technology Wind Electric Generators (WEGs) by undertaking appropriate micro-siting studies in order to optimally utilize the available wind resource potential at the project sites.

In respect of projects where lower capacity and lower hub height WEGs were installed and which have completed more than 15 years of life, proposals will be considered for replacing older turbines with higher capacity WEGs. In such cases, approval will be granted - subject to amendment of Power Purchase Agreement (PPA) with extension of time period for another 25 years.

The tariff payable for energy corresponding to the additional capacity available due to repowering of such projects shall be as per the applicable tariff determined by APERC from time to time.

8 GoAP Incentives

To enable wind power capacity addition in the State, following incentives shall be provided for Eligible Developers for those projects setting during the operative period mentioned in the para one (1).

a) Power Evacuation

i. The Eligible Developer shall bear the entire cost of power evacuation facilities for interconnecting the wind farm with the grid.

ii. The Eligible Developer shall abide by the orders, rules, regulations and terms and conditions as approved by APERC from time to time for operation of wind farms, power evacuation, transmission and wheeling of energy.

iii. Wind power projects will be exempted from paying the supervision charges to APTransco/Discom towards the internal evacuation infrastructure within the wind farm site and upto pooling sub-station. All electrical installations within wind farm site and upto pooling sub-station shall be as per the statutory requirements and shall be certified by the Chief Electrical Inspector General (CEIG) or any other statutory authority.

iv. APTransco/Discom will dispose the proposals for the technical feasibility for evacuation within 14 days from the date of receipt of application. Any upstream system strengthening requirement shall be borne by APTransco/Discom on a priority basis.

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b) Transmission and Distribution charges for wheeling of power

There will be no Transmission and Distribution charges for wheeling of power generated from wind power projects, to the desired location/s for captive use/third party sale within the State through grid. However, the Transmission and Distribution charges for wheeling of power generated from the wind power projects for sale outside the State shall be as per regulations of APERC.

The 3rd party sale by Eligible Developers under this policy will be permitted only to HT – I category consumers as categorized in Tariff Orders and as per the regulations issued by APERC from time to time.

c) Energy Banking

Banking of 100% of energy shall be permitted during all 12 months of the year. Banking charges shall be adjusted in kind @ 2% of the energy delivered at the point of drawal. The banking year shall be from April to March.

Drawals from banked energy shall not be permitted during five (5) month period from 1st April to 30th June and 1st February to 31st March of each financial year. In addition, drawls of banked energy during the Time of the Day (ToD) applicable during the peak hours, as specified in the respective Retail Supply Tariff Order, shall also not be permitted throughout the year. However, the provisions on banking pertaining to drawal restrictions shall be reviewed based on the power supply position in the State.

Energy injected into the grid from date of synchronization to Commercial Operation Date (COD) will be considered as deemed energy banking.

The unutilized banked energy shall be considered as deemed purchase by Discoms at the pooled power purchase cost as determined by the APERC for the applicable year. Energy settlement shall be done on monthly basis.

d) Open Access

Intra-state Open Access clearance for the whole tenure of the project or 25 years whichever is earlier will be granted as per the APERC Regulations amended from time to time. In absence of any response or intimation from the Nodal Agency to the generator within 21 days, then such application shall be considered to be deemed open access.

e) Electricity Duty

All wind power projects are exempted from paying Electricity Duty in case of sale of power to APDiscom.

f) Deemed Public Private Partnership (PPP) Status

Deemed PPP status shall be provided for projects coming up under Category I and have entered into a PPA with APDiscom for sale of power.

g) Non Agriculture Status

Deemed Non-Agricultural (NA) status for the land where wind power projects will be accorded, on payment of applicable statutory fees.

Contd.. 6

h) Deemed Industry Status

Generation of electricity from wind power projects shall be treated as eligible industry under the schemes administered by the Industries Department and incentives available to industrial units under such schemes shall be available to the wind power producers.

i) Must run status

Injection from wind power projects shall be considered to be deemed scheduled subject to prevailing regulations/grid code of appropriate commission.

j) Pollution Clearance

Wind power projects will be exempted from obtaining any NOC/Consent for establishment under pollution control laws from AP Pollution Control Board.

9 Nodal Agency

New and Renewable Energy Development Corporation of A.P. Ltd (NREDCAP) shall act as a Nodal Agency under this policy and as decided by the government from time to time.

The Nodal Agency and/or designated offices by the Nodal Agency shall be responsible for facilitating single window clearance of the projects for the following activities:

a) Registration of projects

b) Allotment of capacity of projects

c) Processing of proposals for allotment of revenue land or Forest land.

d) Arranging approval for power evacuation plan and open access.

e) Arranging other statutory clearances/approvals if any.

f) Co-ordination with MNRE/SECI/APTransco/APDiscoms and other central and state agencies.

An online system will be established by the Nodal Agency for acceptance of applications and for providing status updates. The developers will be given a login access for tracking the status updates. All approvals/clearances shall be disposed within 30 days from the date of registration.

10 Time Lines for Project Completion

The Eligible Developers should enter into a project agreement along with the applicable fees and bank guarantees with the Nodal Agency within two (2) months from the date of sanction of the capacity allotment.

In case of wind power projects allotted in revenue lands, the project shall be commissioned within 18 months from the date of possession of revenue lands and/ or issue of power evacuation clearance, whichever is later. In case of wind power projects allotted in private lands, the projects shall be commissioned within 18 months from the date of issue of power evacuation clearance.

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In case of revenue and private lands, if there is no development at the site, even after three (3) years from the date of sanction, the site may be offered to any other developer by the Nodal Agency. The Nodal Agency would be at liberty to invite bids for setting up wind power projects in such sites, where no development is taken up within prescribed period. In such cases, the Government may resume the lands so allotted or acquire the land purchased by the developers at the same price at which the sale deeds were registered and offer the lands to other developers by inviting bids.

11 Manufacturing

The Government intends to promote wind turbine manufacturing facilities that can contribute towards wind sector development in the State. The following incentives shall be applicable for new manufacturing facilities and equipment's, ancillaries related to wind power projects only.

- Priority allotment of Government land on long term lease basis

- Exemption from electricity duty for a period of ten (10) years for consumption of electricity from the first year of operation.

12 Applicability of this Policy for wind power projects approved under earlier Policy

This policy is applicable in respect of all wind power projects which are not commissioned as on date of notification of this policy in the State of Andhra Pradesh.

13 Project Monitoring

A "High Level Committee" constituted with the following members will monitor the progress of implementation of the Wind Power Policy:

1. Secretary, Energy Department
2. Chairman and Managing Director, APTRANSCO
3. CMD of APDISCOMs
4. V.C.& Managing Director, NREDCAP(Member-Convener)
5. Representative of Indian Wind Turbine Manufacturers Association (IWTMA)
6. Representative of Indian Wind Power Association (IWPA)

If any difficulty arises in giving effect to this policy, the High Level Committee is authorized to issue clarification as well as interpretation to such provisions, as may appear to be necessary for removing the difficultly either on its own motion or after hearing those parties who have represented.

14 Mid-term Review

State Govt. may undertake a Mid-term Review of this policy after a period of two years or as and when need arises in view of any technological breakthrough or to remove any inconsistency with Electricity Act 2003, rules and regulations made there under or any Govt. of India policy.

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15 Power to remove difficulties

If any difficulty arises in giving effect to this policy, energy department is authorized to issue clarification as well as interpretation to such provisions, as may appear to be necessary for removing the difficulty either on its own motion or after hearing those parties who have represented for change in any provision.

(BY ORDER AND IN THE NAME OF THE GOVERNOR OF ANDHRA PRADESH)

AJAY JAIN
SECRETARY TO GOVERNMENT

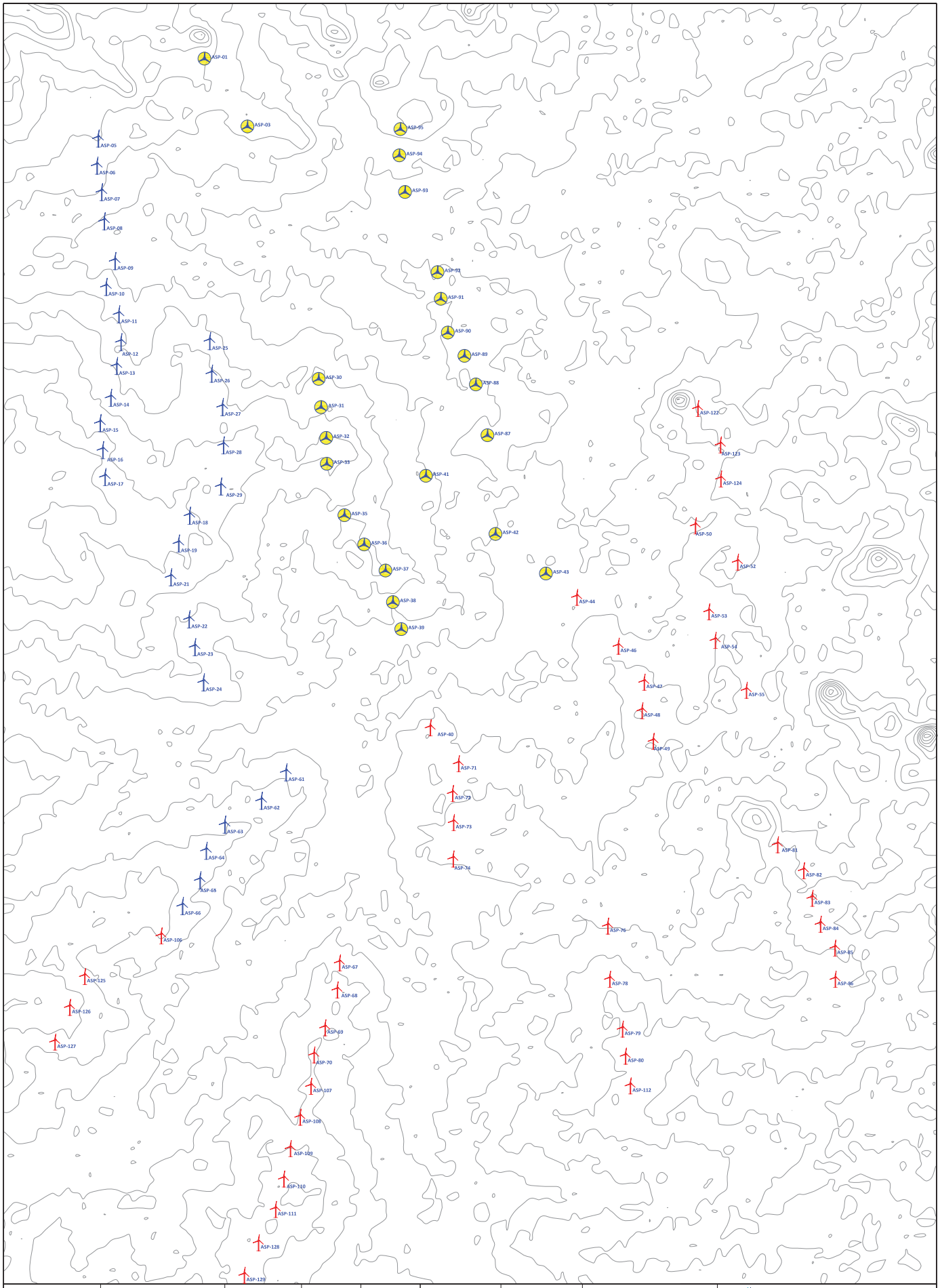
To
The Vice Chairman & Managing Director, NREDCAP, Hyderabad.
The Chairman & Managing Director, APTRANSCO, Hyderabad
The Managing Director, APGENCO, Hyderabad.
The Secretary, APERC, Hyderabad
The CMDs, of APSPDCL, Tirupathi / APEPDCL, Visakhapatnam.
All Collectors & District Magistrates in the state.
The Principal Secretary to Government, EFS&T Department.
The Principal Secretary to Government, Revenue Department.
The Principal Secretary to Govt., Finance (PF.I) Department.
Copy to:
The Secretary to Hon'ble C.M.
The P.S. to Hon'ble Dy. Chief Minister, Revenue, Stamps & Registrations.
The P.S. to Hon'ble Minister for Finance, Planning, Commercial Taxes & Legislature Affairs.
The P.S. to Secretary, Energy, I&I Department.
SF/SC.

//FORWARDED BY ORDER//

SECTION OFFICER

ANNEXURE IX

WTG LOCATIONS



Name of Applicant	Mytrah Energy (India) Ltd	Make/Model	GE / GE-1.7	GE / GE-2.3	SUZLON / S-111	
Name of Site	Aspari	Rating	1700 kW	2300 kW	2100 kW	
Name of District	Kurnool	Hub Height	80 m	94 m	90 m	GE-1.7 WTG
Name of State	Andhra Pradesh	Rotor Ø	103 m	116 m	111.8 m	GE-2.3 WTG
Wind Farm Capacity	200.5 MW	No. of WTGs	30	44	23	S-111 WTG

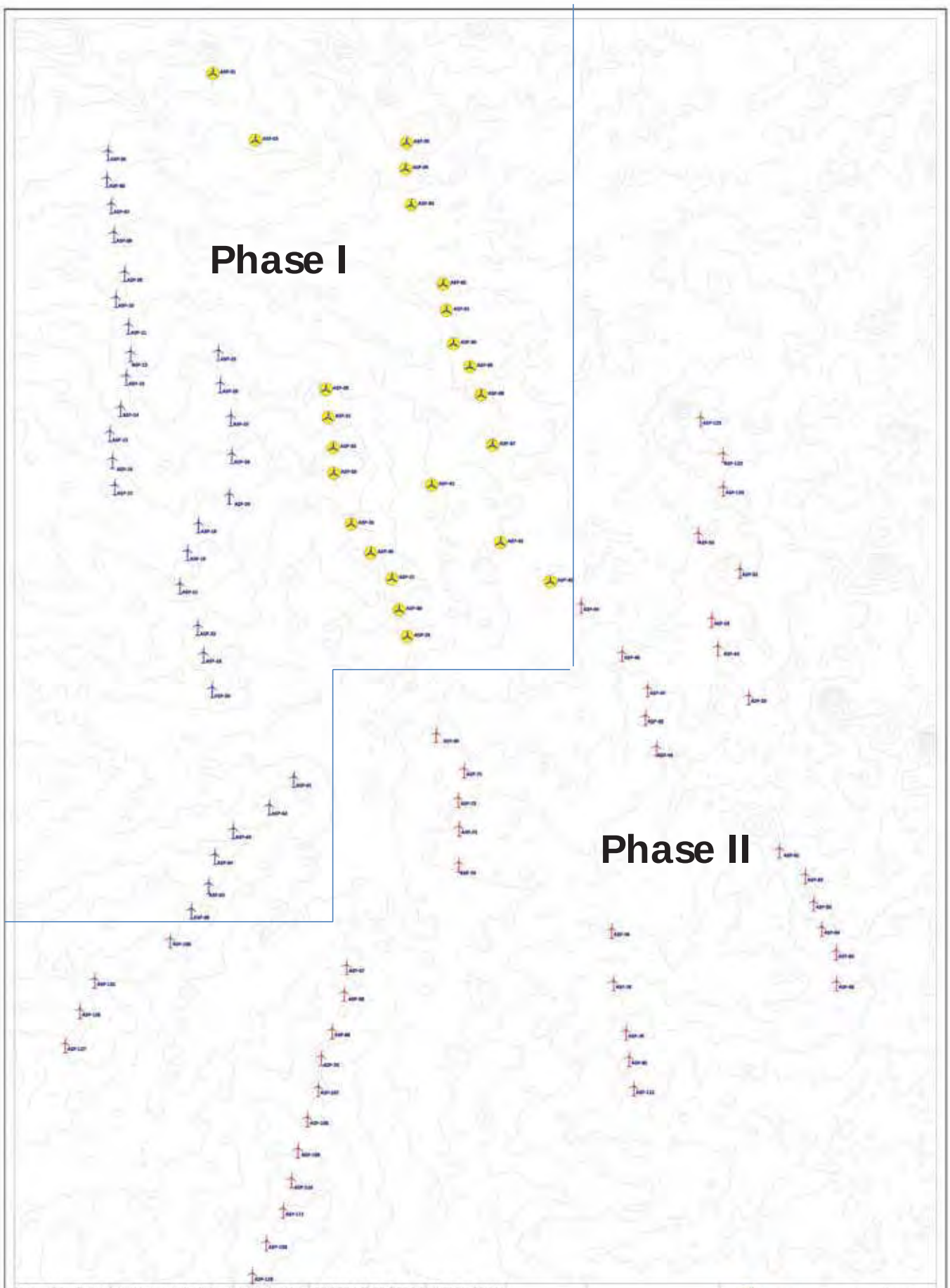
MYTRAH

Mytrah Energy (India) Ltd

Micrositing Drawing of 200.5 MW Windfarm at Aspari,Kurnool Dist, Andhra Pradesh

ANNEXURE X

PHASEWISE WTG LOCATION



Name of Applicant	Mytrah Energy (India) Ltd	Make/Model	GE / GE-1.7	GE / GE-2.3	SUZLON / S-111	
Name of Site	Aspari	Rating	1700 kW	2300 kW	2100 kW	
Name of District	Kurnool	Hub Height	80 m	94 m	90 m	GE-1.7 WTG
Name of State	Andhra Pradesh	Rotor Ø	103 m	116 m	111.8 m	GE-2.3 WTG
Wind Farm Capacity	200.5 MW	No. of WTGs	30	44	23	S-111 WTG

Mytrah Energy (India) Ltd

Micrositing Drawing of 200.5 MW Windfarm at Aspari,Kurnool Dist, Andhra Pradesh

ANNEXURE XI

SUMMARY OF SHADOW FLICKERING STANDARDS

Summary of Wind Policies and Recommendations by Country:
Companion Summary Chart to "International Review of Policies and Recommendations for Wind Turbine Setbacks from Residences"
Minnesota Department of Commerce: Energy Facility Permitting: Kathryn M. B. Haugen

Country	Setback Distance from Residences	Noise Standard	Shadow Flicker Standard	Are the setback distances and/or standards requirements or recommendations?	Notes and Rationale
Germany and Provinces	None	35- 50 dB(A) noise limit for night, and 45- 65 dB(A) noise limit for day, depending on area	Maximum 30 min/day and 30 hr/ year worst case scenario, 8 hr/year actual exposure	Requirements	Noise, shadow flicker concerns
Saarland	550- 850 m setback from residences			Recommendations	Noise, shadow flicker concerns
Lower Saxony	1000 m setback from residences			Recommendations	Noise, landscape concerns
Thuringia	1000 m setback/ potential conflict area for residences & recreational areas			Recommendations	Noise, shadow flicker concerns
Hesse	1000 m setback from residences, with greater distances for healthcare settings and smaller distances from individual homes			Recommendations	Noise, visual impact, shadow flicker, pollution, and spatial development concerns
Rhineland-Palatinate	400 m setback from individual homes, 1000 m setback from residential areas			Recommendations	Noise, landscape, shadow flicker concerns, based on court case and then became guideline
Berlin	None			None	Too developed, one wind turbine only
Bremen	200-500 m setback from residences			Recommendations: General result of going by German noise and shadow flicker regulations	shadow flicker concerns, consideration for neighbors

Schleswig-Holstein	300 m setback from areas with 1 < 4 residences, 500 m setback from rural residential areas, and 1,000 m setbacks from towns and vacation areas			Requirements	Tourism, historical areas, and landscape concerns
Hamburg	300 m setback from individual dwellings, 500 m setback from residential areas			Requirements	Unknown
Saxony	1x height of turbine setback from everything, 300 m setback from one turbine, 500 m setback from wind farms			Recommendations	Environment, landscape, shadow flicker, and noise concerns
Spain	500 m setback from residences	45-50 dB(A) noise limit		Recommendations	Noise, safety, visual impact concerns
Italy	None			None	None found
France	500 m setback from residences	25 dB noise limit inside nearby residences		Requirements	Noise, landscape, visual impact concerns
Canada	None			None	Provinces decide
Yukon	None			None	Sparsely populated
Prince Edward Island	Setback of 3x the total height of turbine from neighboring residences or 1x the height from developer's homes			Requirements	Environmental and public health and safety concerns
New Brunswick	500 m or 5x turbine height setback from all residences/ recreational areas if turbine is located on crown (state) land	40-53 dB(A) noise limit at all homes within 1 km		Requirements	Noise, visual impacts, safety concerns
Nova Scotia	Unknown			Unknown	None Found
British Columbia	None	40 dB(A) noise limit		Requirements	Noise concerns
Alberta	None	40 -56 dB(A) $L_{A\,eq}$ (usually 40 -46 dB(A) $L_{A\,eq}$) night noise limit at most affected residence within 1.5 km, day noise limits 10 dB(A) higher		Requirements	Noise concerns, Rule of Alberta Utilities Commission

Manitoba	500-550 setback from residences	40-53 dB(A) noise limit		Noise requirements, setback recommendations	Noise concerns, municipalities determine setbacks ranging from 300-800 m, Manitoba recommends 500 m
Ontario	550 m setback distances from homes, workplaces, & recreational areas	40-51 dB(A) noise limits		Requirements	Noise, shadow flicker concerns
Newfoundland/ Labrador	Unknown			Unknown	None found
Quebec	None			None	Municipalities determine setbacks, with 500 m being the most commonly used setback distance
UK / England	350 m setback minimum	35-45 dB(A) noise limit, or max 5 dB(A) above background noise, whatever is higher		Recommendations	Noise concerns
Scotland	2 km setback from cities, villages, and towns			Recommendations	Visual impact concerns
Wales	500 m setback from residences			Recommendations	Noise concerns
Portugal	200 m setback from residences	45-55 dB(A) noise limit by night, and 55-65 dB(A) noise limit for day		Noise Requirements, Setback Recommendations	Unknown
Denmark	4x turbine height setback from residences	39-44dB(A) noise limit		Requirements	Noise, shadow flicker, landscape concerns
Netherlands	4x hub height setback from residences	47 dB(A) noise limit by day and 42 dB(A) noise limit for night		Noise Requirements, Setback Recommendations	Noise, shadow flicker, safety concerns
Sweden	400-1000 m setback from residences	40 dB(A) noise limit, may be reduced to 30-35 dB(A) if in quiet area or produces tonality	German guidelines (see below)	Recommendations	Noise, shadow flicker, visual impact, safety

Australia	None			None	States decide, Senate recommends future review for stricter guidelines
New South Wales	None	$L_{A\ eq,\ 10\ min}$ 35 dB(A) noise limit, plus a 5 db penalty for tonality		Recommendations	Noise concerns
South Australia	None	L_{A90} 35-40dB noise limit, plus a 5 dB penalty for tonality	consideration of shadow flicker on all homes within 500m	Recommendations	Noise, shadow flicker concerns
Tasmania	None	5-10 dB penalty for tonality, impulsiveness, and modulation		Recommendations	Noise concerns
Victoria	None	L_{A95} 40 dB noise limit, plus a 5dB penalty for tonality, impulsiveness, and modulation	Shadow flicker limit of 30 hrs/year	Recommendations	Noise, shadow flicker concerns
Western Australia	1 km (1000 m) setbacks	$L_{A\ eq,\ 10\ min}$ 35 dB noise limit, plus a 5-15dB penalty for tonality, impulsiveness, and modulation		Recommendations	Noise, visual impact, shadow flicker concerns
Ireland	500 m setback from residences and noise sensitive areas,	35-45 dB(A) noise limit, or max 5 dB(A) above background noise, whatever is higher	Maximum shadow flicker 30 hr/year and 30 min/day	Recommendations	Noise, shadow flicker concerns
New Zealand	None	35-40 dB(A) noise limit, or max 5 dB(A) above background noise, whatever is higher		Requirements	Noise concerns

Note: This chart is a summary of the information found in the document "International Review of Policies and Recommendations for Wind Turbine Setbacks from Residences: Setbacks, Noise, Shadow Flicker, and Other Concerns." For more detailed information of wind energy requirements and recommendations, please refer to that document.

Reference for distance comparisons (rounded to the nearest foot):

50 m= 164 ft	250 m= 820 ft	450 m= 1476 ft	650 m= 2133 ft	850 m= 2789 ft
100 m= 328 ft	300 m= 984 ft	500 m= 1640 ft	700 m= 2297 ft	900 m= 2953 ft
150 m= 492 ft	350 m= 1148 ft	550 m= 1804 ft	750 m= 2461 ft	950 m= 3117 ft
200 m= 656 ft	400 m= 1312 ft	600 m= 1969 ft	800 m= 2625 ft	1000 m= 3281 ft

Reference for distance comparisons (rounded to the nearest mile):

0.5 km= 0.31 mi	1.0 km= 0.62 mi	1.5 km= 0.93 mi	2.0 km= 1.24 m

Wind Energy Terms

Note: Wind energy terms are not always used in the same way across various countries or sources. These definitions are based on how terms appeared to be most commonly used throughout countries and sources in this document.

Wind Energy: The provision of energy from wind, usually harnessed through wind turbines.
Wind Energy Requirement, Rule, Law, or Policy: A wind energy setback or limit required by a level of government.
Wind Energy Recommendation or Guideline: A wind energy setback or limit that is suggested or encouraged, but not required, by a level of government.
Wind Turbine: A system used to convert potential energy found in wind to mechanical energy to produce electricity. Wind turbines usually range in size from 9 to 200 meters (29- 427 feet), and may be located onshore or offshore.
Onshore Wind Turbine: A wind turbine that is located on land. Onshore wind turbines may range in size from small wind turbines producing 50 kilowatts of electricity a day, to large wind turbines producing up to 3 megawatts of electricity a day.
Offshore Wind Turbine: A wind turbine that is located in deep water such as seas or oceans. Offshore wind turbines are much larger than onshore wind turbines, producing up to 6 megawatts of electricity a day.
Vertical-Axis Wind Turbine: A wind turbine where the blades rotate around an axis that is perpendicular to the ground. Vertical-axis wind turbines are often described as resembling egg-beaters.
Horizontal-Axis Wind Turbine: A wind turbine where the blades rotate around an axis that is parallel to the ground. Horizontal-axis wind turbines are more common that vertical-axis turbines, and usually contain three blades.
Wind Energy Facility, Wind Power Plant, or Wind Farm: A group of three or more wind turbines operated together. A wind energy facility may include several hundred turbines.
Tower: The tall base that serves to raise and anchor the wind turbine blades.
Hub: The area the blades rotate around in a horizontal-axis turbine. The hub is parallel to the ground and contains the mechanical pieces including a gearbox and generator.
Blades: The sections of the wind turbine that the wind moves. There are typically three blades which rotate around the hub.
Turbine Height: The height from the ground to the top of the turbine. In a horizontal-axis turbine, it is the height from the ground to the top of the highest rotating blade.
Hub Height: The height from the ground to the center of the hub the blades rotate around on a horizontal-axis wind turbine.
Rotor Diameter: The diameter of the circular arc produced by the rotation of the blades. **Wind Turbine Mean Power Output:** The average amount of energy produced by a wind turbine or wind energy facility over a given period of time for an average wind speed, usually measured in megawatts or kilowatts.
Megawatts (MW): One million watts, or one thousand kilowatts of energy.
Kilowatts (kW): One thousands watts of energy.
Watts (W): The amount of energy used or produced by an object.
Mean Wind Speed or Velocity: The average rate over a period of time of the flow of wind with no blocking obstacles such as buildings or vegetation.
Setback: The minimum distance a wind turbine may be located from a designated location. Unless otherwise specified, setbacks refer to the minimum distance a wind turbine may be located from a residence. The term setback is also used to describe minimum distances from all buildings, property lines, or historically or environmentally important areas. Setbacks may be a set distance or based on turbine features including turbine height, hub height, rotor diameter, or blade length. Setbacks may also be referred to as a setback distance or separation distance.
Shadow Flicker: The pattern of alternating shadows and light caused by the changes in light when rotating blades cast shadows on an area or residence. Shadow flicker only happens when the sun is low in the sky and behind the rotating turbine blades.
Shadow Flicker Exposure: The amount of time a location experiences shadow flicker, measured in terms of the actual or the “worst-case” scenario.
Shadow Flicker Standard or Shadow Flicker Limit: The maximum exposure to shadow flicker allowed at residences near wind turbines.

Noise Terms

Sound: Vibrations conveyed through the air that may be heard.
Noise: Unwanted sound.
Noise Standard or Noise Limit: The maximum volume from wind turbines allowed in an environment. The noise limit may vary based on the time of day, size and number of turbines, and number of nearby residences or educational or work settings. Usually, the noise limit refers to the volume at nearby residences.
Background Noise: Sounds present in the environment on a regular basis. In terms of wind energy, usually refers to the sounds present before wind turbines are installed.
Residence, Dwelling, or Home: A place where people live.
Residential Area: An area with a number of residences, or an area where residences are the main features instead of commercial, service, industrial, or agricultural facilities.
Quiet Area: An area, usually residential or rural, with little existing background noise.
Wind Facility Neighbor or Receiver: Residences or businesses near to wind facilities, often close enough to call for measurement of sound or shadow flicker levels.
Decibel (dB): The unit used to measure the volume or intensity of a sound.
A-weighting or dB(A): A standard measure of sound volume that is widely used internationally, with sounds weighted more or less depending on their frequency. dB(A) is designed to measure how loud sounds appear to the normal human ear and generally weights sounds with higher frequency levels as appearing louder than lower frequency sounds.
C-weighting or dB(C): A standard measure of sound volume, with sounds weighted more or less depending on their frequency. dB(C) uses less weighting than dB(A) for especially lower frequency sounds, which are rated louder in dB(C) than in dB(A). C-weighting is less widely used than dB(A), but is used when there is concern about the amount of lower frequency sounds from equipment or power sources.
Frequency: The number of oscillations per second of sound waves, measured in Hertz (Hz). Humans can normally hear sounds with frequencies ranging from 20-20,000 Hz.
Infrasound: Sounds at frequencies below 20 Hz that humans cannot hear.
Low Frequency Sound: Sounds at frequencies from 20-200 Hz that humans can usually hear.
Modulation: Regular, audible fluctuations in the sound volume.
Tonality: A sound at a specific, discrete frequency rather than a range of frequencies that produces a distinct tone, like a hum.
Impulsiveness: A repeated short sound, such as banging.
Sound Pressure: The difference in the local air pressure caused by a sound wave.
Sound Pressure Level (SPL): The measure of the sound pressure, or the difference in the local air pressure caused by a sound wave, relative to a standardized value at a distance from a source of a sound.
$L_{A90,\ 10\ min}$ or L_{A90}: The sound pressure level in dB(A) that is equaled or exceeded for 90% of the time measured, often a 10 minute interval.
$L_{A95,\ 10\ min}$ or L_{A95}: The sound pressure level in dB(A) that is equaled or exceeded for 95% of the time measured, often a 10 minute interval.
$L_{A\ eq,\ 10\ min}$, $L_{A\ eq}$ or L_{eq}: The average sound level over a period of time in dB(A), or the continuous sound level that would equal the average of multiple sound pressure levels for a fluctuating sound.
$L_{A\ max,\ 10\ min}$ or $L_{A\ max}$: The highest sound pressure level I dB(A) that occurs within the time measured, often a 10 minute interval.

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ANNEXURE XII

LONG TERM BIRD AND BAT STUDY

LONG TERM BIRD AND BAT SURVEY IN THE PROPOSED ASPARI WIND FARM SITE IN KURNOOL DISTRICT, ANDHRA PRADESH, INDIA.

May 2016

Prepared by **Voyants Solutions Private Limited** for the Asian Development Bank. {*GUR_EMS_1456 Final Bird and bat_27.05.2016* originally posted on May, 2016 available on {http://www.adb.org/projects/ IND: Long term Bird and bat study of 200 MW Wind Farm Project in village Aspari, District Kurnool, Andhra Pradesh.}

NOTES

(i) The fiscal year 2016-17 of the Government of India ends on March 31, 2017.

(ii) In this report, "$" refers to US dollars.

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EXECUTIVE SUMMARY

Mytrah Vayu (Tungabhadra) Private Limited (MVTPL) proposes to develop a wind farm of 200 MW capacities at Aspari village, Kurnool District, Andhra Pradesh. The proposed wind farm will consist of installation of 97 Wind Turbine Generators (WTG) of different capacities. The present long term bird and bat survey was undertaken to study the potential impact of wind turbines on bat and avifauna population of the proposed project site area. The total area required for the project is approximately 494 acres. The proposed project is spread over 12 revenue villages of Aluru and Pattikonda Taluka. The land identified for the proposed project site is primarily undulating and mix of single cropped agricultural and barren land. The core zone is mostly single crop land but the buffer zone up to 10 km is predominantly agricultural land interspersed with isolated patches of sparse vegetation and without crop of rocky boulders. The major observations of the present survey are:

i. 24 bats species and 164 bird species are recorded in the whole Kurnool district as per the publically available data. As per the IUCN Criteria the entire mentioned bat species fall under the criteria of Least Concern whereas 5 bird species belong to "Critically Endangered" and 3 species belong to "Endangered" category.
ii. In the project site 88 bird species and 4 bat species were recorded. However, none of them belong to "Critically Endangered" or "Endangered" category of IUCN Red list.
iii. There are no major migratory paths observed during the site study and found as per the available secondary data
iv. Out of 88 bird and bat species 36 species including 26 migratory species were found to be species of concern as per national and different international regulations.

The anticipated impact to the bat and avifauna population due to the project was found to be general in nature common with wind mill projects like mortality due to collision with turbine rotor or accidental body touch with high tension transmission line or in general disturbance in the site due to construction and operation of the project.

The proposed project does not expect to threaten the long term viability/function of any of bat and bird species found in the area. However, mitigation measures are suggested to minimize the project impact on bat and avifauna. The project as per the closure of ESIA falls into the Category B in reference to the ADB environmental and social safeguard policy (2009). The project is expected to be beneficial in improving the power scenario of the area.

1 INTRODUCTION

Myrrha Vayu (Tungabhadra) Private Limited (herein after referred as 'MVTPL'), is a subsidiary of Myrrha Energy (India) Limited (MEIL) intends to develop a 200 MW Wind Project at Aspari village, Kurnool District, Andhra Pradesh (herein after referred to as the 'Project'). The project envisages installation of 30 x 1.7 MW (GE-1.7), 44 x 2.3 MW (GE-2.3), 23 x 2.1 MW (S-111 Salon) Wind Turbine Generators (WTG). In order to ensure that the project is established in a manner that is socially responsible and reflects sound environmental management practices, MVTPL intends to carry out an Environmental and Social Impact Assessment (ESIA) study for the Project, in accordance with Asian Development Bank (ADB) Safeguard Policy Statement (SPS), 2009, International Finance Corporation's (IFC) Performance Standards (PS) on Social and Environmental Sustainability, 2012 and Environment, Health and Safety Guidelines, 2007. Further to assess the impacts on Bird and Bats, ADB has advised to MVTPL to conduct a long term Bird and Bat Study. The Bird and Bat scope of work given by ADB was agreed by MVTPL and the Consultant. The below report is in-line with scope of work and the requirement of ABD.

1.1 PROJECT DETAILS AND PROJECT PROPONENT

MVTPL proposes to develop a wind farm of 200 MW capacities at Aspari village, Kurnool District, Andhra Pradesh. The proposed wind farm will consist of installation of 97 Wind Turbine Generators (WTG) of different capacities. A brief detail of the major components of the proposed wind farm is highlighted in the table below:

Details	Value
Total Area	493.7 Acres
No. of WTG	97
Height of WTG with blades	94 m
Rotor Diameter	116 m (max)
No. of Blades	3

MVTPL is the SPV of Mytrah Energy (India) Limited (MEIL) which is a wholly owned subsidiary of Mytrah Energy Limited (MEL) in India and aims to own and operate 5000 MW of renewable power in India. MEIL is a pioneer and one of the largest Independent Power Producer (IPP) in renewable energy in India with 543 MW power generations across six states. MEIL has more than 200 wind mats spread across multiple states in India. MEIL currently has an active development pipeline of about 3500 MW. From a standing start in late 2010, MEIL has already built a portfolio of over 500 MW of operating wind plants in India.

1.2 BACKGROUND OF BIRD AND BAT MONITORING STUDY

Voyants Solutions Pvt Ltd (VSPL) herein termed as "Consultant" has been entrusted by MVTPL to carry out the long term bird and bat survey for this proposed wind mill project at Aspari, Kurnool District, Andhra Pradesh. The present long term bird and bat survey was undertaken to study the potential impact of wind turbines on bat and avifauna population of the proposed project area. Wind turbine generators generally are considered to be a hazard to the migratory route of bat and avifauna. Continuous whistling noise from WTG may impact the natural habitat of avifauna as well. The present survey was undertaken to study the natural habitat conditions, bat and bird species

profile, their behavior, etc. to assess the potential impacts of WTGs on the bat and avifauna population.

1.3 OBJECTIVES

The proposed project site is located at Aspari village, Kurnool District, Andhra Pradesh. The main objective of long term bird and bat study is to assess the potential impact of proposed wind turbines on avifauna population of the proposed project area.

1.4 SCOPE OF WORK

The proposed project site is located at Aspari village, Kurnool District, Andhra Pradesh. The major scopes of work are highlighted bellow:

i. Desktop study to obtain existing records of bird/bat with special reference to "Endanger" and "Critically Endangered" species in the project area as per IUCN Red list category.
ii. Habitat and flight path survey of bat and avifauna population to assess likelihood of impact due to WTG locations.
iii. Consultation with local State forest and wildlife department to recognize if they have any concerns with proposed wind farms and major flight paths, if any.
iv. Discussion with local NGO's for conservation of birds and bats
v. Appraisal of issues of bird/bat collision in areas of operational turbines.
vi. Vantage point survey within 2 km radius of vantage point following procedure detailed in SNH 2010, 2014; Band et al. 2007, 2012.
vii. Mapping of water bodies in and around 5 km radius of the project site.
viii. Mapping of migratory routes of avifauna, if any.
ix. All carcass sites monitoring for the operational WTG locations
x. Livestock carcass sites monitoring

1.5 BIRD AND BAT MONITORING PLAN

Bird and bat monitoring plan rely on direct field observations, indirect evidences, authentic information, desktop study of available relevant literature as well as subject expert's professional judgement. After review of relevant secondary information available for the area habitat and vantage point surveys were undertaken in late winter (February, 2016) and early summer (March-April, 2016). Monitoring surveys undertaken in the month of February and March-April, 2016 included surveys around 10 km radius of the project area, vantage point survey, waterbody survey, survey of livestock carcass sites as well as monitoring in and around the operational WTG sites to record issues of bird/bat collision.

1.6 LIMITATION OF STUDY

Some of the limitations of the present study may be noted as follows:

i. The observations were for the day and night with slight variations in the starting and ending time depending on the season.

ii. Further, all surveys were carried out during dawn (early morning), dusk (late evening) and night to capture nocturnal avi fauna only.
iii. The survey was carried out for short span i.e. 15 days per month for two months of time.
iv. We could not follow individual species life style and behavior in detail.

1.7 REPORT STRUCTURE

The full report presents the findings, analysis and recommendations for the proposed project. For convenience of understanding the report have been segregated into six chapters as follows:

Executive Summary: This section concisely describes the critical facts, significant findings and recommended mitigative actions.

Chapter-1: Introduction: The chapter provides description of project background, objectives, scope and organization of the study and approach & methodology.

Chapter-2: Study Area: This chapter deals with project details encompassing layout, land details, site settings, project components etc.

Chapter-3: Approach and Methodology: This chapter highlights approach and methodology adopted for the present assessment.

Chapter-4: Observation and Analysis: This chapter listed out the major observations and their analysis.

Chapter-5: Potential impacts and mitigation measures: This chapter highlights the observations and professional judgement of anticipated impact along with proposed mitigation measures.

Chapter-6: Closure In this chapter a brief conclusion drawn from the impact assessment study has been presented.

2 STUDY AREA

2.1 PROJECT SITE/ STUDY AREA

The proposed project site is located at village Aspari, District Kurnool Andhra Pradesh. The total area required for erection of turbines and associated facilities such as access roads, pooling substation and switchyard is approximately 412 acres. All the Wind Turbine Generator (97 numbers) have been proposed on private land. Approximately 400-acre land will be required for WTG and 1 acre per tower land would be required for transmission line which would be 82 acres. The wind farm site is located approximately 70 km to the Southwest of Kurnool District Headquarter and 60 km to the Northeast of Bellary District Headquarter. The nearest towns are Guntakal and Adoni. The proposed project is spread over 12 revenue villages of Aluru and Pattikonda Taluka. Proposed Project location map and study area map has been shown as Figure 2.1 and Figure 2.2.

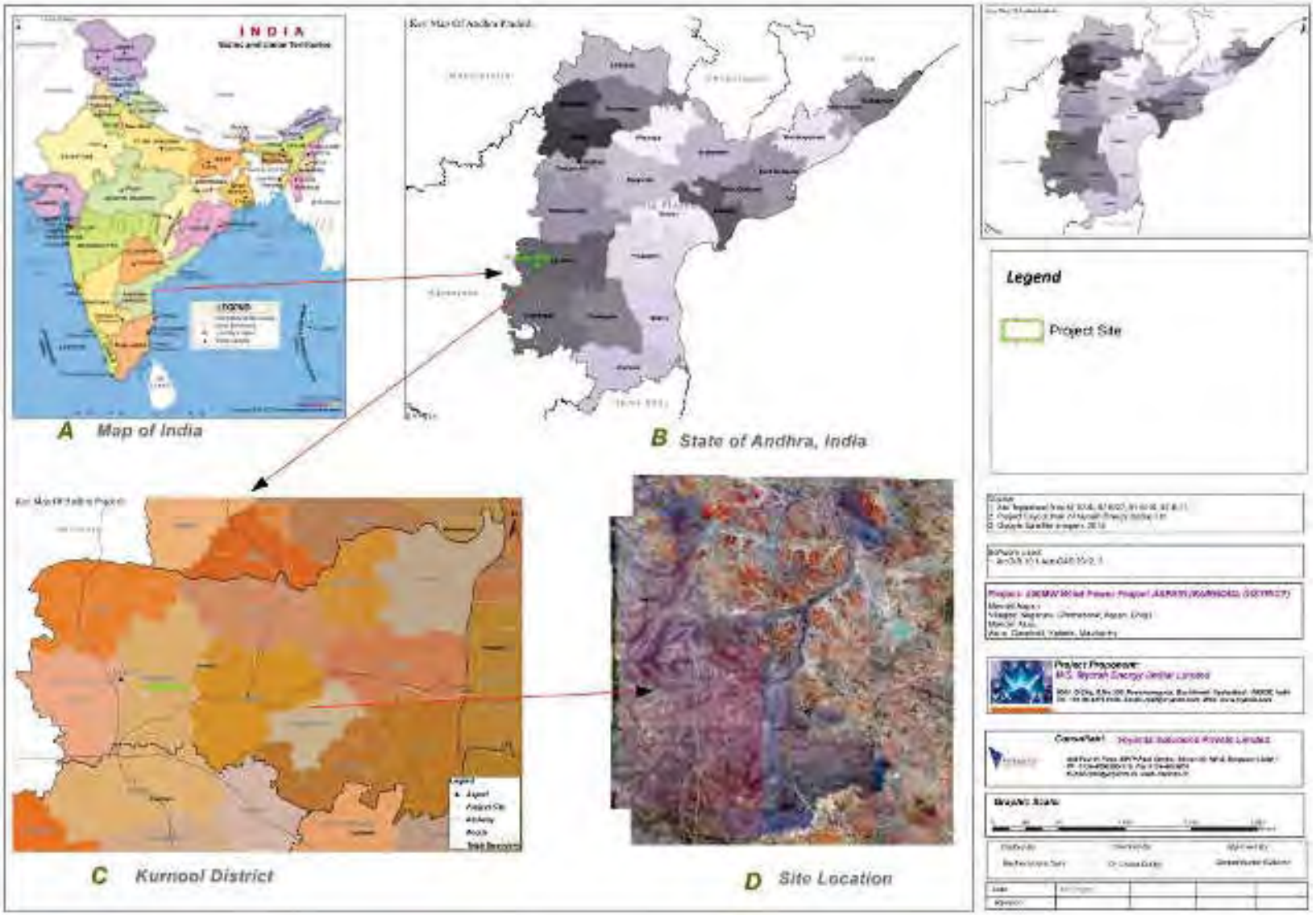

Figure 2-1: Location Map of the Project Area

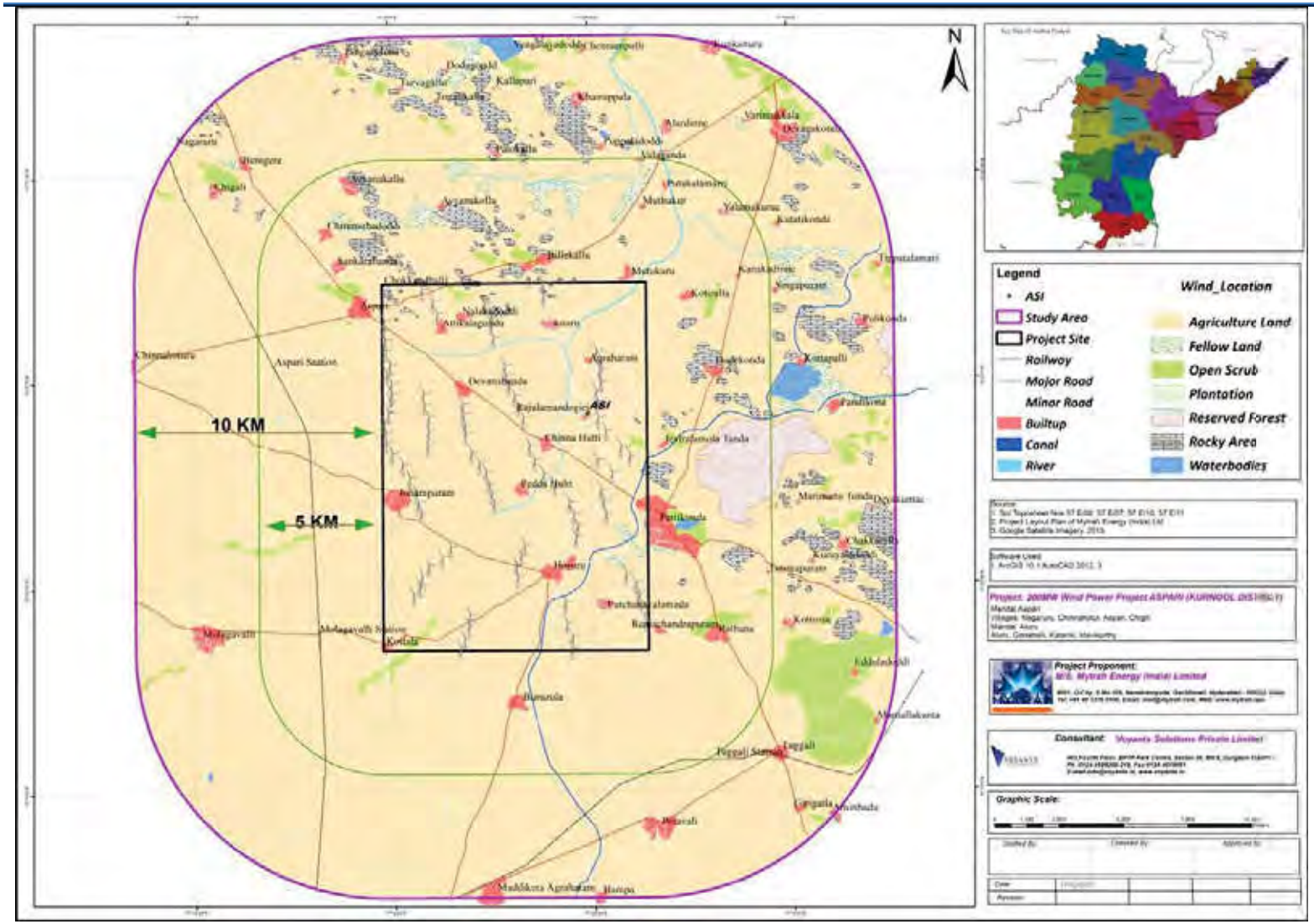

Figure 2-2: study area Map of the Project Area

2.2 BIOGEOGRAPHIC SETTINGS

The land identified for the proposed project site is primarily undulating and mix of single cropped agricultural and barren land (Figure 2.3). The general topography of the area is undulating land. The core zone is mostly agricultural land but the buffer zone up to 10 km is predominantly agricultural land interspersed with isolated patches of wild vegetation and rocky boulders. There is little hilly terrain in the buffer zone whose elevation is up to 480 MSL. There is no forest land in the project site. Pattikonda Reserve Forest is identified outside 10 km radius of the project site in NW direction from Pattikonda Village. The area is dominated by scrubby growth. These scrub growths are invaded by Prosopis juliflora. There is a canal in southern part of the study area named Handri Niwas Suzla Shrawanti Pathkam Canal which gets its supply from Handry River following around 30 km from the project site.

Figure 2-3: Physiographic setting of the study area

2.3 CLIMATOLOGICAL SETTING:

The climate in Krnool district may be described as semi arid type. There is not much variation in the day and night temperature with daily maximum and minimum temperature varies in between 34.1°C and 22.1°C. Observed mean highest temperature in Kurnool District is 43.1°C whereas mean lowest temperature is 11.1°C. Total annual rainfall in the district is about 726 mm. The bulk of rainfall is received during rainy season in the month of June to October.

3 APPROACH AND METHODOLOGY

This chapter highlights approach and methodology adopted for the present assessment. The main objective of the present study is to assess the potential impact of wind turbines on bat and avifauna population of the proposed project area. To achieve the mentioned objective, general reconnaissance survey in and around the proposed site was carried out. Identification of avifauna species in the field was carried out with the help of the Book of Indian Bird by Salim Ali (Thirteenth Revised Edition, 2002) and bats were identified with the help of Bats of the Indian Subcontinent by Bates and Harrison (1997). Good quality Camera and Binoculars were used for field observations. Identification studies based on direct/indirect evidences in the field were based on the standard guidelines and techniques issued from time to time through scientific publications of Zoological Survey of India (Subsidiary Govt. organization under the control of MOEFCC, Govt. of India, New Delhi), Bombay Natural History Society (BNHS), Wildlife Institute of India (WII). Overall approach for the present study may be listed as follows:

- To identify bat and avifauna species in the area
- Distribution, location of sightings and abundance under local status.
- Known routes and movements in/around or through the site
- Relative importance of the site to each species
- Specific uses of the site including temporal and spatial use

The detailed methods adopted for the present study is enumerated bellow:

Step 1: Review of Secondary Literature: Species of bat and avifauna as well as any other specific ecological issues associated with the area was identified through the available secondary literature.

Step 2: Transect Walk: Transect walk was undertaken to collect visual information about the species composition of bats and birds. The transect walk will also help in verification of the secondary data secured from the secondary record.

Step 3: Identification of Species: Identification of the species in field through direct sightings. Identification of a species based on indirect evidence (Feathers, nests, carcass) was also carried in the field wherever applicable.

Step 4: Vantage Point Survey: Detailed vantage point survey within 2 km radius of the vantage point was undertaken in 23 identified vantage points. There were altogether two surveys during February, 2016 to March - April, 2016. Each Vantage point was surveyed for two hours in the morning and evening time.

Step 5: Waterbody survey: Waterbodies in and around the project sites were surveyed with a view to identify aquatic and water dependent bird species in the area. All waterbodies are located beyond 10 Kms from the Site.

Step 6: Livestock Carcass Sites Monitoring: Livestock carcass disposal sites were monitored through discussion with local people, villagers, farmers and butchers.

Step 7: Carcass Survey: Carcass Surveys were carried out in the study area as well as in nearby areas to detect bird and bat carcass.

Step 8: Visit to operation WTGs: Monitoring and discussion study was undertaken around the operational WTGs to identify issues of bird/bat collision in areas of operational turbines

Step 9: Consultation with State Forest and Wildlife Department: Consultation with local State forest and wildlife department was undertaken to identify issues of local concern with respect to bird and bat population of the proposed area.

Step 10: Preparation of Inventory: On the basis of current field identification studies carried out during transect walk and surveys and secondary data from the available literature an inventory of bat and avi fauna in the project area was prepared.

Step 11: Mapping of Migratory Routes of Avifauna: Mapping of Migratory routes of bat and avifauna population were done by interacting with local people and by applying professional judgement.

Step 12: Discussion with local NGOs: Discussion with local NGOs was undertaken for conservation of birds and bats.

Step 13: Report Preparation: The report includes detail assessment of distribution, abundance, rarity, migratory, species diversity, habitat requirements, economic significance, commercial value, etc. to assess the anticipated impact of wind turbines on bat and avifauna population of the proposed project area. The report also includes recommendations to avoid any long term potential impact on bat and avifauna population of the area.

4 OBSERVATION AND ANALYSIS

This chapter discusses the findings of the data collected during two surveys. About 24 bat species belonging to 8 families have been recorded from Kurnool district. As per the IUCN Criteria all the species fall under the criteria of "Least Concern" Category. None of the species come under any of the "Threat Criteria" of IUCN Red list. About 164 bird species of 122 genera belonging to 58 families under 18 orders have been recorded from Kurnool district. Out of the 164 species, 5 bird species belongs to "Critically Endangered", 3 species belong to "Endangered", 6 species belong to "Vulnerable" and 8 species belong to "Near Threatened" criteria of IUCN Red list category. Of the mentioned species 6 bird species have been listed under CITES APPENDIX: II and 10 bird species have been listed under CMS APPENDIX: II. As per the Indian Wildlife (Protection) Act, 1972 (As amended up to, 2006) Regulations, 3 species belong to Schedule I category. List of bird and bat species and their IUCN category found in the Kurnool district has been listed in Table 4.1 and 4.2 respectively. Species diversity of bat and bird recorded in Kurnool district is shown in Figure 4.1 and 4.2 respectively.

Table 4-1: List of Bat Species Recorded from Kurnool District

Sr. No.	Common Name	Scientific Name	Remarks
1	Greater Short-nosed Fruit Bat	*Cynopterus sphinx* (Val)	IW(P)A: Schedule: V, IUCN Category: Least Concern
2	Indian Flying Fox	*Pteropus giganteus* (Brunnich)	IW(P)A:Schedule: V; IUCN Category: Least Concern; CITES: APPENDIX: II
3	Indian Fulvous Fruit Bat	*Rousettus lleschenaulti* (Desmarest)	IW(P)A: Schedule: V, IUCN Category Least Concern
4	Cave Fruit Bat/Dawn Bat	*Eonycteris spelaea* (Dobson)	IW(P)A: Schedule: V, IUCN Category: Least Concern
5	Lesser Rat-tailed Bat	*Rhinopoma hardwickei* (Gray)	IUCN Category: Least Concern
6	Long-armed Sheath tailed Bat	*Taphozous longimanus* (Hardwicke)	IUCN Category: Least Concern
7	Black-bearded Tomb Bat	*Taphozous melanopogon* Temminck	IUCN Category: Least Concern
8	Tomb Bat	*Taphozous perforatus* Geoffroy	IUCN Category: Least Concern
9	Indian False Vampire Bat	*Megaderma lyra* Geoffroy	IUCN Category: Least Concern
10	Malay False Vampire Bat	*Megaderma s. spasma* (Linnaeus)	IUCN Category: Least Concern
11	Rufous Horseshoe Bat	*Rhinolophus rouxi* Temminck	IUCN Category: Least Concern
12	Fulvus Leaf-nosed Bat	*Hipposideros fulvus pallidus*	IUCN Category: Least

Sr. No.	Common Name	Scientific Name	Remarks
		Anderson	Concern
13	Sri Lanka Gigantic/ Kelaart's Leaf-nosed Bat	*Hipposideros lankadiva* Kelaart	IUCN Category: Least Concern
14	Schneider's Leaf-nosed Bat	*Hipposideros speoris* (Schneider))	IUCN Category: Least Concern
15	Painted Bat	*Kerivoula picta* (Pallas)	IUCN Category: Least Concern
16	Kelaart's Pipistrelle	*Pipistrellus* (*Pipistrellus*) *ceylonicus indicus* (Kelaart)	IUCN Category: Least Concern
17	Indian Pipistrelle	*Pipistrellus* (*Pipistrellus*) *c. coromandra* (Gray)	IUCN Category: Least Concern
18	Dormer's Bat	*Pipistrellus* (*Pipistrellus*) *dormeri* (Dobson)	IUCN Category: Least Concern
19	Indian Pigmy Pipistrelle	*Pipistrellus* (*Pipistrellus*) *mimus* Wroughton	IUCN Category: Least Concern
20	Greater Asiatic Yellow House Bat	*Scotophilus h. heathi* (Horsfield)	IUCN Category: Least Concern
21	Lesser Asiatic Yellow House Bat	*Scotophilus K. kuhli* Leach	IUCN Category: Least Concern
22	Tickle's Bat	*Hesperoptenus* (*Milithronycteris*) *tickelli* (Blyth)	IUCN Category: Least Concern
23	Schreiber's Long-winged Bat	*Miniopterus schreibersi fuliginosus* (Hodgson)	IUCN Category: Least Concern
24	Egyptian Free-tailed Bat	*Tadarida aegyptiaca* (Geoffroy)	IUCN Category: Least Concern

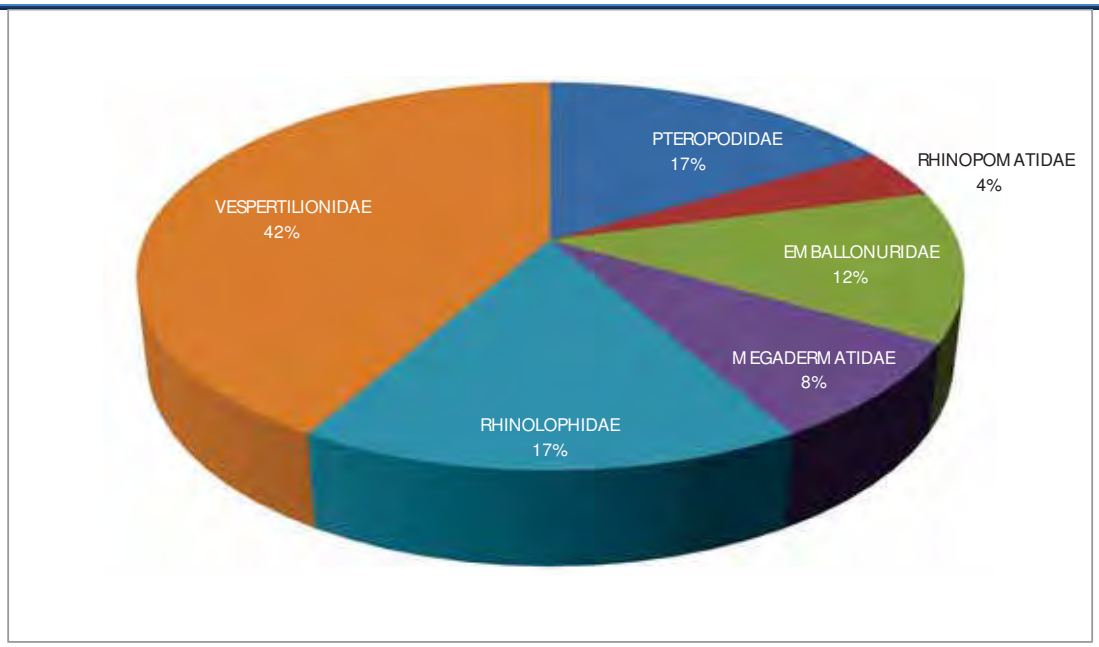

Figure 4-1: Bat species diversity recorded from Kurnool District

Table 4-2: List of Bird Species recorded from Kurnool District

Sr. No.	Common Name	Scientific Name with Classification	Remarks,
1.	Little Grebe/ Dabchick	*Tacthbaptus ruficollis* (Pallas)	IW(P)A: Schedule: IV, IUCN Category: Least Concern
2.	Little Cormorant	*Phalacrocorax niger* (Viellot)	IW(P)A: Schedule: IV, IUCN Category: Least Concern
3.	Great Cormorant	*Phalacrocorax carbo* (Linnaeus)	IW(P)A: Schedule: IV, IUCN Category: Least Concern
4.	Indian Cormorant	*Phalacrocorax fuscicollis* (Viellot)	IW(P)A:Schedule: IV, IUCN Category: Least Concern
5.	Spot-billed Pelican	*Pelecanus philippensis* (Gmelin)	IW(P)A: Schedule: IV, IUCN Category: Near Threatened
6.	Darter	*Anhinga melanogaster* (Pennant)	IW(P)A: Schedule: IV, IUCN Category: Near Threatened
7.	Little Egret	*Egretta garzetta* (Linnaeus)	IW(P)A: Schedule: IV, IUCN Category: Least Concern
8.	Intermediate/Median Egret	*Egretta intermedia* (Wagler)	IW(P)A: Schedule: IV, IUCN Category: Least Concern

Sr. No.	Common Name	Scientific Name with Classification	Remarks,
9.	Large Egret	*Casmerodius albus* (Linnaeus)	IW(P)A: Schedule: IV, IUCN Category: Least Concern
10.	Cattle Egret	*Bubulcus ibis* (Boddaert) = *Bubulcus coromandus* (Linnaeus)	IW(P)A: Schedule: IV, IUCN Category: Least Concern
11.	Indian Pond Heron	*Ardeola grayii* (Sykes)	IW(P)A: Schedule: IV, IUCN Category: Least Concern
12.	Indian Grey Heron	*Ardea cinerea* (Linnaeus)	IW(P)A: Schedule: IV, IUCN Category: Least Concern
13.	Black-crowned Night Heron	*Nycticorax nycticorax* (Linnaeus)	IW(P)A:Schedule: IV, IUCN Category: Least Concern
14.	Indian Purple Heron	*Ardea purpurea* (Linnaeus)	IW(P)A: Schedule: IV, IUCN Category: Least Concern
15.	Asian Openbill Stork	*Anastomus oscitans* (Boddaert)	IW(P)A: Schedule: IV, IUCN Category: Least Concern
16.	Painted Stork	Mycteria leucocephala (Pennant)	IW(P)A: Schedule: IV, IUCN Category: Near Threatened
17.	Black-necked Stork	*Ephippiorhynchus asiaticus* (Latham)	IW(P)A: Schedule: IV, IUCN Category: Near Threatened
18.	Lesser Adjutant Stork	*Leptoptilos javanicus* (Horsefield)	IW(P)A: Schedule: IV, IUCN Category: Vulnerable
19.	Black Stork	*Ciconia nigra* (Linnaeus)	IW(P)A: Schedule: IV, IUCN Category: Least Concern
20.	White-necked Stork	*Ciconia episcopus* (Boddaert)	IW(P)A: Schedule: IV, IUCN Category: Vulnerable
21.	Oriental White/Black Headed Ibis	*Threskiornis melanocephalus* (Latham)	IW(P)A: Schedule: IV, IUCN Category: Near Threatened
22.	Black Ibis	*Pseudibis papillosa* (Temminck)	IW(P)A: Schedule: IV, IUCN Category: Least Concern
23.	Glossy Ibis	*Plegadis falcinellus* (Linnaeus)	IW(P)A: Schedule: IV, IUCN Category: Least Concern

Sr. No.	Common Name	Scientific Name with Classification	Remarks,
24.	Bar-headed goose	*Anser indicus* (Latham)	IW(P)A: Schedule: IV, IUCN Category: Least Concern
.25.	Ruddy Shelduck/ Bramhani Duck	*Tadorna tadorna* (Linnaeus)	IW(P)A:Schedule: IV, IUCN Category: Least Concern
26.	Northern Pintail	*Anas acuta* (Linnaeus)	IW(P)A: Schedule: IV, IUCN Category: Least Concern
27.	Common Teal	*Anas crecca* (Linnaeus)	IW(P)A: Schedule: IV, IUCN Category: Least Concern
28.	Spot-billed Duck	*Anas poecilorhymcha* (J. M. Forester)	IW(P)A: Schedule: IV, IUCN Category: Least Concern
29.	Gadwall	*Anas strepera* (Linnaeus)	IW(P)A: Schedule: IV, IUCN Category: Least Concern
30.	Cotton Teal/Cotton Pigmy-Goose	*Nettapus coromandelianus* (Gmelin)	IW(P)A: Schedule: IV, IUCN Category: Least Concern
31.	Garganey	*Anas querquedula* (Linnaeus)	IW(P)A: Schedule: IV, IUCN Category: Least Concern
32.	Common Pochard	*Aythya farina*	IW(P)A: Schedule: IV, IUCN Category: Vulnerable
33.	Lesser Whistling Teal/Duck	*Dendrocygna javanica* (Horsfield)	IW(P)A: Schedule: IV, IUCN Category: Least Concern
34.	Black-winged Kite	*Elanus caeruleus* (Desfontaines)	IUCN Category: Least Concern
35.	Black Kite	*Milvus migrans* (Boddaert)	IUCN Category: Least Concern
36.	Indian Shikra	*Accipiter badius* (Gmelin)	IUCN Category: Least Concern
37.	Tawny Eagle	*Aquila rapax* (Franklin)	IUCN Category: Least Concern
38.	Greater Spotted Eagle	*Aquila clanga* (Pallas)	IUCN Category: Least Concern: Vulnerable
39.	Short-toed Snake-Eagle	*Circaetus gallicus* (Gmelin)	IUCN Category: Least Concern
40.	Pallid Harrier	*Circus macrourus* (Gmelin)	IUCN Category: Near Threatened
41.	Marsh Harrier	*Circus aeruginosus* (Linnaeus)	IUCN Category: Least Concern

Sr. No.	Common Name	Scientific Name with Classification	Remarks,
42.	White-eyed Bazard	*Butastur teesa* (Franklin)	IUCN Category: Least Concern
43.	White Backed Vulture	*Gyps bengalensis* (Gmelin)	IW(P)A: Schedule I Part: III IUCN Category: Critically Endangered
44.	Egyptian Vulture	*Neophron percnopterus* (Latham)	IW(P)A: Schedule IV IUCN Category: Endangered
45.	Red-headed Vulture	*Sarcogyps calvus* (Scopoli)	IW(P)A: Schedule IV IUCN Category: Critically Endangered
46.	Long Biied Vulture	*Gyps indicus* (Scopoli)	IW(P)A: Schedule IV IUCN Category: Critically Endangered
47.	Red-headed Falcon	*Falco chicquera* (Daudin)	IUCN Category: Near Threatened
48.	Grey Francolin	*Francolinus pondicerianus* (Gmelin)	IW(P)A: Schedule: IV IUCN Category: Least Concern
49.	Painted Francolin	*Francolinus pictus* (Jardine and Selby)	IW(P)A: Schedule: IV IUCN Category: Least Concern
50.	Common Quail	*Coturnix coturnix* (Linnaeus)	IW(P)A: Schedule: IV IUCN Category: Least Concern CMS: APPENDIX: II
51	Rain Quail	*Coturnix coromandelica* (Gmelin)	IW(P)A: Schedule: IV IUCN category: Least Concern CMS: APPENDIX: II
52.	Indian Peafowl	*Pavo cristatus* (Linnaeus)	IW(P)A: Schedule I Part III IUCN Category: Least Concern
53.	White Brested Waterhen	*Amaurornis phoenicurus* (Pennant)	IW(P)A: Schedule: IV IUCN Category: Least Concern
54.	Purple Moorhen	*Porphyrio porphyrio* (Linnaeus)	IW(P)A: Schedule: IV IUCN Category : Least Concern
55.	Common Moorhen	*Gallinula chloropus* (Linnaeus)	IW(P)A: Schedule: IV IUCN Category: Least Concern
56.	Common Coot	*Fulica atra* (Linnaeus)	IW(P)A: Schedule: IV IUCN Category: Least Concern

Sr. No.	Common Name	Scientific Name with Classification	Remarks,
57.	Great Indian Bustard	*Ardeotis nigriceps* (Vigors)	IW(P)A: SCHEDULE: I Part: III; IUCN Category: Critically Endangered; CITES: APPENDIX: II
58.	Lesser Florican	*Sypheotides indica* (J. F. Miller)	IW(P)A: SCHEDULE: I Part: III; IUCN Category: Endangered; CITES: APPENDIX: II
59.	Red-wattled Lapwing	*Vanellus indicus* (Boddaert)	IW(P)A: Schedule: IV IUCN Category: Least Concern CMS: APPENDIX II
60.	Yellow-wattled Lapwing	*Vanellus malabaricus* (Boddaert)	IW(P)A: Schedule: IV IUCN Category: Least Concern CMS: APPENDIX II
61.	Little Ringed Plover	*Charadrius dubius* (Scopoli)	IW(P)A: Schedule: IV IUCN Category: Least Concern CMS: APPENDIX II
62.	Common Sand Piper	*Actitis hypoleucos* (Linnaeus)	IW(P)A: Schedule: IV IUCN Category: Least Concern CMS: APPENDIX II
63.	Wood Sand Piper	*Tringa glareola* (Linnaeus)	IW(P)A: Schedule: IV IUCN category: Least Concern CMS: APPENDIX II
64.	Wood Snipe	*Gallinago nemoricola* (Linnaeus)	IW(P)A: Schedule: IV IUCN Category: Vulnerable CMS: APPENDIX : II
65.	Black-tailed Godwit	*Limosa limosa* (Linnaeus)	IW(P)A: Schedule: IV IUCN Category: Near Threatened CMS: APPENDIX II
66.	Black-winged Stilt	*Himantopus himantopus* (Linnaeus)	IW(P)A: Schedule: IV IUCN Category: Least Concern CMS: APPENDIX II
67.	Indian Courser	*Cursorius coromandelicus* (Gmelin)	IUCN Category: Least Concern

Sr. No.	Common Name	Scientific Name with Classification	Remarks,
68.	Jerdon's Courser	*Rhinoptilus bitorquatus* (Blyth)	IW(P)A: SCHEDULE: I Part: III; IUCN Category: Critically Endangered
69.	Small Pratincole	*Glareola lactea* (Temminck)	IW(P)A: Schedule: IV IUCNCategory: Least Concern
70.	River Tern	*Sterna aurantia* (J. E. Grey)	IW(P)A: Schedule: IV IUCN Category: Least Concern
71.	Black-bellied Tern	*Sterna acuticauda* (J. E. Grey)	IW(P)A: Schedule: IV IUCN Category: Endangered
72.	Yellow-footed Green Pigeon	*Treron phoenicopterus* (Latham)	IW(P)A: Schedule: IV IUCN Category: Least Concern
73.	Rock Pigeon	*Columba livia* (Gmelin)	IUCN Category: Least Concern
74.	Oriental Turtle Dove	*Streptopelia orientalis* (Latham)	IUCN Category: Least Concern
75.	Laughing/ Little Brown Dove	*Streptopelia senegalensis* (Linnaeus)	IUCN Category: Least Concern
76.	Spotted Dove	*Streptopelia chinensis* (Scopoli)	IUCN Category: Least Concern
77.	Eurasian/ Indian Ring/ Collared Dove	*Streptopelia decaocto* (Frivaldszky)	IW(P)A: Schedule: IV IUCN Category: Least Concern
78.	Alexandrine Parakeet	*Psittacula eupatria* (Linnaeus)	IW(P)A: Schedule: IV IUCN Category: Near Threatened CITES: APPENDIX : II
79.	Rose-ringed Parakeet	*Psittacula krameri* (Scopoli)	IW(P)A: Schedule: IV IUCN Category: Least Concern
80.	Plum/ Blossom Headed Parakeet	*Psittacula cyanocephala* (Linnaeus)	IW(P)A: Schedule: IV IUCN Category: Least Concern CITES: APPENDIX : II
81.	Greater Coucal/ Crow Phaesant	*Centropus sinensis* (Stephens)	IW(P)A: Schedule: IV IUCN Category: Least Concern
82.	Indian/ Asian Koel	*Eudynamys scolopaceus* (Linnaeus)	IW(P)A: Schedule: IV IUCN Category: Least Concern

Sr. No.	Common Name	Scientific Name with Classification	Remarks,
83.	Drongo Cuckoo	*Surniculus dicruroides* (Hodgson)	IW(P)A: Schedule: IV IUCN Category: Least Concern
84.	Small green-billed Malkoha	*Surniculus dicruroides* (Hodgson)	IW(P)A: Schedule: IV IUCN Category: Least Concern
85.	Northern Spotted Owlet	*Athene brama* (Temminck)	IW(P)A: Schedule: IV IUCN Category: Least Concern CITES: APPENDIX : II
86.	Common Barn Owl	*Tyto alba* (Scopoli)	IW(P)A: Schedule: IV IUCN Category: Least Concern CITES: APPENDIX : II
87.	Indian Common/Little Nigthjar	*Caprimulgus asiaticus* (Latham)	IW(P)A: Schedule: IV IUCN Category: Least Concern
88.	House Swift	*Apus affinis* (J. E. Grey)	IW(P)A: Schedule: IV IUCN Category: Least Concern
89.	Asian Palm Swift	*Cypsiurus balasiensis* (J. E. Grey)	IW(P)A: Schedule: IV IUCN Category: Least Concern
90.	Alpine Swift	*Tachymarptis melba* (Linnaeus)	IW(P)A: Schedule: IV IUCN Category: Least Concern
91.	Crested Tree Swift	*Hemiprocne coronate* (Tickell)	IW(P)A: Schedule: IV IUCN Category: Least Concern
92.	Common Small Blue Kingfisher	*Alcedo atthis* (Linnaeus)	IW(P)A: Schedule: IV IUCN Category: Least Concern
93.	White Breasted Kingfisher	*Halcyon smyrnensis* (Linnaeus)	IW(P)A: Schedule: IV IUCN Category: Least Concern
94.	Lesser Pied Kingfisher	*Ceryle rudis* (Linnaeus)	IW(P)A: Schedule: IV IUCN Category: Least Concern
95.	Blue Tailed Bee-eater	*Meriops philippinus* (Linnaeus)	IW(P)A: Schedule: IV IUCN Category: Least Concern
96.	Little green Bee-eater	*Merops orientalis* (Latham)	IW(P)A: Schedule: IV IUCN Category: Least Concern
97.	Chestnut-headed Bee-eater	*Merops leschenaulti* (Vieillot)	IW(P)A: Schedule: IV IUCN Category: Least Concern

Sr. No.	Common Name	Scientific Name with Classification	Remarks,
98.	Indian/ Northern Roller/Blue Jay	*Coracias benghalensis* (Linnaeus)	IW(P)A: Schedule: IV IUCN Category: Least Concern
99.	Common Hoopoe	*Upupa epops* (Linnaeus)	IW(P)A: Schedule: IV IUCN Category: Least Concern
100	Indian Grey Hornbill	*Ocyceros birostris* (Scopoli)	IW(P)A: Schedule: IV IUCN Category: Least Concern
101	Brown Headed/ Northern Green Barbet	*Psilopogon zeylanica* (Gmelin)	IW(P)A: Schedule: IV IUCN Category: Least Concern
102	Crimson -breasted Barbet/ Copper -smith Barbet	*Psilopogon hemacephala* (P.L.S. Muller)	IW(P)A: Schedule: IV IUCN Category: Least Concern
103	Northern Golden backed Woodpecker/ Black-rumped Flameback	*Dinopium benghalense* (Linnaeus)	IW(P)A: Schedule: IV IUCN Category: Least Concern
104	Yellow fronted pied / Mahratta Woodpecker	*Dendrocopos mahrattensis* (Latham)	IW(P)A: Schedule: IV IUCN Category: Least Concern
105	Indian Pitta	*Pitta brachyura* (Linnaeus)	IW(P)A: Schedule: IV IUCN Category: Least Concern
106	Ashy-crowned Sparrow-Lark	*Eremopterix grisea* (Horsfield)	IW(P)A: Schedule: IV IUCN Ctegory: Least Concern
107	Redrumped Swallow	*Hirundo daurica* (Linnaeus)	IW(P)A: Schedule: IV IUCN Category: Least Concern
108	Western Swallow	*Hirundo rustica* (Linnaeus)	IW(P)A: Schedule: IV IUCN Category: Least Concern
109	Wire-tailed Swallow	*Hirundo smithii* (Leach)	IW(P)A: Schedule: IV IUCN Category: Least Concern
110	Paddyfield /Oriental Pipit	*Anthus rufulus* (Vieillot)	IW(P)A: Schedule: IV IUCN Ctegory: Least Concern
111	White Wagtail	*Motacilla alba* (Vieillot)	IW(P)A: Schedule: IV IUCN Category: Least Concern
112	Grey Wagtail	*Motacilla cinerea* (Tunstall)	IW(P)A: Schedule: IV IUCN Category: Least Concern

Sr. No.	Common Name	Scientific Name with Classification	Remarks,
113	Citrine/ Yellow Hooded Wagtail	*Motacilla citreola* (Pallas)	IW(P)A: Schedule: IV IUCN Category: Least Concern
114	White Browed/ Large Pied Wagtail	*Motacilla maderaspatensis* (Gmelin)	IW(P)A: Schedule: IV IUCN Category: Least Concern
115	Indian Bay-backed Shrike	*Lanius vittatus* Val.	IW(P)A: Schedule: IV IUCN Category: Least Concern
116	Indian/ Common Woodshrike	*Tephrodornis pondicerianus* (Gmelin)	IW(P)A: Schedule: IV IUCN Category: Least Concern
117	Indian Large Cuckoo-shrike	*Coracina macei* (Lesson)	IW(P)A: Schedule: IV IUCN Category: Least Concern
118	Orange/ Scarlet Minivet	*Pericrocotus flammeus* (Forster)	IW(P)A: Schedule: IV IUCN Category: Least Concern
119	Black-capped/ Blackcrested Yellow Bulbul	*Pycnonotus melanicterus* (Gmelin)	IW(P)A: Schedule: IV IUCN Category: VULNERABLE
120	Red Whiskered Bulbul	*Pycnonotus jocosus* (Linnaeus)	IW(P)A: Schedule: IV IUCN Category: Least Concern
121	Red-vented Bulbul	*Pycnonotus cafer* (Linnaeus)	IW(P)A: Schedule: IV IUCN Category: Least Concern
122	Common Iora	*Aegithina tiphia* (Linnaeus)	IW(P)A: Schedule: IV IUCN Category: Least Concern
123	Oriental Magpie-Robin	*Copsychus saularis* (Linnaeus)	IW(P)A: Schedule: IV IUCN Category: Least Concern
124	Indian Robin	*Saxicoloides fulicatus* (Linnaeus)	IW(P)A: Schedule: IV IUCN Category: Least Concern
125	Eastern Black Redstart	*Phoenicurus ochruros* (Vieillot)	IW(P)A: Schedule: IV IUCN Category: Least Concern
126	Indian Scimitar Babbler	*Pomatorhinus horsfieldii* (Sykes)	IW(P)A: Schedule: IV IUCN Category: Least Concern
127	Yellow-eyed Babbler	*Chrysomma sinense* (Gmelin)	IW(P)A: Schedule: IV IUCN Category: Least Concern

Sr. No.	Common Name	Scientific Name with Classification	Remarks,
128	Common Babbler	*Turdoides caudata* (Dumont)	IW(P)A: Schedule: IV IUCN Category: Least Concern
129	Jungle Babbler/ Saat Bhai	*Turdoides striata* (Dumont)	IW(P)A: Schedule: IV IUCN Category: Least Concern
130	Franklin's Ashy-grey Wren-Warbler/ Grey Breasted Prinia	*Prinia hodgsonii* (Blyth)	IW(P)A: Schedule: IV IUCN Category: Least Concern
131	Plain Prinia/ White-browed Wren-warbler	*Prinia inornata* (Sykes)	IW(P)A: Schedule: IV IUCN Category: Least Concern
132	Zitting Cisticola	*Cisticola juncidis* (Rafinesque)	IW(P)A: Schedule: IV IUCN Category: Least Concern
133	Common Tailor Bird	*Orthotomus sutorius* (Pennant)	IW(P)A: Schedule: IV IUCN Category: Least Concern
134	Blyth's Reed- Warbler	*Acrocephalus dumetorum* (Blyth)	IUCN Category: Least Concern
135	Streaked Fantail-Warbler	*Cisticola juncidis* (Franklin)	IUCN Category: Least Concern
136	Western Crowned Warbler	*Phylloscopus occipitalis* (Blyth)	IUCN Category: Least Concern
137	Indian Great Tit	*Parus major stupae* (Koelz)	IUCN Category: Least Concern
138	Indian Thickbilled Flowerpecker	*Dicaeum agile* (Tickell)	IW(P)A: Schedule: IV IUCN Category: Least Concern
139	Purple-rumped Sunbird	*Leptocoma zeylonica* (Linnaeus) = *Nectarinia zeylonica*	IW(P)A: Schedule: IV IUCN Category: Least Concern
140	Purple Sunbird	*Cinnyris asiaticus* (Latham) = *Nectarinia asiatica*	IW(P)A: Schedule: IV IUCN Category: Least Concern
141	Common Rosefinch	*Carpodacus erythrinus* (Pallas)	IW(P)A: Schedule: IV IUCN Category: Least Concern
142	Black-headed/Grey-necked Bunting	*Emberiza buchanani* (Blyth)	IW(P)A: Schedule: IV IUCN Category: Least Concern
143	Red-headed Bunting	*Emberiza melanocephala* (Scopoli)	IW(P)A: Schedule: IV IUCN Category: Least Concern
144	Green Avadavat/ Green Munia	*Amandava formosa* (Latham)	IW(P)A: Schedule: IV IUCN Category: Least Concern

Sr. No.	Common Name	Scientific Name with Classification	Remarks,
145	White-backed/ rumped Munia	*Lonchura striata* (Linnaeus)	IW(P)A: Schedule: IV IUCN Category: Least Concern
146	Black Throated/ Rufous-bellied Munia	*Lonchura kelaarti* (Jerdon)	IW(P)A: Schedule: IV IUCN Category: Least Concern
147	Indian Spotted Munia	*Lonchura punctulata* (Linnaeus)	IW(P)A: Schedule: IV IUCN Category: Least Concern
148	White Throated Munia/ Indian Silverbill	*Lonchura malabarica* (Linnaeus)	IW(P)A: Schedule: IV IUCN Category: Least Concern
149	House Sparrow	*Passer domesticus* (Linnaeus)	IW(P)A: Schedule: IV IUCN Category: Least Concern
150	Yellow- throated Sparrow	*Petronia xanthocollis* (Burton)	IW(P)A: Schedule: IV IUCN Category: Least Concern
151	Baya Weaver Bird	*Ploceus philippinus* (Linnaeus)	IW(P)A: Schedule: IV IUCN Category: Least Concern
152	Grey Headed Myna/ Chestnut-tailed Sterling	*Sturnia malabarica* (Gmelin)	IW(P)A: Schedule: IV IUCN Category: Least Concern
153	Brahminy Starling	*Sturnia pagodarum* (Gmelin)	IW(P)A: Schedule: IV IUCN Category: Least Concern
154	Indian Common Myna	*Acridotheres tristis* (Linnaeus)	IW(P)A: Schedule: IV IUCN Category: Least Concern
155	Common Starling	*Sturnus vulgaris* (Linnaeus)	IW(P)A: Schedule: IV IUCN Category: Least Concern
156	Indian Golden Oriole	*Oriolus kundoo* (Sykes)	IW(P)A: Schedule: IV IUCN Category: Least Concern
157	South Indian Black-headed/ Black hooded Oriole	*Oriolus xanthornus* (Linnaeus)	IW(P)A: Schedule: IV IUCN Category: Least Concern
158	Black Drongo	*Dicrurus macrocercus* (Vieillot)	IW(P)A: Schedule: IV IUCN Category: Least Concern
159	White Bellied Drongo	*Dicrurus caerulescens* (Linnaeus)	IW(P)A: Schedule: IV IUCN Category: Least Concern

Sr. No.	Common Name	Scientific Name with Classification	Remarks,
160	Indian Ashy Drongo	*Dicrurus leucophaeus* (longicaudatus Hay)	IW(P)A: Schedule: IV IUCN Category: Least Concern
161	Ashy wood swallow/ Ashy Swallow Shrike	*Artamus fuscus* (Vieillot)	IW(P)A: Schedule: IV IUCN Category: Least Concern
162	Indian/ Rufous Tree Pie	*Dendrocitta vagabunda* (Latham)	IW(P)A: Schedule: IV IUCN Category: Least Concern
163	House Crow	*Corvus splendens* (Vieillot)	IW(P)A: Schedule: V IUCN Category: Least Concern
164	Indian Jungle Crow	*Corvus culminatus* (Vieillot)	IW(P)A: Schedule: V IUCN Category: Least Concern

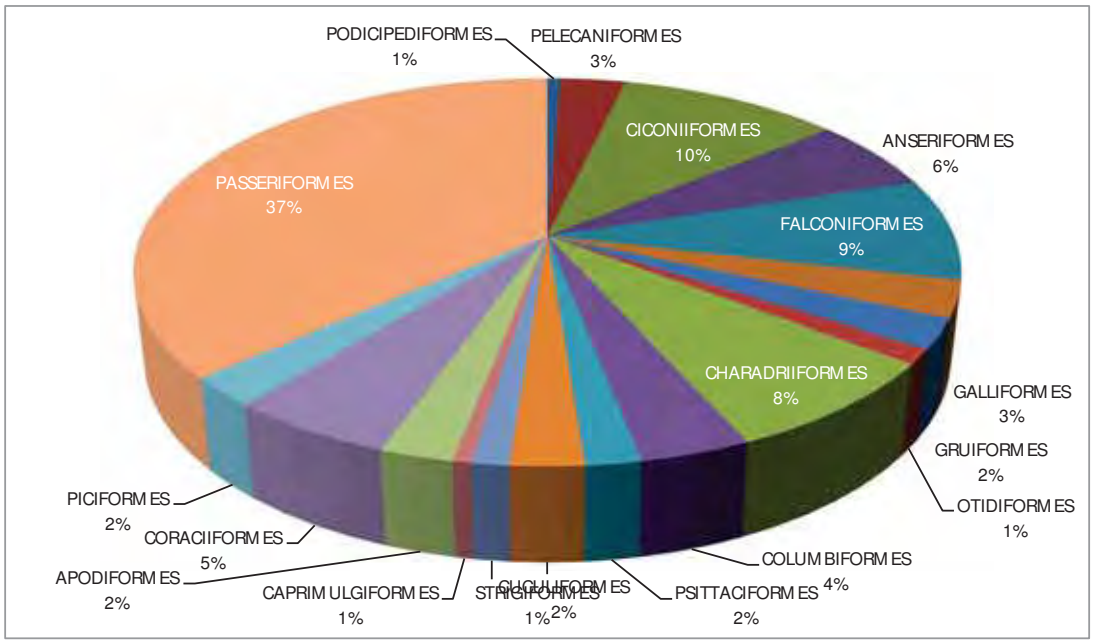

Figure 4-2: Bird Species Diversity Recorded in Kurnool District

As per our survey and publicly available secondary information about 4 bat species and 88 bird species have been observed and identified during field surveys conducted in the study area. List of bird and bat species and their IUCN category found in the study area has been listed in Table 4.3 and 4.4 respectively. Species diversity of bat and bird recorded in study area is shown in Figure 4.3 and 4.4 respectively.

Table 4-3: List of Bat Species Sighted and Recorded in the Study Area

Sr. No.	Common Name	Scientific Name with Classification	Remarks, if any
1.	Greater Short-nosed Fruit Bat	*Cynopterus sphinx* (Val)	IW(P)A:Schedule: V, IUCN Category: Least Concern
2.	Indian Flying Fox	*Pteropus giganteus* (Brunnich)	IW(P)A: Schedule: V; IUCN Category: Least Concern; CITES : APPENDIX: II
3.	Kelaart's Pipistrelle	Pipistrellus (Pipistrellus) *ceylonicus indicus* (Kelaart)	IUCN Category: Least Concern
4.	Indian Pipistrelle	Pipistrellus (Pipistrellus) *c. coromandra* (Gray)	IUCN Category: Least Concern

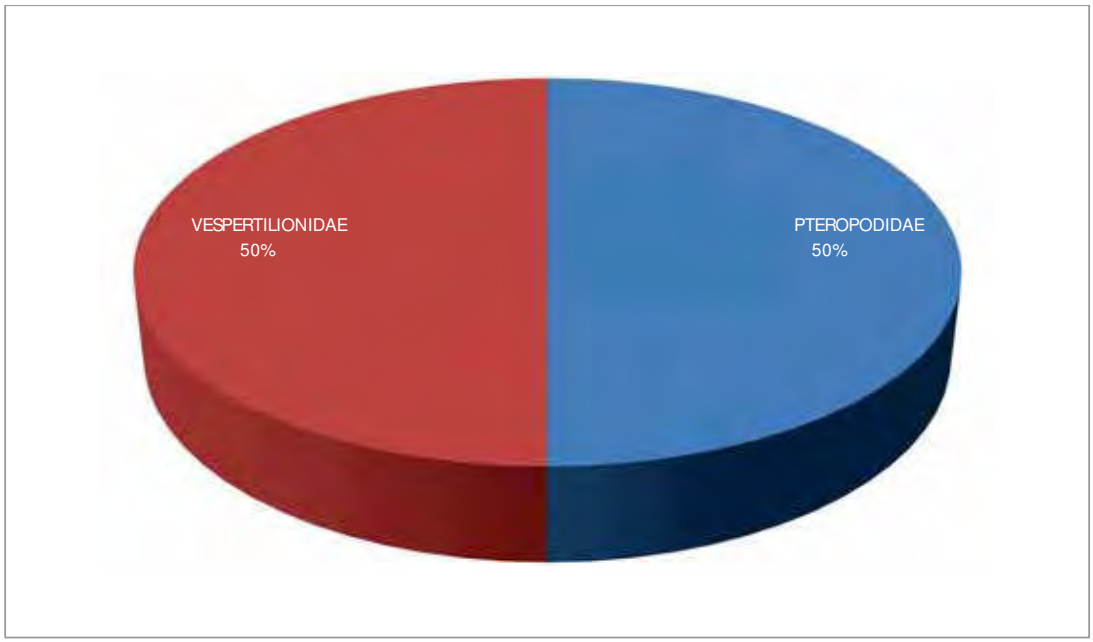

Figure 4-3: Bat Species Diversity Recorded in Study Area

Table 4-4: List of Bird Species Sighted and Recorded in the Study Area

Sr. No.	Common Name	Scientific Name with Classification	Remarks
1.	Little Grebe/ Dabchick	*Tacthbaptus ruficollis* (Pallas)	IW(P)A: Schedule IV IUCN Category: Least Concern
2.	Little Cormorant	*Phalacrocorax niger* (Viellot)	IW(P)A: Schedule IV IUCN Category: Least Concern
3.	Great Cormorant	*Phalacrocorax carbo*	IW(P)A: Schedule IV

Sr. No.	Common Name	Scientific Name with Classification	Remarks
		(Linnaeus)	IUCN Category: Least Concern
4.	Indian Cormorant	*Phalacrocorax fuscicollis* (Viellot)	IW(P)A: Schedule IV IUCN Category: Least Concern
5.	Darter	*Anhinga melanogaster* Pennant	IW(P)A: Schedule IV IUCN Category: Near Threatened
6.	Little Egret	*Egretta garzetta* (Linnaeus)	IW(P)A: Schedule IV IUCN category: Least Concern
7.	Intermediate/Median Egret	*Egretta intermedia* (Wagler)	IW(P)A: Schedule IV IUCN Category: Least Concern
8.	Large Egret	*Casmerodius albus* (Linnaeus)	IW(P)A: Schedule IV IUCN Category: Least Concern
9.	Cattle Egret	*Bubulcus ibis* (Boddaert) = *Bubulcus coromandus* (Linnaeus)	IW(P)A: Schedule IV IUCN Category: Least Concern
10.	Indian Pond Heron	*Ardeola grayii* (Sykes)	IW(P)A: Schedule IV IUCN Category: Least Concern
11.	Indian Grey Heron	*Ardea cinerea* (Linnaeus)	IW(P)A: Schedule IV IUCN Category: Least Concern
12.	Black-crowned Night Heron	*Nycticorax nycticorax* (Linnaeus)	IW(P)A: Schedule IV IUCN Category: Least Concern
13.	Indian Purple Heron	*Ardea purpurea* (Linnaeus)	IW(P)A: Schedule IV IUCN Category: Least Concern
14.	Asian Openbill Stork	*Anastomus oscitans* (Boddaert)	IW(P)A: Schedule IV IUCN Category: Least Concern
15.	Painted Stork	*Mycteria leucocephala* (Pennant)	IW(P)A: Schedule IV IUCN Category: Near Threatened
16.	Oriental White/Black Headed Ibis	*Threskiornis melanocephalus* (Latham)	IW(P)A: Schedule IV IUCN Category: Near Threatened
17.	Black Ibis	*Pseudibis papillosa* (Temminck)	IW(P)A: Schedule IV IUCN Category: Least Concern
18.	Glossy Ibis	*Plegadis falcinellus* (Linnaeus)	IW(P)A: Schedule IV IUCN Category: Least Concern
19.	Bar-headed goose	*Anser indicus* (Latham)	IW(P)A: Schedule IV IUCN Category: Least Concern
20.	Spot-billed Duck	*Anas poecilorhymcha* J. M. Forester	IW(P)A: Schedule IV IUCN Category: Least Concern
21.	Black-winged Kite	*Elanus caeruleus* (Desfontaines)	IUCN Category: Least Concern
22.	Black Kite	*Milvus migrans* (Boddaert)	IUCN/Birdlife International (2012):

Sr. No.	Common Name	Scientific Name with Classification	Remarks
			Least Concern
23.	Indian Shikra	*Accipiter badius* (Gmelin)	IUCN Category: Least Concern
24.	Pallid Harrier	*Circus macrourus* (Gmelin)	IUCN Category: Least Concern
25.	Grey Francolin	*Francolinus pondicerianus* (Gmelin)	IW(P)A: Schedule IV IUCN Category: Least Concern
26.	Indian Peafowl	*Pavo cristatus* (Linnaeus)	IW(P)A: Schedule IV IUCN Category: Least Concern
27.	White Brested Waterhen	*Amaurornis phoenicurus* (Pennant)	IW(P)A: Schedule: IV IUCN/Birdlife International(2012): Least Concern
28.	Purple Moorhen	*Porphyrio porphyrio* (Linnaeus)	IW(P)A: Schedule IV IUCN Category: Least Concern
29.	Common Moorhen	*Gallinula chloropus* (Linnaeus)	IW(P)A: Schedule IV IUCN Category: Least Concern
30.	Common Coot	*Fulica atra* (Linnaeus)	IW(P)A: Schedule IV IUCN Category: Least Concern
31.	Red-wattled Lapwing	*Vanellus indicus* (Boddaert)	IW(P)A: Schedule: IV IUCN Category: Least Concern CMS: APPENDIX (w.e.f. Feb 2015) : II
32.	Yellow-wattled Lapwing	*Vanellus malabaricus* (Boddaert)	IW(P)A: Schedule: IV IUCN Category: Least Concern CMS: APPENDIX (w.e.f. Feb 2015) : II
33.	Little Ringed Plover	*Charadrius dubius* (Scopoli)	IW(P)A: Schedule: IV IUCN Category: Least Concern CMS: APPENDIX II
34.	Black-winged Stilt	*Himantopus himantopus* (Linnaeus)	IW(P)A: Schedule: IV IUCN Category: Least Concern CMS: APPENDIX II
35.	Yellow-footed Green Pigeon	*Treron phoenicopterus* (Latham)	IW(P)A: Schedule: IV IUCN Category: Least Concern
36.	Rock Pigeon	*Columba livia* (Gmelin)	IUCN Category: Least Concern
37.	Oriental Turtle Dove	*Streptopelia orientalis* (Latham)	IUCN Category: Least Concern
38.	Laughing/ Little Brown Dove	*Streptopelia senegalensis* (Linnaeus)	IUCN Category: Least Concern

Sr. No.	Common Name	Scientific Name with Classification	Remarks
39.	Spotted Dove	*Streptopelia chinensis* (Scopoli)	IUCN Category: Least Concern
40.	Eurasian/Indian Ring/ Collared Dove	*Streptopelia decaocto* (Frivaldszky)	IW(P)A: Schedule: IV IUCN Category: Least Concern
41.	Alexandrine Parakeet	*Psittacula eupatria* (Linnaeus)	IW(P)A: Schedule: IV IUCN Category: Near Threatened CITES: APPENDIX : II
42.	Rose-ringed Parakeet	*Psittacula krameri* (Scopoli)	IW(P)A: Schedule: IV IUCN Category: Least Concern
43.	Plum/ Blossom Headed Parakeet	*Psittacula cyanocephala* (Linnaeus)	IW(P)A: Schedule: IV IUCN Category: Least Concern CITES: APPENDIX : II
44.	Greater Coucal/ Crow Phaesant	*Centropus sinensis* (Stephens)	IW(P)A: Schedule: IV IUCN Category: Least Concern
45.	Indian/Asian Koel	*Eudynamys scolopaceus* (Linnaeus)	IW(P)A: Schedule: IV IUCN Category: Least Concern
46.	Drongo Cuckoo	*Surniculus dicruroides* (Hodgson)	IW(P)A: Schedule: IV IUCN Category: Least Concern
47.	Small green-billed Malkoha	*Surniculus dicruroides* (Hodgson)	IW(P)A: Schedule: IV IUCN Category: Least Concern
48.	Northern Spotted Owlet	*Athene brama* (Temminck)	IW(P)A: Schedule: IV IUCN Category: Least Concern CITES: APPENDIX : II
49.	Common Barn Owl	*Tyto alba* (Scopoli)	IW(P)A: Schedule: IV IUCN Category: Least Concern CITES: APPENDIX : II
50.	House Swift	*Apus affinis* (J. E. Grey)	IW(P)A: Schedule: IV IUCN Category: Least Concern
51.	Asian Palm Swift	*Cypsiurus balasiensis* (J. E. Grey)	IW(P)A: Schedule: IV IUCN Category: Least Concern
52.	Common Small Blue Kingfisher	*Alcedo atthis* (Linnaeus)	IW(P)A: Schedule: IV IUCN Category: Least Concern
53.	White Breasted Kingfisher	*Halcyon smyrnensis* (Linnaeus)	IW(P)A: Schedule: IV IUCN Category: Least Concern
54.	Blue Tailed Bee-eater	*Meriops philippinus* (Linnaeus)	IW(P)A: Schedule: IV IUCN Category: Least Concern
55.	Little green Bee-eater	*Merops orientalis* (Latham)	IW(P)A: Schedule: IV IUCN Category: Least Concern
56.	Chestnut-headed	*Merops leschenaulti*	IW(P)A: Schedule: IV

Sr. No.	Common Name	Scientific Name with Classification	Remarks
	Bee-eater	(Vieillot)	IUCN Category: Least Concern
57.	Indian/ Northern Roller/Blue Jay	*Coracias benghalensis* (Linnaeus)	IW(P)A: Schedule: IV IUCN Category: Least Concern
58.	Common Hoopoe	*Upupa epops* (Linnaeus)	IW(P)A: Schedule: IV IUCN Category: Least Concern
59	Indian Pitta	*Pitta brachyura* (Linnaeus)	IW(P)A: Schedule: IV IUCN Category: Least Concern
60	Ashy-crowned Sparrow-Lark	*Eremopterix grisea* (Horsfield)	IW(P)A: Schedule: IV IUCN Category: Least Concern
61	Western Swallow	*Hirundo rustica* (Linnaeus)	IW(P)A: Schedule: IV IUCN Category: Least Concern
62	Wire-tailed Swallow	*Hirundo smithii* (Leach)	IW(P)A: Schedule: IV IUCN Category: Least Concern
63	Paddyfield /Oriental Pipit	*Anthus rufulus* (Vieillot)	IW(P)A: Schedule: IV IUCN Category: Least Concern
64	White Wagtail	*Motacilla alba* (Vieillot)	IW(P)A: Schedule: IV IUCN Category: Least Concern
65	Citrine/ Yellow Hooded Wagtail	*Motacilla citreola* (Pallas)	IW(P)A: Schedule: IV IUCN Category: Least Concern
66	White Browed/ Large Pied Wagtail	*Motacilla maderaspatensis* (Gmelin)	IW(P)A: Schedule: IV IUCN Category: Least Concern
67	Indian Bay-backed Shrike	*Lanius vittatus* Val.	IW(P)A: Schedule: IV IUCN Category: Least Concern
68	Orange/ Scarlet Minivet	*Pericrocotus flammeus* (Forster)	IW(P)A: Schedule: IV IUCN Category: Least Concern
69	Black-capped/ Blackcrested Yellow Bulbul	*Pycnonotus melanicterus* (Gmelin)	IW(P)A: Schedule: IV IUCN Category: Vulnerable
70	Red Whiskered Bulbul	*Pycnonotus jocosus* (Linnaeus)	IW(P)A: Schedule: IV IUCN Category: Least Concern
71	Red-vented Bulbul	*Pycnonotus cafer* (Linnaeus)	IW(P)A: Schedule: IV IUCN Category: Least Concern
72	Oriental Magpie-Robin	*Copsychus saularis* (Linnaeus)	IW(P)A: Schedule: IV IUCN Category: Least Concern
73	Indian Robin	*Saxicoloides fulicatus* (Linnaeus)	IW(P)A: Schedule: IV IUCN Category: Least Concern

Sr. No.	Common Name	Scientific Name with Classification	Remarks
74	Eastern Black Redstart	*Phoenicurus ochruros* (Vieillot)	IW(P)A: Schedule: IV IUCN Category: Least Concern
75	Yellow-eyed Babbler	*Chrysomma sinense* (Gmelin)	IW(P)A: Schedule: IV IUCN Category: Least Concern
76	Common Babbler	*Turdoides caudata* (Dumont)	IW(P)A: Schedule: IV IUCN Category: Least Concern
77	Jungle Babbler/ Saat Bhai	*Turdoides striata* (Dumont)	IW(P)A: Schedule: IV IUCN Category: Least Concern
78	Purple Sunbird	*Cinnyris asiaticus* (Latham)	IW(P)A: Schedule: IV IUCN Category: Least Concern
79	White-backed/ rumped Munia	*Lonchura striata* (Linnaeus)	IW(P)A: Schedule: IV IUCN Category: Least Concern
80	Black Throated/ Rufous-bellied Munia	*Lonchura kelaarti* (Jerdon)	IW(P)A: Schedule: IV IUCN Category: Least Concern
81	White Throated Munia/ Indian Silverbill	*Lonchura malabarica* (Linnaeus)	IW(P)A: Schedule: IV IUCN Category: Least Concern
82	House Sparrow	*Passer domesticus* (Linnaeus)	IW(P)A: Schedule: IV IUCN Category: Least Concern
83	Baya Weaver Bird	*Ploceus philippinus* (Linnaeus)	IW(P)A: Schedule: IV IUCN Category: Least Concern
84	Indian Common Myna	*Acridotheres tristis* (Linnaeus)	IW(P)A: Schedule: IV IUCN Category: Least Concern
85	Black Drongo	*Dicrurus macrocercus* (Vieillot)	IW(P)A: Schedule: IV IUCN Category: Least Concern
86	Indian/ Rufous Tree Pie	*Dendrocitta vagabunda* (Latham)	IW(P)A: Schedule: IV IUCN Category: Least Concern
87	House Crow	*Corvus splendens* (Vieillot)	IW(P)A: Schedule: V IUCN Category: Least Concern
88	Indian Jungle Crow	*Corvus culminatus* (Vieillot)	IW(P)A: Schedule: V IUCN Category: Least Concern

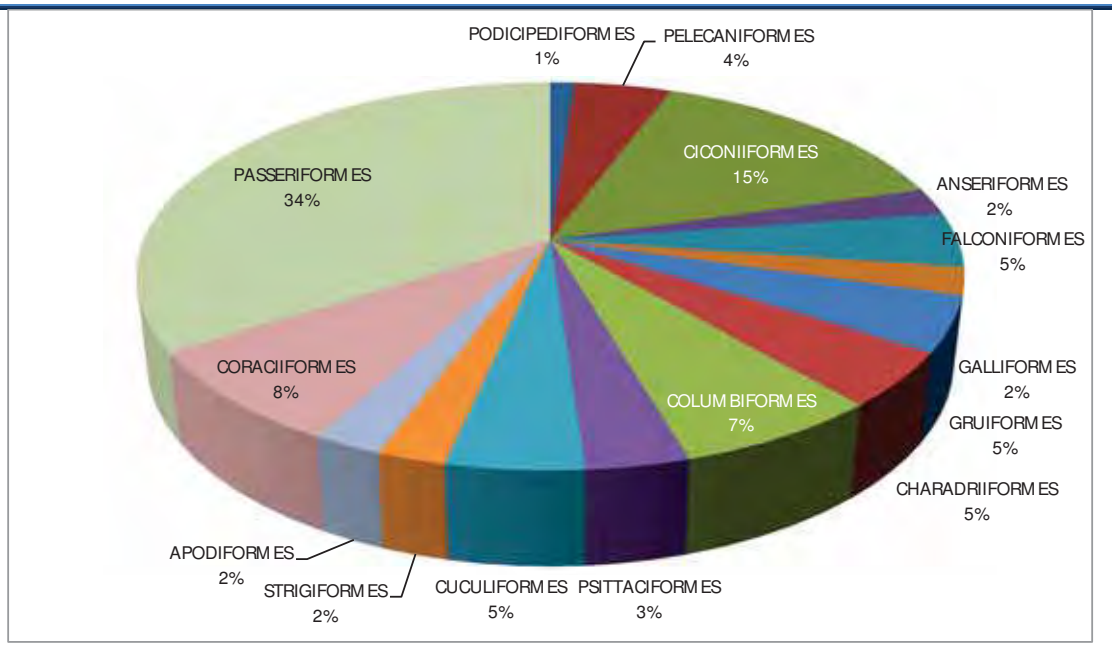

Figure 4-4: Bird species diversity recorded in study area

Out of 88 bird and 4 bat species found in the study area 10 species (1 bat and 9 bird species) are found to be species of concern. Similarly, 26 species are found to be migratory in nature. Three raptor and two owl species have also been recorded from the study area. However, no "Critically Endangered" and /or "Endangered" species have been recorded from within the study area. Species of concern with their conservation and migration status has been listed in the table 4.5. Figure 4.5 shows percenateg of species of concern from conservation point view whereas Figure 4.6 shows percentage of population of migratory species found in the study area.

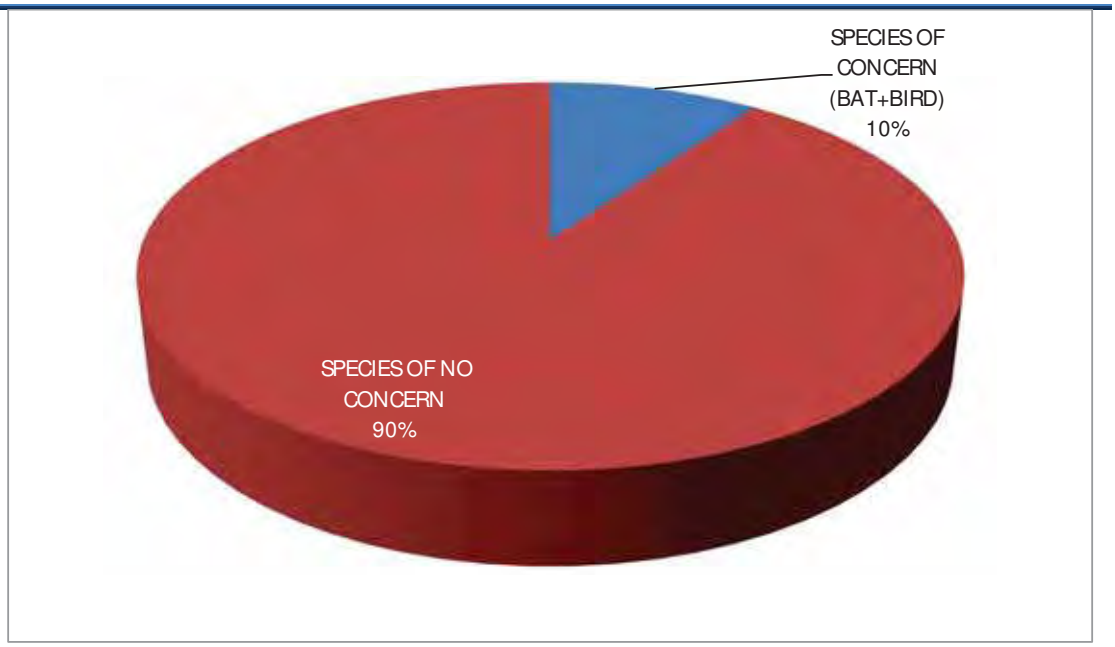

Figure 4-5: Percentage population of Species of Concern in the Study Area

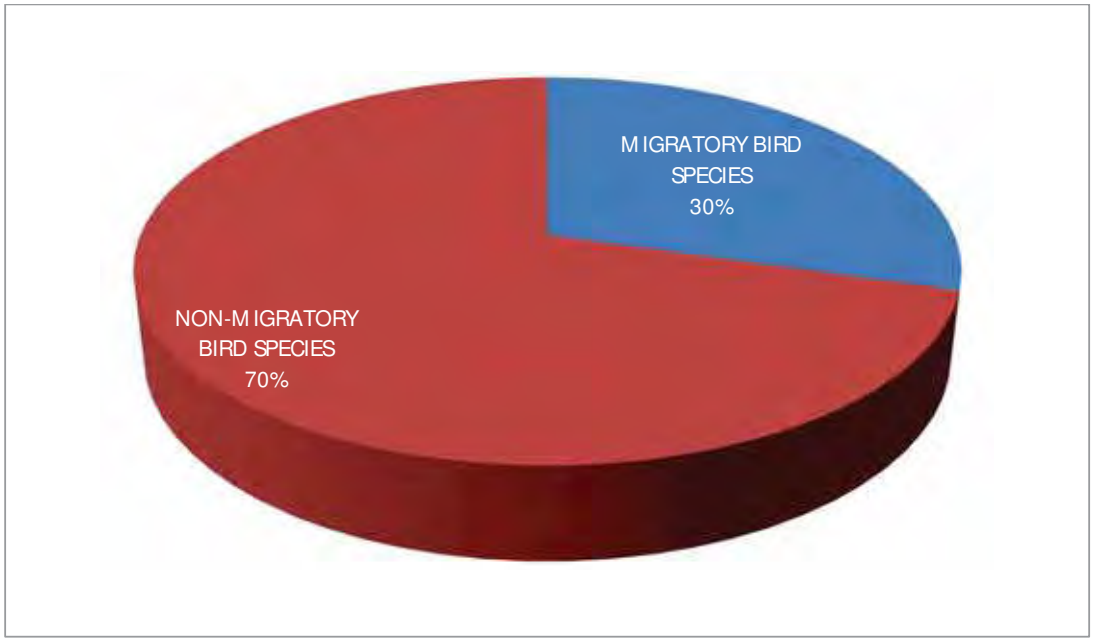

Figure 4-6: Percentage Population of Migratory Birds in the Study Area

Table 4-5: List of Identified Species of Concern based on Higher Threat Categories of Conservation and Migration Status

Sr. No.	Common Name	Scientific Name with Classification	CONSERVATION STATUS					
			Indian WL (Protect)Act (1972)	IUCN CATEGORY:	CITES APPENDIX	CMS APPENDIX	IBAT STATUS	LOCAL STATUS
1.	Indian Flying Fox	*Pteropus giganteus* (Brunnich)	IW(P)A: Schedule: V	Least Concern	APPENDIX : II	NIL	Least Concern	COMMON (Chakraborty, et al. 2008)
2.	Great Cormorant	*Phalacrocorax carbo* (Linnaeus)	Schedule IV	Least Concern	NIL	NIL	Least Concern	RARE (Srinivasulu & Nagulu, 2002) LOCAL MIGRATORY
3.	Indian Cormorant	*Phalacrocorax fuscicollis* (Viellot)	Schedule IV	Least Concern	NIL	NIL	Least Concern	OCCASIONAL (Srinivasulu & Nagulu, 2002) LOCAL MIGRATORY
4.	Darter	*Anhinga melanogaster* (Pennant)	Schedule IV	NEAR THREATENED	NIL	NIL	Least Concern	COMMON (Srinivasulu & Nagulu, 2002) LOCAL MIGRATORY
5.	Indian Grey Heron	*Ardea cinerea* (Linnaeus)	Schedule IV	Least Concern	NIL	NIL	Least Concern	COMMON (Srinivasulu & Nagulu, 2002) LOCAL MIGRATORY
6.	Indian Purple Heron	*Ardea purpurea* (Linnaeus)	Schedule IV	Least Concern	NIL	NIL	Least Concern	COMMON (Srinivasulu & Nagulu, 2002) LOCAL MIGRATORY
7.	Asian	*Anastomus oscitans*	Schedule IV	Least	NIL	NIL	Least Concern	COMMON (Srinivasulu

Sr. No.	Common Name	Scientific Name with Classification	CONSERVATION STATUS					
			Indian WL (Protect)Act (1972)	IUCN CATEGORY:	CITES APPENDIX	CMS APPENDIX	IBAT STATUS	LOCAL STATUS
	Openbill Stork	(Boddaert)		Concern				& Nagulu, 2002) LOCAL MIGRATORY
8.	Painted Stork	*Mycteria leucocephala* (Pennant)	Schedule IV	NEAR THREATENED	NIL	NIL	NEAR THREATENED	COMMON (Srinivasulu & Nagulu, 2002) LOCAL MIGRATORY
9.	Oriental White/Black Headed Ibis	*Threskiornis melanocephalus* (Latham)	Schedule IV	NEAR THREATENED	NIL	NIL	NEAR THREATENED	OCASSIONAL (Srinivasulu & Nagulu, 2002) LOCAL MIGRATORY
10.	Glossy Ibis	*Plegadis falcinellus* (Linnaeus)	Schedule IV	Least Concern	NIL	NIL	Least Concern	COMMON (Srinivasulu & Nagulu, 2002) LOCAL MIGRATORY
11.	Bar-headed goose	*Anser indicus* (Latham)	Schedule IV	Least Concern	NIL	NIL	Least Concern	OCASSIONAL (Srinivasulu & Nagulu, 2002) WINTER MIGRATORY
12.	Pallid Harrier	*Circus macrourus* (Gmelin)	-	NEAR THREATENED	NIL	NIL	NEAR THREATENED	COMMON (Srinivasulu & Nagulu, 2002) WINTER MIGRATORY
13.	Indian Peafowl	*Pavo cristatus* (Linnaeus)	SCHEDULE: I PART: III	Least Concern	NIL	NIL	Least Concern	COMMON (Srinivasulu & Nagulu, 2002)

Sr. No.	Common Name	Scientific Name with Classification	CONSERVATION STATUS					
			Indian WL (Protect)Act (1972)	IUCN CATEGORY:	CITES APPENDIX	CMS APPENDIX	IBAT STATUS	LOCAL STATUS
14.	Red-wattled Lapwing	*Vanellus indicus* (Boddaert)	Schedule IV	Least Concern	NIL	APPENDIX: II	Least Concern	COMMON (Srinivasulu & Nagulu, 2002) WINTER MIGRATORY
15.	Yellow-wattled Lapwing	*Vanellus malabaricus* (Boddaert)	Schedule IV	Least Concern	NIL	APPENDIX: II	Least Concern	COMMON (Srinivasulu & Nagulu, 2002) WINTER MIGRATORY
16.	Little Ringed Plover	*Charadrius dubius* (Scopoli)	Schedule IV	Least Concern	NIL	APPENDIX: II	Least Concern	COMMON (Srinivasulu & Nagulu, 2002) WINTER MIGRATORY
17.	Black-winged Stilt	*Himantopus himantopus* (Linnaeus)	Schedule IV	Least Concern	NIL	APPENDIX: II	Least Concern	COMMON (Srinivasulu & Nagulu, 2002) WINTER MIGRATORY
18.	Eurasian/Indian Ring/ Collared Dove	*Streptopelia decaocto* (Frivaldszky)	Schedule IV	Least Concern	NIL	NIL	Least Concern	COMMON (Srinivasulu & Nagulu, 2002) LOCAL MIGRATORY
19.	Alexandrine Parakeet	*Psittacula eupatria* (Linnaeus)	Schedule IV -	NEAR THREATENED	APPENDIX: II	NIL	NEAR THREATENED	UNCOMMON (Srinivasulu & Nagulu, 2002) LOCAL MIGRATORY
20.	Rose-ringed Parakeet	*Psittacula krameri* (Scopoli)	Schedule IV	Least Concern	NIL	NIL	Least Concern	COMMON (Srinivasulu & Nagulu, 2002)

Sr. No.	Common Name	Scientific Name with Classification	CONSERVATION STATUS					
			Indian WL (Protect)Act (1972)	IUCN CATEGORY:	CITES APPENDIX	CMS APPENDIX	IBAT STATUS	LOCAL STATUS
								LOCAL MIGRATORY
21.	Plum/ Blossom Headed Parakeet	*Psittacula cyanocephala* (Linnaeus)	Schedule IV	Least Concern	APPENDIX : II	NIL	Least Concern	COMMON (Srinivasulu & Nagulu, 2002) LOCAL MIGRATORY
22.	Northern Spotted Owlet	*Athene brama* (Temminck)	Schedule IV	Least Concern	APPENDIX : II	NIL	Least Concern	COMMON (Srinivasulu & Nagulu, 2002)
23.	Common Barn Owl	*Tyto alba* (Scopoli)	Schedule IV	Least Concern	APPENDIX : II	NIL	Least Concern	UNCOMMON (Srinivasulu & Nagulu, 2002)
24.	White Breasted Kingfisher	*Halcyon smyrnensis* (Linnaeus)	Schedule IV	Least Concern	NIL	NIL	Least Concern	COMMON (Srinivasulu & Nagulu, 2002) LOCAL MIGRATORY
25.	Blue Tailed Bee-eater	*Meriops philippinus* (Linnaeus)	Schedule IV	Least Concern	NIL	NIL	Least Concern	UNCOMMON (Srinivasulu & Nagulu, 2002) WINTER MIGRATORY
26.	Little green Bee-eater	*Merops orientalis* (Latham)	Schedule IV	Least Concern	NIL	NIL	Least Concern	COMMON (Srinivasulu & Nagulu, 2002) LOCAL MIGRATORY
27.	Chestnut-headed Bee-	*Merops leschenaulti*	Schedule IV	Least Concern	NIL	NIL	Least Concern	UNCOMMON (Srinivasulu & Nagulu,

Sr. No.	Common Name	Scientific Name with Classification	CONSERVATION STATUS					
			Indian WL (Protect)Act (1972)	IUCN CATEGORY:	CITES APPENDIX	CMS APPENDIX	IBAT STATUS	LOCAL STATUS
	eater	(Vieillot)						2002) LOCAL MIGRATORY
28.	Indian/ Northern Roller/Blue Jay	*Coracias benghalensis* (Linnaeus)	Schedule IV	Least Concern	NIL	NIL	Least Concern	COMMON (Srinivasulu & Nagulu, 2002) LOCAL MIGRATORY
29	Indian Pitta	*Pitta brachyura* (Linnaeus)	Schedule IV	Least Concern	NIL	NIL	Least Concern	COMMON (Srinivasulu & Nagulu, 2002) WINTER MIGRATORY
30	Ashy-crowned Sparrow-Lark	*Eremopterix grisea* (Horsfield)	Schedule IV	Least Co ncern	NIL	NIL	Least Concern	COMMON (Srinivasulu & Nagulu, 2002) LOCAL MIGRATORY
31	Western Swallow	*Hirundo rustica* (Linnaeus)	Schedule IV	Least Concern	NIL	NIL	Least Concern	COMMON (Srinivasulu & Nagulu, 2002) LOCAL MIGRATORY
32	Wire-tailed Swallow	*Hirundo smithii* (Leach)	Schedule IV	Least Concern	NIL	NIL	Least Concern	COMMON (Srinivasulu & Nagulu, 2002) LOCAL MIGRATORY
33	White Wagtail	*Motacilla alba* (Vieillot)	Schedule IV	Least Concern	NIL	NIL	Least Concern	COMMON (Srinivasulu & Nagulu, 2002) LOCAL MIGRATORY

Sr. No.	Common Name	Scientific Name with Classification	CONSERVATION STATUS					
			Indian WL (Protect)Act (1972)	IUCN CATEGORY:	CITES APPENDIX	CMS APPENDIX	IBAT STATUS	LOCAL STATUS
34	Citrine/ Yellow Hooded Wagtail	*Motacilla citreola* (Pallas)	Schedule IV	Least Concern	NIL	NIL	Least Concern	COMMON (Barish Dutta and Sakthivel,2008) WINTER MIGRATORY
35	Red Whiskered Bulbul	*Pycnonotus jocosus* (Linnaeus)	Schedule IV	Least Concern	NIL	NIL	Least Concern	OCCASSIONAL (Srinivasulu & Nagulu, 2002) LOCAL MIGRATORY
36	Eastern Black Redstart	*Phoenicurus ochruros* (Vieillot)	Schedule IV	Least Concern	NIL	NIL	Least Concern	UNCOMMON (Srinivasulu & Nagulu, 2002) WINTER MIGRATORY

Based on flying capacity of birds and bat species of concern, they are categorised into four types viz. Low Fliers, Low-Medium Fliers, Medium-High Fliers, High Fliers (Ref: Salim Ali, 2002). Categorization of birds and bat based on flying capacity is listed in Table 4-6. It has been observed that 9 Low Flier, 11 Medium Flier, 14 Medium-High Flier and 2 High Flier species of concern have been recorded. Pictorial diagram of categorization of species of concern including migratory birds of species of concern based on their flying capacity is shown in figure 4.7.

Table 4-6: Categorisation of Bat and Birds Species of Concern including Migratory Species of concern Based on Flying Capacity

SR. No.	COMMON NAME	SCIENTIFIC NAME	LOW FLIERS	LOW-MEDIUM FLIERS	MEDIUM-HIGH FLIERS	HIGH FLIERS
1.	Indian Flying Fox	*Pteropus giganteus* (Brunnich)	-	-	-	YES
2.	Great Cormorant	*Phalacrocorax carbo* (Linnaeus)	-	YES	-	-
3.	Indian Cormorant	*Phalacrocorax fuscicollis* (Viellot)	-	YES	-	-
4.	Darter	*Anhinga melanogaster* (Pennant)	YES	-	-	-
5.	Indian Grey Heron	*Ardea cinerea* (Linnaeus)	YES	-	-	-
6.	Indian Purple Heron	*Ardea purpurea* (Linnaeus)	YES	-	-	-
7.	Asian Openbill Stork	*Anastomus oscitans* (Boddaert)	YES	-	-	-
8.	Painted Stork	*Mycteria leucocephala* (Pennant)	YES	-	-	-
9.	Oriental White/Black Headed Ibis	*Threskiornis melanocephalus* (Latham)	-	YES	-	-
10.	Glossy Ibis	*Plegadis falcinellus* (Linnaeus)	-	YES	-	-
11.	Bar-headed goose	*Anser indicus* (Latham)	YES	-	-	-
12.	Pallid Harrier	*Circus macrourus* (Gmelin)	-	-	-	YES
13.	Indian Peafowl	*Pavo cristatus* (Linnaeus)	YES	-	-	-
14.	Red-wattled Lapwing	*Vanellus indicus* (Boddaert)	YES	-	-	-
15.	Yellow-wattled Lapwing	*Vanellus malabaricus*	YES	-	-	-

SR. No.	COMMON NAME	SCIENTIFIC NAME	LOW FLIERS	LOW-MEDIUM FLIERS	MEDIUM-HIGH FLIERS	HIGH FLIERS
		(Boddaert)				
16.	Little Ringed Plover	*Charadrius dubius* (Scopoli)	-	YES	-	-
17.	Black-winged Stilt	*Himantopus himantopus* (Linnaeus)	-	YES	-	-
18.	Eurasian/Indian Ring/ Collared Dove	*Streptopelia decaocto* (Frivaldszky)	-	-	YES	-
19.	Alexandrine Parakeet	*Psittacula eupatria* (Linnaeus)	-	-	YES	-
20.	Rose-ringed Parakeet	*Psittacula krameri* (Scopoli)	-	-	YES	-
21.	Plum/ Blossom Headed Parakeet	*Psittacula cyanocephala* (Linnaeus)	-	-	YES	-
22.	Northern Spotted Owlet	*Athene brama* (Temminck)	-	-	YES	-
23.	Common Barn Owl	Tyto alba (Scopoli)	-	YES		-
24.	White Breasted Kingfisher	*Halcyon smyrnensis* (Linnaeus)	-	YES		-
25.	Blue Tailed Bee-eater	*Meriops philippinus* (Linnaeus)	-	-	YES	-
26.	Little green Bee-eater	*Merops orientalis* (Latham)	-	-	YES	-
27.	Chestnut-headed Bee-eater	*Merops leschenaulti* (Vieillot)	-	-	YES	-
28.	Indian/ Northern Roller/Blue Jay	*Coracias benghalensis* (Linnaeus)	-	-	YES	-
29	Indian Pitta	*Pitta brachyura* (Linnaeus)	-	-	YES	-
30	Ashy-crowned Sparrow-Lark	*Eremopterix grisea* (Horsfield)	-	-	YES	-
31	Western Swallow	*Hirundo rustica* (Linnaeus)	-	-	YES	-
32	Wire-tailed Swallow	*Hirundo smithii* (Leach)	-	-	YES	-
33	White Wagtail	*Motacilla alba* (Vieillot)	-	YES	-	-

SR. No.	COMMON NAME	SCIENTIFIC NAME	LOW FLIERS	LOW-MEDIUM FLIERS	MEDIUM-HIGH FLIERS	HIGH FLIERS
34	Citrine/ Yellow Hooded Wagtail	*Motacilla citreola* (Pallas)	-	YES	-	-
35	Red Whiskered Bulbul	*Pycnonotus jocosus* (Linnaeus)	-	YES	-	-
36	Eastern Black Redstart	*Phoenicurus ochruros* (Vieillot)	-	-	YES	-

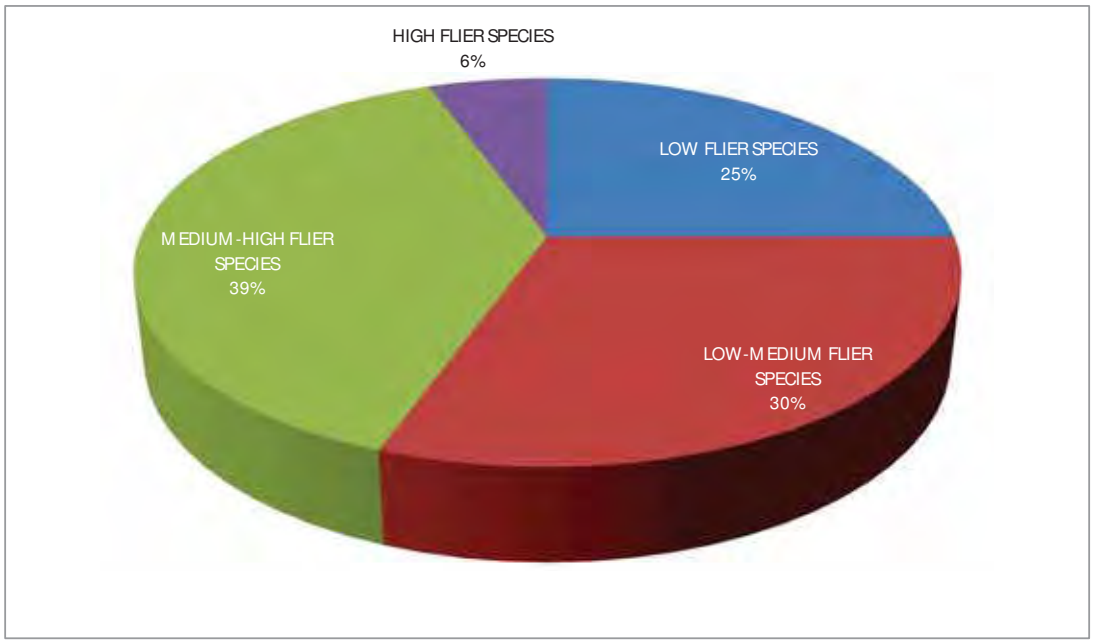

Figure 4-7: Flying capacity of species including migratory species of Concern

4.1 CARCASS SURVEYS

No carcass of any live stock animals was sighted in the study area during the surveys. Detailed discussions with local farmers, villagers, butchers and authorities of local bodies reveal that practice of throwing/leaving livestock carcass in open field is not followed in this region. According to them most of the carcasses after removing the skin are buried in the open fields. Table 4.7 gives the details of bird carcass/other remnants body parts sighted during the surveys. Photograph of some of carcass and other body parts sighted during surveys have been shown in Figure 4.8.

Table 4-7: Carcass in the study area

S.No	COMMON NAME	SCIENTIFIC NAME	NATURE OF BODY PART	SIGHTING LOCATION
1.	Crow Pheasant	***Centropus sinensis*** (Stephens)	Carcass	Near Hosuru Village
2.	Black Kite	***Milvus migrans*** (Boddaert)	Feather	Proposed WTG No 81 near Hosuru village
3.	Black-winged Kite	***Elanus caeruleus*** (Desfontaines)	Feather	Proposed WTG No 54 near Pattikonda village
4.	Cattle	Domestic Cattle	Femur bone piece	Proposed WTG No 5 near Aspari village
5.	Carnivore	Canis species	Jaw bones	Proposed WTG No 3 near Attikalagundu village

Figure 4-8: Carcass in the study area

5 POTENTIAL IMPACTS & MITIGATION MEASURES

Wind-powered turbines generating electricity are helpful in achieving greener energy with no pollution. Despite these positive features, windmills have the potential to leave an impact on bat and avifauna population. Windmills comprise wind turbines, interconnecting cables, transformer stations, meteorological masts and ancillary infrastructure. The components of the individual turbines comprise of a tapering mast, the nacelle or hub, foundations and rotor blades. Risk zone is the region between the lowest and topmost points swept by the rotor blades or the aerial height band swept by the rotor blades. Bird and bat mortality due to collision with turbine rotor or accidental body touch with high tension transmission line are some of the major environmental problems associated with wind mill project.

5.1 Potential Detrimental Effects of wind turbines on birds and bats:

The identified potential impact of the proposed wind mill project at Aspari, Kurnool District, A.P. have been enumerated bellow:

i. Mortality due to Collision of birds and bats with moving blades, tower, and associated infrastructure.
ii. Mortality of bird and bat species due to electrocution.
iii. Impact on behavior of bird and bat species due to noise pollution.
iv. Disturbance, displacement, exclusion from the area around wind turbines that may be caused by turbines, vehicles, people, and/or construction.
v. Barriers to movement, disruption of feeding, breeding, and migration of birds and bats.
vi. Change or loss of habitat.
vii. Damage, disturbance, or destruction of foraging habitats, roosting areas, and commuting corridors.

Collision mortality: Direct mortality or lethal injury of birds can result not only from collisions with rotors, but also with towers, nacelles, and associated structures such as guy cables, power lines, and meteorological masts. Current research indicates that passerines, particularly nocturnal migrants, suffer the most collision fatalities at wind farms. The collision risk is greater on foraging and roosting sites of birds, or on migratory flyways. Large birds with poor maneuverability are generally at greater risk of collision with structures) and species that habitually fly at dawn and dusk or at night are at less risk as they are likely to detect and avoid turbines.

Displacement due to disturbance: Sometime wind farm development could lead to the displacement of migrating species due to disturbance associated with wind farm construction and post-construction maintenance. However, the scale and degree of disturbance varies according to the site and species-specific factors.

Barrier effect: The barrier effect is of concern because birds have to change the routes and fly further to avoid a large array of turbines, which potentially disrupt linkages between distant feeding, roosting, molting, and breeding areas. The effect depends on the species, bird movement type, flight

height, wind force and direction, etc.

Habitat loss and habitat alteration: Some ornithologists consider the habitat loss associated with windmill development to be a greater threat to bird populations than collision fatalities. There is evidence that construction of windmills renders habitat unsuitable for birds.

5.2 POTENTIAL BIRD AND BAT IMPACT FOR ASPARI SITE

About 24 bat species and 164 bird species have been recorded from Kurnool district. Out of the 164 species recorded in the Kurnool District 5 bird species belong to "Critically Endangered", 3 species belong to "Endangered"; 6 species belong to "Vulnerable" and 8 species belong to "Near Threatened" criteria of IUCN Red list category. However, in the Project site (study area) 4 bat and 88 bird species were recorded. None of them belong to "Critically Endangered", or "Endangered" category of IUCN Red list category. In the study area 36 species of concern including 26 migratory species were identified. Of the identified 36 species of concern 9 species are low fliers and 2 species are high fliers. Low fliers and high fliers' species have little chances of collision with turbine rotor blade. However, species belonging to Low-Medium fliers (11 species) and Medium-High fliers (14 species) have the potential of collision with turbine blade as well electrocution with high tension transmission wires. However, the habitat of the study area is not suitable for most of the species of concern listed above. Majority of them are aquatic and/or water dependent (Semi-aquatic) species. The study area is a mixture of predominant agriculture and open land. There is no natural water body in the study area. Therefore, the potential impact of habitat fragmentation or displacement due to disturbance is also minimal. Moreover, to take informed decision on the subject the proposed project site was also screened through the Integrated Biodiversity Assessment Tool (IBAT). The IBAT tool provides critical information on biodiversity priority sites to inform decision-making processes and address any potential biodiversity impacts. The screening through IBAT tool identified 28 bird species to be possibly occurring in the area. Of the identified 28 bird species in three species grid in study area 8 belongs to "Critically Endangered", and "Endangered" categories. The results of IBAT screening of the area is enumerated in details in the Table 4.8. Even through IBAT screening, it is confirmed that no "Critically Endangered" or "Endangered" species fall within the study area. Further, it has also been confirmed through this screening that the study area does not form part of any critical habitat, IUCN protected area, Important Bird Area and Ramsar Wetland Site.

Table 5-1: Screening of Critically Endangered and Endangered species listed in the three Species Grids around Aspari in IBAT Tool

Sr. No.	Common Name	Scientific Name with Classification	Dutta and Sakthivel (2008) Kurnool Dist.	Srinivasulu & Nagulu (2002) Kurnool Dist.	LOCAL STATUS	Study Area	Remarks, if any
1.	White backed vulture	*Gyps bengalensis* (gmelin)	Yes	Yes	Uncommon (Srinivasulu & Nagulu, 2002) Local	Not sighted	Detailed discussions with local residents have revealed that the vultures have not been sighted in

Sr. No.	Common Name	Scientific Name with Classification	Dutta and Sakthivel (2008) Kurnool Dist.	Srinivasulu & Nagulu (2002) Kurnool Dist.	LOCAL STATUS	Study Area	Remarks, if any
					migratory		the study area in recent past.
2.	Egyptian vulture	*Neophron percnopterus* (latham)	Yes (Kurnool city) 60 km away from the study area	Yes	Uncommon (Srinivasulu & Nagulu, 2002) Resident	Not sighted	Detailed discussions with local residents have revealed that the vultures have not been sighted in the study area in recent past
3.	Red-headed Vulture	*Sarcogyps calvus* (Scopoli)	Yes	Yes	Ocassional (Srinivasulu & Nagulu, 2002) Local migratory	Not sighted	Detailed discussions with local residents have revealed that the vultures have not been sighted in the study area in recent past
4.	Long biied vulture	*Gyps indicus* (scopoli)	Yes	Yes	Uncommon (Srinivasulu & Nagulu, 2002) Local migratory	Not sighted	Detailed discussions with local residents have revealed that the vultures have not been sighted in the study area in recent past
5.	Great Indian bustard	*Ardeotis nigriceps* (vigors)	Yes Sri lankamalleswara WLS; Sri peninsula-narashimma WLS and Rollapadu wildlife sanctuary, 100+ kms from site.	-	Rare, fragmented and isolated (IUCN Red list website) Resident but absent in study area nears Aspari Village.	Not sighted	There are no suitable Habitats of semi-arid and grass-land ecosystem in and around study area. The study area habitat is grossly dominated by agroecosystem.
6.	Lesser florican	*Sypheotides indica*	Yes	-	Fragmented and	Not sighted	Rollapadu wildlife sanctuary is more

Sr. No.	Common Name	Scientific Name with Classification	Dutta and Sakthivel (2008) Kurnool Dist.	Srinivasulu & Nagulu (2002) Kurnool Dist.	LOCAL STATUS	Study Area	Remarks, if any
		(J. F. Miller)	Rollapadu wildlife sanctuary in Kurnool dist.)		isolated (IUCN Red list website) Resident/local migratory		than 100 kms away from the site. As per IUCN Rollapadu comes in non-breeding distributional range of the species.
7.	Jerdon's courser	*Rhinoptilus bitorquatus* (blyth)	Yes	Absent in kurnool dist	Severely fragmented in 6-10 locations (Srinivasulu & Nagulu, 2002) (IUCN Red list website) Resident	Not sighted	As per IUCN Red list website information rediscovery of species was done from Sri lankamalai WLS in Andhra Pradesh. Sighting records in past are from Cudaapah dist. in Andhra Pradesh. Both the areas are more than 100 km away from the Aapari site.
8.	Black-bellied Tern	*Sterna acuticauda* (J. E. Grey)	Yes	Yes	Uncommon (Srinivasulu & Nagulu, 2002) Seasonal Local migratory	Not sighted	Found near large rivers banks (usually breeding on sandspits and islands) and marshes, occasionally on smaller pools and ditches, in lowlands. There are no large rivers and/or waterbody within the study area.

5.3 MITIGATION MEASURES SUGGESTED

In the proposed project site, no "Critically Endangered" or "Endangered" species were recorded. Moreover, the proposed site does not form part of any critical habitat, IUCN protected area, Important Bird Area and Ramsar Wetland Site. The anticipated impact identified due to the project are general in nature common with wind mill projects like mortality due to collision with turbine rotor or accidental body touch with high tension transmission line or in general disturbance in the site due to construction and operation of the project. Mitigation measures suggested in following paragraphs are not for any particular targeted species. They are based on perception that some species of lesser importance, migratory species, raptor species, scavengers and/or water dependent species may be using the study area for various purposes. Such species may face negative hazardous impact due to wind mill activities during construction and operation phases. The objective of the proposed mitigation measures is to suggest to avoid/minimise disturbance to the habitat condition, avoid/minimise mortality due to collision/electrocution of bird and bat and avoid general disturbance to the bat and avifauna population. Following measures are suggested to possibly minimizing the hazardous impacts in the study area:

I. Appropriate working practices to be implemented to minimise any major disturbance to the bird and bat species in the habitat of the study area and its nearby surrounding.

II. Timing of construction to avoid sensitive periods such as migratory and breeding seasons, and roost timings of birds and bats (Avoid dusk and dawn timings).

III. Care should be taken not to attract bat and bird species having more risk of collision in windmill areas. Avoid planting fruit bearing trees (Such as guava, mango, banana, fig) and flowering plants in the windmill area. Such trees will attract bat and bird species more.

IV. Providing adequate briefing for site personnel and conducting an on-site ecological study during construction, as well as operation phase of the project.

V. Marking overhead cables and transmission poles using defectors and avoiding use of areas of high bird concentrations, especially for species vulnerable to collision.

VI. Where possible, installing transmission cables underground in accordance with existing best practice guidelines for underground cable installation. Otherwise if possible, install overhead cables with proper insulation to avoid bat and bird electrocution through body touch. Install bird defectors on overhead transmission cables at selected points wherever possible.

VII. To work out feasibility of use of low intensity of moving flash lights when rotor starts at the corners of blades when rotor starts at night to distract bat and bird species away from the turbine blades to avoid collision.

VIII. There is possibility of bird and bat mortality/injury in the study area during seasonal migration. If possible, consider to shut down or reduce the rotor blade speed during periods of seasonal migration of birds. If feasible, shut down of turbines by rotation for few hours during late night and early morning hours before dawn can also be considered.

IX. The illumination within the project area should be bare minimum and be within the acceptable limits, particularly during night hours. This will help in undisturbed activities of nocturnal species like rodents, bats and owls.

X. Some bird reflectors can be fitted at relevant places to divert low-medium and medium-high flying bird species during day time.

XI. Feasibility of fixing of bird defector on the turbine to avoid perching of birds near blades can be worked out, specially raptor species which prefer to perch at higher points.

XII. Research indicate that taller tower with larger rotors may cause more mortality than smaller turbines (Narwade et al., 2013).

XIII. Narwade et al., 2013 have recommended tubular towers with no exposed holes and with pointed tops. There should be no exterior ladders or platforms to avoid perching, nesting and mortality. Periodic inspection of towers from inside to check any bird nest inside the tower.

XIV. There should be everyday surveillance for checking the casualties, if any, occurred near each turbine. The carcasses to be removed immediately, while the injured specimens to be taken to nearest veterinary care center for further medical treatment.

XV. A separate record of bird and bat mortality and/or injury should be kept and reviewed periodically.

6 CLOSURE

The proposed project does not expect to threaten the long term viability/function of any of bat and bird species found in the area. No species of the area belongs to "Critically Endangered", or "Endangered" category of IUCN Red list category. There is no record of major migratory path as per publicly available secondary data. The impact identified to the bat and avifauna population due to the project was found to be general in nature common with wind mill projects like mortality due to collision with turbine rotor or accidental body touch with high tension transmission line or in general disturbance in the site due to construction and operation of the project. Though there are chances of collision mortality and electrocution which is commonly associated with wind power project, but with the above survey and evidences we may infer that they may not cause any substantial change in abundance and/or reduction in distribution of a bird and bat population. Bat and birds will not emerge out in high wind velocity and will prefer to remain in roost at such time. So possibility of collision with wind mill blades will be rare here at Aspari Site. Even if it occurs, it will not be fatal but may be injurious.

No migratory bat species have been recorded from the study area. However, Indian Fruit bat travels everyday a long distance in search of food and returns back to day-time roost. Since the memory and vision of Indian Flying Fox is very good, its foraging area is fairly large and some of the location sites near Aspari village where a day-time roost have been located may come under its foraging area. However, they are high fliers and can fly above turbine heights mostly in line formations during evening, night and early morning hours. When wind mills will be in operation, these bats will sense the obstructions in their route with the help of excellent night vision and memory. They are vocal and communicate with other members with vocal sounds and body postures and positioning. They will change the route and select a safer path in the foraging area.

As far as insectivorous bat species are concerned none of them are high fliers and they fly at lower to medium heights. They will sense obstructions in their routes with the help of very well developed ultra bio-sonar and eco-location systems. In addition, they possess very good vision. Therefore, in these cases also possibility of collision with wind mill blades will be rare. Even if it occurs, it will not be fatal but may be injurious.

Finally, the developmental activities with respect to wind mill project under study will not be detrimental to the survival of these species. However proper and eco-friendly care is essential with bare minimum disturbance to the habitat during construction and operational phases. It can minimize threats, if any, to the local bat and bird populations. Attempts to be made not to bring in major changes in study area habitats which may attract at latter stage, birds and bats for foraging, nesting and resting purposes. However, proper vigilance needs to be ensured to monitor any changes in bird and bat population, if any in latter stage. If any hazard is observed to any of bat and bird species a detailed species oriented study to be undertaken and the mitigation measures should ensure proper restoration and rehabilitation for the area.

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ANNEXURES

Annexure I: Photolog of Avi Fauna sited during site visit

	
Indian Silver bill	Black shouldered kite
	
Laughing dove	Red Vented Bulbul
	
Green bee eater	Black drongo

	
Purple Sunbird	Red wattled lapwing
	
Purple Heron	Spotted Owlet
	
Indian Shikra	Grey Heron

	
Euresean Collared Dove	Black Ibis
	
Painted Stork Black Ibis Grey Heron	Indian Flying Fox Roost

CONSULTANT DISCLOSURE

ECOLOGY AND BIODIVERSITY EXPERT (FAUNA) - DR. M ALHAR S PRADHAN

Dr. Pradhan is working with VSPL as Ecology and Biodiversity Expert (Fauna) was Officer In-charge and Head of Department, Zoological Survey of India and he has severed as Joint Director Scientist E (Group-A Gazetted officer) with over 35 years of experience in field faunal studies. He has expertise in taxonomy of mammal species with special reference to small mammals (Rodents, Bats, Insectivores and Scandentians) and Inventorization and preparation of systematic account of mammal species from conservation and non-conservation areas including wetland bodies.

Dr. Pradhan possess rich experience in faunal (Bird and Bat) study. He has conducted wildlife studies with special reference to the identification of bird and bats wildlife material, products, derivatives, live animals, etc. (Mammalia and Reptilia) seized by the Law Enforcement Authorities for filing court cases against illegal trade at domestic as well as at international levels provoking provisions under Ind. Wildlife (Protect.) Act and CITES Regulations.

He has conducted more than 20 general extensive faunistic survey studies of assigned areas in Maharashtra, Karnataka, Goa and Kerala states including entire Western Ghats. He has conducted status survey studies of a selected endangered and threatened mammal species. He has conducted EIA studies for various government projects for mines and railways with special reference to Vertebrate fauna in Maharashtra. Carried out joint collaborative status survey studies of Wroughton's Free-Tailed bat (Otomops wroughtoni), a most endangered Indian endemic bat species reported from Belgaon, Karnataka.

He has extensively worked for faunistic and research studies in Western Ghats Vidharbha regions, Ujani wetland Pune, Nathsagar-Jaikwadi wet land, Melghat Tiger Project, Pench Tiger Reserve, Tadoba-Andhari Tiger Reserve, Molem Wildlife Sanctuary of Goa, Sanjay Gandhi National Park, Lonar Crater Wildlife Sanctuary of Maharashtra, Nilgiri Biosphere Reserve Karnataka, Eravikulam National Park Kerala.

ANNEXURE XIII

LETTER FOR DFO KARNOOL

MYTRAH
INSPIRING SOLUTION

Mytrah Vayu (Tungabhadra) Private Limited
(CIN : U40105TG2015PTC098250)
8001, S.No 109, O-City, Nanakramguda,
Gachibowli, Hyderabad - 500032, Telangana, India
Tel. +91 40 33760100, F: +91 40 33760101
Website: www.mytrah.com E-mail: mail@mytrah.com

Letter No : EHS/ASPARI/MVTPL/08/2016/1 Date: 02.09.2016

To,

DIVISIONAL FOREST OFFICER,
KURNOOL DISTRICT,
ANDHRA PRADESH

Sub: Intimation of insinuation for sustainable wind plant operation at Aspari Village , Kurnool District , Andhra Pradesh-Reg.

Dear Sir,

Mytrah Vayu (Tungabhadra) Private Limited (MVTPL) has proposed to develop a wind farm of 200 MW capacities at Aspari village, Kurnool District, Andhra Pradesh. The proposed wind farm will consist of installation of 97 Wind Turbine Generators (WTG) of different capacities.

The total area required for the project is approximately 494 acres. The proposed project is spread over 12 revenue villages of Aluru and Pattikonda Taluka. However as a part of conventional way for Wind farm , the lands are bought only wind turbine footprints and auxiliary facility basis. Rest land use pattern will be unchanged as earlier.

Being a renewable power project, the environmental impact due to the project is not anticipated to be significant and is exempted from the purview of Environmental Clearance from MoEFCC under EIA notification, 2006 and NOC/consent from State Pollution Control Board.

Considering the ambit of EIA notification'2006 , no EIA study is required for Wind farm, but voluntarily we have carried out Environmental & Social Impact assessment study to identify potential impacts , If any for running the said Wind farm in a sustainable manner. As per the secondary records available with Forest department, Black Buck (Antilope) which is found in the 10 km radius of the ESIA study area. Though there is no anticipated impact on Black buck due to Wind firm operation and no such historic evidences in this regard related with Wind farm , we are not falling under the ambit of any frame work , stipulated by MOEF&CC, GOI , however as an environment conscious company , we will definitely monitor under our Environmental & Social management Plan throughout the Wind Farm lifecycle with your active guidance.

This letter is being submitted to your good office as an insinuation of the proceeding of sustainable Wind Plant operation. You are requested to acknowledge the letter

Thanking you,

Mytrah Vayu (Tungabhadra) Private Limited Hyderabad

Authorised Signatory,

Mytrah Vayu (Tungabhadra) Private Limited (MVTPL)

DFO
7 SEP 2016
KURNOOL

ANNEXURE XIV

NOISE MODELING INPUT DATA

ANNEXURE XIV- NOISE MODELING INPUTS

1 Noise Impact Modeling Methodology

The impact on nearby receptor was assessed to present the worst case scenario considering following assumptions.

- Source is operating at highest noise i.e. 107.5 dB(A) as discussed above sections
- No absorption of noise by the surface in between
- No absorption of noise by medium of transportation,
- No barrier is between receptor and source

The impact from wind turbine at receptor were assessed considering hemispherical propagation of sound wave presented by the following equation-

$L_R = L_S + DI - 20 \log(r) - A_e - 8$

Where,

L_R: Sound pressure level at a receptor located at radial 'r', dB (A)

L_S: Sound pressure level at the source, dB (A)

DI: Directivity index of the source (for hemispherical radiation DI = 3dB (A)

r: Radial distance of the receptor from the source, m

A_e: represents excess attenuation of sound caused by the environmental conditions

such as:

- Absorption in Air
- Effect of rain, snow and fog
- Reflections and refractions at barriers and buildings
- Effect of the terrain, grass, shrubs, trees etc.
- Effect of wind and temperature gradient

The absorption of the sound is generally a complex phenomenon. In general, for homogeneous loss free atmosphere Ae = 0.

2 Modeling Input

2.1 Noise Source – Wind Turbines

Aerodynamic noise originates from the flow of air around the blades.

2.1.1 GE-2.3 MW

Normal Operation Calculated Apparent Sound Power level and octave Band Spectra. Sound Pressure level as likely from normal operation of GE- 2.3 MW are presented in Table below.

Turbine Model GE-2.3 Normal Operation Noise Values

Hub Height Wind speed	4	5	6	7	8	9	10	11	12	13	14-cut out
Standard wind speed at 10m for	2.9	3.6	4.3	5.0	5.7	6.5	7.2	7.9	8.6	9.3	10.1-cut

Hub Height Wind speed		4	5	6	7	8	9	10	11	12	13	14-cut out
a hub height of 80m (m/s)												out
Standard wind speed at 10m for a hub height of 94 m (m/s)		2.8	3.5	4.2	4.9	5.6	6.3	7.0	7.7	8.4	9.1	9.8 –Cut out
Frequency	16	52.5	52.6	53.8	57.1	60.1	62.6	64.8	65.0	65.1	65.1	65.1
	31.5	67.4	67.1	68.3	71.3	74.2	76.7	78.7	78.9	79.0	79.0	79.0
	63	77.7	77.4	78.9	81.8	84.5	86.9	88.7	88.8	88.9	89.0	89.0
	125	84.2	84.4	87.1	90.1	92.5	93.5	95.1	95.0	95.0	95.1	95.2
	250	88.5	89.2	92.2	95.7	98.5	98.6	99.9	99.6	99.6	99.6	99.7
	500	90.2	90.9	93.3	96.9	100.1	101.3	102.9	102.9	102.8	102.8	102.8
	1000	88.9	89.8	91.7	94.9	98.0	100.2	102.1	102.3	102.4	102.5	102.5
	2000	84.2	85.9	88.1	91.0	93.6	95.7	97.7	97.8	97.8	97.6	97.3
	4000	73.0	77.0	80.8	83.8	86.3	87.5	89.2	89.0	88.4	87.4	87.1
	8000	55.1	58.8	62.2	66.3	69.1	68.2	68.4	68.1	67.5	66.8	66.4
Total Sound Power Level in dB(A)		95.0	95.8	98.2	101.6	104.5	105.8	107.5	107.5	107.5	107.5	107.5

2.1.2 GE 1.7-103-50Hz and 60 Hz

Table below summarizes the acoustic emission characteristics of 1.7-103 wind turbine for normal operation.

Turbine Model GE-1.7 Normal Operation Noise Values

Standard wind speed at 10 m (m3/s)		5	5.5	6	6.5	7	8	9	10-cutout
Hub height wind speed at 80 m (m/s)		7.0	7.7	8.4	9.1	9.7	11.1	12.5	14-Cutout
Frequency	32	73.9	75.9	77.8	79.5	80.6	80.7	80.6	80.4
	63	83.4	85.5	87.5	89.3	90.5	90.5	90.5	90.3
	125	88.7	90.9	92.9	94.7	95.5	95.7	95.7	95.6
	250	92.7	95.0	97.1	99.0	98.1	97.7	97.7	97.6
	500	94.9	97.6	100.0	102.2	101.5	100.3	100.3	100.3
	1000	93.8	96.2	98.5	100.8	101.7	102.4	102.6	102.7
	2000	92.5	94.5	96.4	98.1	98.9	99.6	99.6	99.4
	4000	86.7	89.2	91.3	93.2	92.8	91.4	90.5	89.9
	8000	68.8	72.1	74.9	77.1	75.2	74.1	73.3	72.6
	16000	31.2	33.4	35.4	37.6	37.9	35.9	35.6	35.9
Total apparent sound power level Lwa,k (dB)		100.3	102.6	104.9	106.9	107.0	107.0	107.0	107.0

2.1.3 Suzlon 2.1MW

Sound Level due to normal operation is presented in Table below.

Turbine Model Suzlon-2.1 Normal Operation Noise Values

hh wind	63 Hz	125 Hz	250 Hz	500 Hz	1kHz	2kHz	4kHz	8kHz	LWA[Db(A)]
4.0	77.1	81.5	85.0	90.1	92.5	92.4	84.6	89.7	98.0
5.0	77.3	82.5	86.3	90.8	93.9	92.3	84.6	79.7	98.0
6.0	78.1	84.2	88.4	92.6	95.8	93.9	89.6	79.3	100.0
7.0	79.6	87.3	91.6	95.5	98.0	95.8	93.1	81.1	102.5

hh wind	63 Hz	125 Hz	250 Hz	500 Hz	1kHz	2kHz	4kHz	8kHz	LWA[Db(A)]
8.0	81.2	89.7	94.2	97.8	99.6	97.2	94.9	82.8	104.4
9.0	81.0	90.6	94.8	98.7	100.1	97.0	95.9	84.4	105.0
10.0	79.5	87.2	91.0	96.7	98.3	95.4	93.2	85.3	102.8
11.0	79.7	86.7	89.1	94.3	96.8	95.2	90.7	85.4	101.4
12.0	80.3	86.7	88.6	92.9	96.0	95.4	90.7	85.6	100.9
13.0	80.3	86.6	88.4	92.2	95.7	95.5	90.8	85.8	100.7
14.0	80.3	86.6	88.4	92.0	95.6	95.5	91.0	86.4	100.7
15.0	80.3	86.7	88.4	92.1	95.6	95.5	91.1	86.6	100.7

To assess the worst case scenario, maximum incremental Nosie level at individual receptor was superimposed on maximum existing noise level i.e. 48.06 dB(A). The average increment noise level in the project vicinity would be in the tune of 2.59 dB(A).

2.2 Turbine Locations

The proposed geographic coordinates of the turbines and its position are as presented in **Table 3.1**.

Geographical Coordinates of the Turbine

S. No.	Location No.	WTG Model	Geographical Coordinates (zone 43p)	
			Easting (m)	Northing (m)
1	ASP-05	GE 1.7	757261	1711975
2	ASP-06	GE 1.7	757243	1711584
3	ASP-07	GE 1.7	757310	1711204
4	ASP-08	GE 1.7	757347	1710783
5	ASP-09	GE 1.7	757502	1710209
6	ASP-10	GE 1.7	757375	1709837
7	ASP-11	GE 1.7	757558	1709442
8	ASP-12	GE/ GE 1.7	757588	1709041
9	ASP-13	GE/ GE 1.7	757527	1708697
10	ASP-14	GE/ GE 1.7	757442	1708239
11	ASP-15	GE/ GE 1.7	757288	1707875
12	ASP-16	GE/ GE 1.7	757326	1707485
13	ASP-17	GE/ GE 1.7	757359	1707097
14	ASP-18	GE/ GE 1.7	758578	1706541
15	ASP-19	GE/ GE 1.7	758419	1706140
16	ASP-21	GE/ GE 1.7	758308	1705654
17	ASP-22	GE/ GE 1.7	758570	1705047
18	ASP-23	GE/ GE 1.7	758653	1704647
19	ASP-24	GE/ GE 1.7	758778	1704140
20	ASP-25	GE/ GE 1.7	758867	1709056
21	ASP-26	GE/ GE 1.7	758895	1708587
22	ASP-27	GE/ GE 1.7	759051	1708106
23	ASP-28	GE/ GE 1.7	759065	1707554
24	ASP-29	GE/ GE 1.7	759028	1706962
25	ASP-61	GE/ GE 1.7	759968	1702844

S. No.	Location No.	WTG Model	Geographical Coordinates (zone 43p)	
			Easting (m)	Northing (m)
26	ASP-62	GE / GE 1.7	759612	1702434
27	ASP-63	GE / GE 1.7	759085	1702090
28	ASP-64	GE / GE 1.7	758817	1701713
29	ASP-65	GE / GE 1.7	758728	1701288
30	ASP-66	GE / GE 1.7	758475	1700917
31	ASP-40	GE / GE-2.3	762045	1703492
32	ASP-44	GE / GE-2.3	764159	1705373
33	ASP-46	GE / GE-2.3	764756	1704668
34	ASP-47	GE / GE-2.3	765128	1704150
35	ASP-48	GE / GE-2.3	765098	1703738
36	ASP-49	GE / GE-2.3	765260	1703298
37	ASP-50	GE / GE-2.3	765867	1706402
38	ASP-52	GE / GE-2.3	766475	1705879
39	ASP-53	GE / GE-2.3	766062	1705165
40	ASP-54	GE / GE-2.3	766153	1704752
41	ASP-55	GE / GE-2.3	766602	1704033
42	ASP-67	GE / GE-2.3	760739	1700107
43	ASP-68	GE / GE-2.3	760705	1699716
44	ASP-69	GE / GE-2.3	760529	1699171
45	ASP-70	GE / GE-2.3	760371	1698780
46	ASP-71	GE / GE-2.3	762453	1702975
47	ASP-72	GE / GE-2.3	762368	1702547
48	ASP-73	GE / GE-2.3	762381	1702128
49	ASP-74	GE / GE-2.3	762375	1701603
50	ASP-76	GE / GE-2.3	764604	1700636
51	ASP-78	GE / GE-2.3	764632	1699870
52	ASP-79	GE / GE-2.3	764816	1699152
53	ASP-80	GE / GE-2.3	764859	1698762
54	ASP-81	GE / GE-2.3	767051	1701808
55	ASP-82	GE / GE-2.3	767427	1701435
56	ASP-83	GE / GE-2.3	767550	1701037
57	ASP-84	GE / GE-2.3	767668	1700663
58	ASP-85	GE / GE-2.3	767878	1700318
59	ASP-86	GE / GE-2.3	767882	1699869
60	ASP-106	GE / GE-2.3	758168	1700496
61	ASP-107	GE / GE-2.3	760325	1698327
62	ASP-108	GE / GE-2.3	760170	1697883
63	ASP-109	GE / GE-2.3	760030	1697431
64	ASP-110	GE / GE-2.3	759935	1696993
65	ASP-111	GE / GE-2.3	759816	1696554
66	ASP-112	GE / GE-2.3	764928	1698334

S. No.	Location No.	WTG Model	Geographical Coordinates (zone 43p)	
			Easting (m)	Northing (m)
67	ASP-122	GE / GE-2.3	765902	1708092
68	ASP-123	GE / GE-2.3	766228	1707569
69	ASP-124	GE / GE-2.3	766232	1707077
70	ASP-125	GE / GE-2.3	757066	1699910
71	ASP-126	GE / GE-2.3	756850	1699465
72	ASP-127	GE / GE-2.3	756637	1698966
73	ASP-128	GE / GE-2.3	759570	1696074
74	ASP-129	GE / GE-2.3	759365	1695606
75	ASP-01	Suzlon / S-111	758788	1713250
76	ASP-03	Suzlon / S-111	759407	1712273
77	ASP-30	Suzlon / S-111	760434	1708636
78	ASP-31	Suzlon / S-111	760468	1708229
79	ASP-32	Suzlon / S-111	760543	1707786
80	ASP-33	Suzlon / S-111	760551	1707413
81	ASP-35	Suzlon / S-111	760805	1706672
82	ASP-36	Suzlon / S-111	761089	1706251
83	ASP-37	Suzlon / S-111	761397	1705875
84	ASP-38	Suzlon / S-111	761504	1705420
85	ASP-39	Suzlon / S-111	761624	1705031
86	ASP-41	Suzlon / S-111	761979	1707240
87	ASP-42	Suzlon / S-111	762982	1706402
88	ASP-43	Suzlon / S-111	763709	1705832
89	ASP-87	Suzlon / S-111	762866	1707824
90	ASP-88	Suzlon / S-111	762699	1708556
91	ASP-89	Suzlon / S-111	762535	1708968
92	ASP-90	Suzlon / S-111	762295	1709304
93	ASP-91	Suzlon / S-111	762194	1709790
94	ASP-92	Suzlon / S-111	762147	1710174
95	ASP-93	Suzlon / S-111	761678	1711329
96	ASP-94	Suzlon / S-111	761596	1711856
97	ASP-95	Suzlon / S-111	761612	1712235

2.3 Receptors

Residential, Commercial and Institutional structures in project impact area are considered as receptor for noise modeling. Receptors geographical position along with category are presented in Table below.

Geographical Location of Receptors

Receptor	Coordinates of Receptors		Receptor ID considered
	Northing	Easting	
Residential Area of Aspari Village	1712267	756655	REC-01

Receptor	Coordinates of Receptors		Receptor ID considered
	Northing	Easting	
Residential Area of Devnabanda Village	1709164	760296	REC-02
Residential Area of Devnabanda Village	1709125	760320	REC-03
Residential Area of Devnabanda Village	1709038	760366	REC-04
Residential Area of Joharapuram Village	1705131	757660	REC-05
Residential Area of Joharapuram Village	1704899	758247	REC-06
School Building in village Joharapuram	1705023	758010	REC-07
Residential Area of Joharapuram Village	1704899	758247	REC-06
Residential Area of Joharapuram Village	1704826	758240	REC-08
Residential Area of Joharapuram Village	1704604	757821	REC-09
Residential Area of Devnabanda Village	1709217	760293	REC-10
Residential Area of Devnabanda Village	1708981	760398	REC-11
Residential Area of Joharapuram Village	1704963	758164	REC-12
Residential Area of Joharapuram Village	1704604	757818	REC-13
Cluster of Houses near to Kottala Village	1698899	757461	REC-14
Cluster of Houses near to Kottala Village	1699353	758054	REC-15
Residential Area of Devnabanda Village	1708984	760430	REC-16
Residential Area of Pedda Hulti Village	1705292	762516	REC-17
Residential Area of Pedda Hulti Village	1705464	762746	REC-18
Residential Area of Pedda Hulti Village	1705115	762709	REC-19
Residential Area of Chinna Hulti Village	1706880	763679	REC-20
Residential Area of Pedda Hulti Village	1705400	762931	REC-21
Residential Area of Chinna Hulti Village	1707240	763575	REC-22
Residential Area of Devanabanda Village	1708995	761115	REC-23
Residential Area of Devanabanda Village	1709268	760716	REC-24
Residential Area of Devnabanda Village	1708981	760416	REC-25
Residential Area of Attikalagundu Village	1712063	759544	REC-26
Residential Area of Nalakadoddi Village	1708995	760725	REC-27
Residential Area of Nalakadoddi Village	1712186	760814	REC-28
Single Structure	1712670	761690	REC-29
Residential Area of village Pedda Hulti	1705022	762770	REC-30
Residential Area of village Pedda Hulti	1705136	763074	REC-31
Residential Area of Pedda hulti Village	1705124	763111	REC-32
Residential Area of Pedda hulti Village	1705112	763082	REC-33
Residential Area of Hosuru Village	1702371	764969	REC-34
Residential Area of Hosuru Village	1702372	764973	REC-35
Residential Area of Chinna hulti Village	1706960	763978	REC-36
Cluster of Houses near to pattikonda Village	1704987	767137	REC-37
Single structure	1704940	765883	REC-38

Receptor	Coordinates of Receptors		Receptor ID considered
	Northing	Easting	
Residential Area of Pattikonda Village	1703796	767812	REC-39
Cluster of Houses near to Kottala Village	1699295	758165	REC-40
Cluster of Houses near to Kottala Village	1699246	758181	REC-41
Cluster of Houses near to Kottala Village	1699235	758185	REC-42
Residential Area of Hosuru Village	1702074	763854	REC-43
Residential Area of Hosuru Village	1702015	763792	REC-44
Residential Area of Hosuru Village	1701791	763960	REC-45
Structure in village Putchakayalamada	1700642	765729	REC-46
Residential Area of Putchakayalamada Village	1700488	765991	REC-47
Residential Area of Hosuru Village	1700440	766036	REC-48
Residential Area of Putchakayalamada Village	1700721	766334	REC-49
Residential Area of Putchakayalamada Village	1700571	766423	REC-50
Residential Area of Ramachandrapuram Village	1699434	768335	REC-54
Residential Area of Ramachandrapuram Village	1699434	768335	REC-54
Cluster of Houses near to Kottala Village	1699352	758060	REC-51
Cluster of Houses near to Kottala Village	1699234	758183	REC-52
Cluster of Houses near to Burujula Village	1696623	762397	REC-53
Residential Area of Putchakayalamada Village	1700488	765991	REC-47
Cluster of Housese in village Ramchandrapuram	1699434	768335	REC-54
Cluster of Housese in village Ramchandrapuram	1699434	768335	REC-54
Cluster of Houses near to Kottala Village	1699352	758060	REC-51
Cluster of Houses near to Kottala Village	1698915	757251	REC-56
Cluster of Houses near to Burujula Village	1696433	762379	REC-57
Settlement	1708426	765958	REC-58
Settlement	1708388	765984	REC-59
Settlement	1708100	765501	REC-60
Settlement	1708422	765980	REC-55

ANNEXURE XV

MINISTRY OF POWER'S COMPENSATION GUIDELINES FOR TRANSMISSION LINES

No.3/7/2015-Trans
Government of India
Ministry of Power
Shram Shakti Bhawan
Rafi Marg, New Delhi – 110001

Dated, 15th October, 2015

To

1. Chief Secretaries/Administrators of all the States/UTs
(As per list attached)
2. Chairperson, CEA, New Delhi with the request to disseminate the above guidelines to all the stakeholders.
3. CMD, PGCIL, Gurgaon.
4. CEO, POSOCO, New Delhi.
5. Secretary, CERC, New Delhi.
6. CMD of State Power Utilities/SEBs

Subject: Guidelines for payment of compensation towards damages in regard to Right of Way for transmission lines.

During the Power Ministers Conference held on April 9-10, 2015 at Guwahati with States/UTs, it has, *inter alia*, been decided to constitute a Committee under the chairmanship of Special Secretary, Ministry of Power to analyse the issues related to Right of Way for laying of transmission lines in the country and to suggest a uniform methodology for payment of compensation on this count. Subsequently, this Ministry had constituted a Committee with representatives from various State Governments and others. The Committee held several meetings to obtain the views of State Governments on the issue and submitted its Report along with the recommendations (copy of the Report is at **Annex-1**).

2. The Recommendations made by the Committee are hereby formulated in the form of following guidelines for determining the compensation towards "damages" as stipulated in section 67 and 68 of the Electricity Act, 2003 read with Section 10 and 16 of Indian Telegraph Act, 1885 which will be in addition to the compensation towards normal crop and tree damages. This amount will be payable only for transmission lines supported by a tower base of 66 KV and above, and not for sub-transmission and distribution lines below 66 KV:-

(i) Compensation @ 85% of land value as determined by District Magistrate or any other authority based on Circle rate/ Guideline value/ Stamp Act rates for tower base area (between four legs) impacted severely due to installation of tower/pylon structure;

(ii) Compensation towards diminution of land value in the width of Right of Way (RoW) Corridor due to laying of transmission line and imposing certain restriction would be decided by the States as per categorization/type of land in different places of States, subject to a maximum of 15% of land value as determined based on Circle rate/ Guideline value/ Stamp Act rates;

(iii) In areas where land owner/owners have been offered/ accepted alternate mode of compensation by concerned corporation/ Municipality under Transfer Development Rights (TDR) policy of State, the licensee /Utility shall deposit compensation amount as per (i) & (ii) above with the concerned Corporation/ Municipality/ Local Body or the State Government.

(iv) For this purpose, the width of RoW corridor shall not be more than that prescribed in the table at **Annex-2**and shall not be less than the width directly below the conductors.

3. Necessary action may kindly be taken accordingly. These guidelines may not only facilitate an early resolution of RoW issues and also facilitate completion of the vital transmission lines through active support of State/ UT administration.

4. All the States/UTs etc. are requested to take suitable decision regarding adoption of the guidelinesconsidering that acquisition of land is a State subject.

Yours faithfully,

Jyoti Arora

(Jyoti Arora)
Joint Secretary (Trans.)
Tele: 011-2371 0389

Copy, along with enclosure, forwarded to the following:

1. Secretaries of Government of India (Infrastructure Ministries/Deptt including MoEF - As per attached list)
2. Prime Minister's Office (Kind Attn: Shri Nripendra Mishra, Principal Secretary to PM).
3. Technical Director, NIC, Ministry of Power with the request to host on the website of Ministry of Power.

Copy to PS to Hon'ble MoSP (IC) / Secretary (Power) / AS (BNS) / AS (BPP) / All Joint Secretaries/EA/ All Directors/DSs, Ministry of Power.

Report of the Committee for payment of compensation in regard to Right of Way (RoW) for transmission lines

1.0 Background:

1.1 The Transmission Projects in the country are implemented by the licensee in accordance with the provisions of the Electricity Act, 2003. The compensation towards "damages" during implementation of such projects is governed by Section 67 & 68 of the Electricity Act read with Section 10 & 16 of the Indian Telegraph Act, 1885. The present stipulations provide for compensation towards all damages without acquisition of land which are assessed/ reviewed by the Revenue Authorities. However, there is no clear definition of the term "damages", nor are there any guidelines in this regard.

1.2 For laying electricity transmission lines, licensee erects towers at intervals of about 400 m. and conductors are strung on these towers maintaining a safe height depending on the voltage and other geographical parameters. Thus, typical transmission lines have following two kinds of impact:

(i) Tower base area whichis more or less completely lost or loses its productivity due to severe restriction an access;

(ii) Corridor of land underneath strung conductor between two towers may be adversely affected by imposition of restriction on its usage.

1.3 The maximum width of RoW corridor is calculated on the basis of tower design, span, and wind speed, maximum sag of conductor and its swing plus other requirement of electric safety. The requirement of ROW for different voltage types under standard conditions is as follows:

ROW width for different voltage line*

Transmission Voltage	Width of Right of Way (in Meters)
66 kV	18
110 kV	22
132 kV	27
220 kV	35
400 kV S/C	46
400 kV D/C	46
+/-500 kV HVDC	52
765 kV S/C (with delta configuration)	64
765 kV D/C	67
+/-800 kV HVDC	69
1200 kV	89

* Width of Right of Way is as per the MoEF guidelines dated 5.5.2014 (**Annex-A**)

1.4 The Telegraph Act provides for compensation towards damages (without acquisition) while placing the tower and stringing the conductor. The local authorities/ District Magistrates have been provided Power under Section 16 (1) of the

Telegraphic Act for adjudication and fixing the compensation. The provisions of the Electricity Act and Telegraph Act in respect of compensation are as follows:

A. The Electricity Act, 2003, Part-VIII, Section 67 & 68

Section 67 (3 & 4):

"(3) *A licensee shall, in exercise of any of the powers conferred by or under this section and the rules made thereunder, cause as little damage, detriment and inconvenience as may be,* ***and shall make full compensation for any damage, detriment or inconvenience*** *caused by him or by any one employed by him.*

(4) *Where any difference or dispute [including amount of compensation under sub-section (3)] arises under this section, the matter shall be determined by the Appropriate Commission.*

Section 68 (5 & 6):

(5) *Where any tree standing or lying near an overhead line or where any structure or other object which has been placed or has fallen near an overhead line subsequent to the placing of such line, interrupts or interferes with, or is likely to interrupt or interfere with, the conveyance or transmission of electricity or to interrupt or interfere with, the conveyance or transmission of electricity or the accessibility of any works, an Executive Magistrate or authority specified by the Appropriate Government may, on the application of the licensee, cause the tree, structure or object to be removed or otherwise dealt with as he or it thinks fit.*

(6) *When disposing of an application under sub-section (5), an Executive Magistrate or authority specified under that sub-section shall, in the case of any tree in existence before the placing of the overhead line,* ***award to the person interested in the tree such compensation as he thinks reasonable,*** *and such person may recover the same from the licensee.*

Explanation – For purposes of this section, the expression tree shall be deemed to include any shrub, hedge, jungle growth or other plant."

B. The Indian Telegraph Act, 1885, Part-III, Section 10 ("C"):

"Section 10 – *The telegraph authority may, from time to time, place and maintain a telegraph line under, over, along, or across, and posts in or upon any immovable property, Provided that –*

a) *the telegraph authority shall not exercise the powers conferred by this section except for the purposes of a telegraph established or maintained by the [Central Government], or to be so established or maintained;*

b) ***the [Central Government] shall not acquire any right other than that of user only*** *in the property under, over, along, across in or upon which the telegraph authority places any telegraph line or post; and*

c) *except as hereinafter provided, the telegraph authority shall not exercise those powers in respect of any property vested in or under the control or management of any local authority, without the permission of that authority; and*

d) *in the exercise of the powers conferred by this section, the telegraph* ***authority shall do as little damage as possible, and, when it has exercised those powers in respect of any property other than that referred to in clause (c), shall pay full compensation to all persons interested for any damage sustained by them*** *by reason of the exercise of those powers."*

1.5 As the "damages" have not been defined in the said Acts, licensees, in past, used to pay compensation for the damages caused to crops/ trees and structures. However, the land owners/farmers are now demanding the cost of land for tower base as well as cost diminution of land value in the corridor area due to laying of transmission

line on their land. The present provisions of the Act/ Rules do not provide for any set procedure for calculation of such compensation. In the absence of clarity and notified procedures, the provisions of existing Acts are being differently interpreted by concerned DC/ Revenue Authorities that are also at variance with each other even among neighboring districts which is resulting in the resistance by the farmers causing unwarranted delay in the project implementation. Presently many lines in the States of Maharashtra, Western U.P., Karnataka, Kerala, Andhra, Jharkhand etc. are held up due to resistance by land owners demanding enhanced compensation.

2.0 Constitution of the Committee:

2.1 The matter was deliberated during the Power Ministers' Conference on 9-10 April 2015 at Guwahati and a Committee under the chairmanship of Special Secretary, Ministry of Power was constituted vide order No. 3/7/2015-Trans dated 15th April 2015 to analyse the issues relating to Right of Way for laying transmission lines in the country and to suggest a uniform methodology for payment of compensation on this account. The composition of the Committee is given below:

i. Shri R. N. Choubey, Special Secretary, Ministry of Power – Chairman
ii. Chairperson, Central Electricity Authority
iii. Principal Secretary/Secretary (Energy), Madhya Pradesh
iv. Principal Secretary/Secretary (Energy), U.P
v. Principal Secretary/Secretary (Energy), Maharashtra
vi. Principal Secretary/Secretary (Energy), Karnataka,
vii. Principal Secretary/Secretary (Energy), Kerala,
viii Jt. Secretary (Trans.), Ministry of Power
ix. CMD/Dir(Projects), POWERGRID
x. Shri K. K. Arya, CE (SP&PA), CEA – Convener & Member Secretary.

The notification of the Committee is at **Annex-I**.

3. Proceedings of the Committee:

3.1 The first meeting of the Committee was held on 20.04.2015. During the meeting Powergrid and States mentioned that the difficulties were being faced in construction of transmission lines in more or less all the states due to severe resistance being posed by the land owners/ farmers with the demand of higher compensation including demand for compensation for the diminution value of the land below towers and under

the line corridor. Powergrid also informed about the opinion of Attorney General of India taken by them, which states that the land underneath the legs of the tower is permanently lost by the owner and that the land under the corridor can be conveniently used but with certain restrictions and compensation for such diminution in land value for the line corridor is also payable to land owners. All the states were also of the view that compensation against the land diminution should be paid to the land owners. Most of the participants suggested that a uniform policy should be in place at the central level in terms of fixed percentages of market value of the and under transmission towers and under corridor, however, some of the states were of the view that this should be left to the concerned state to formulate the policy.

3.2 During the meeting, two views were emerged as under;

(i) 100 % compensation for land should be paid for tower footing and 10% for corridor under the line.

(ii) Policy should not be changed as state authorities are solving the compensation issues and it will also affect the financial viability of transmission projects.

The minutes of the meeting are at **Annex-II**.

3.3 The second meeting was held on 30.04.2015. Director (Projects), POWERGRID presented a detailed presentation including Legal & Regulatory framework about the compensation, policies of various States as well as the brief on the order of various Courts on compensation issues and various other order of different DM/DC regarding compensation and interpretation of present provisions. Copy of the presentation is at **Annex-III**. The summary of AG's opinion on legal position and coverage/inclusions of various aspects while deciding compensation including land value diminution was also informed by POWERGRID.

3.4 POWERGRID proposal regarding full compensation for tower base and at least 10% for RoW Corridor was also discussed in detail. The private entities M/s. Sterlite and Essel Infra also emphasized that there should be a standard norms for calculating compensation for transmission line and it should also be revised, reviewed periodically for its regular updation keeping in mind the market rate. M/s Sterlite also suggested that instead of land cost, corridor compensation per km may be fixed based on voltage of

line. Chairperson, CEA informed that possibility of reduction in RoW width is minimal as it has already been fixed based on the required Electricity Safety norms.

3.5 The Committee opined that payment of full value of land cost, tower base seems justified due to severe restriction put in by placing of tower which heavily impact the productivity/use of land area falling below tower base. Principal Secretary (Power), U.P however expressed his reservation on 100% cost without acquisition may be a difficult proposition due to ongoing complication regarding compensation under new Land Acquisition Act. Principal Secretary (Power), U.P and Principal Secretary (Power), M.P expressed their apprehension about the proposal of RoW Corridor payment as in their view such payment may also hamper the implementation of distribution lines and may also put additional financial burden on distribution company. Moreover, they were also of the opinion that we may not be able to resolve compensation issue by paying 10% as in all probabilities the farmers/land owners will demand more as has already been stipulated in the different State policies and DCs orders.

3.6 Due to sensitivity of the proposal and its implementation by the different State Governments, it was decided that this issue may also be discussed during the forthcoming Power Secretaries meetings for wider consultation and acceptance. Minutes of the meeting are at **Annex-IV**.

3.7 The Committee further consulted many States to obtain their views on the issue during the Review, Planning and Monitoring (RPM) meeting held on 11.5.2015 at Delhi, which was attended by Principle Secretaries/ Secretaries (Energy) of various States. The issues related to compensation and deliberations held during last 2 meetings were informed to the participants and they were asked to give their opinion on whether Committee should recommend a minimum uniform standard compensation norm for transmission line RoW for whole country or not. The different States present in the meeting suggested following:

i. **West Bengal:** The state was not very keen on providing compensation for ROW corridor however they suggested for tower base 50 % of the land cost due to restriction and 20 % for corridor However it should be left to state for final decision.

ii. **Jammu & Kashmir:** It informed that because of the special provision in the state they were already acquiring tower base land by paying full compensation as per the land acquisition norm and accordingly state be granted power on such issue.

iii. **Madhya Pradesh:** It also suggested that such decision be left to state government to decide.

iv. **Uttar Pradesh:** The state was ready to pay the compensation as decided by the district authority and hence suggested there should be a mechanism so that such compensation be pass through as project cost.

v. **Kerala:** Kerala was in favour of uniform compensation norms. It also suggested that beyond such uniform rate, it should be left to state who would also bear the cost if additional compensation is paid.

vi. **Bihar:** The State was also in favor of compensation for tower base and corridor. However, it suggested that decision on deciding percentage be left on state for finalization.

vii. **Karnataka:** It was also in favor of such compensation, however it also suggested that the finalization of percentage cost may be left at the discretion of the state.

viii. **Andhra Pradesh:** The State was of the view that compensation for 100 % land value for tower base be paid to the landowner but no compensation for corridor should be given. It also suggested that such compensation should not be made applicable to line below 33 KV.

ix. **Jharkhand:** The State was also in favor of uniform standard rate at generic level but suggested that state must be authorized for finalizing the quantum of such compensation.

x. **Odisha:** The State was also in favor of uniform standard rate. However, it suggested that district authority must be authorized for finalizing such compensation.

xi. **Uttarakhand:** It also wanted a uniform rate for such compensation considering revenue rate as basis and suggested 80% land value for tower base but no compensation for corridor as agricultural practices take place without any hindrance. However, they suggested that 5% cost of land for corridor for lines below 33 KV be included as these lines put severe restriction on agricultural practices.

xii. **Meghalaya:** it suggested that they will come back after consulting other stakeholders and senior officials.

xiii **Gujarat:** it favors that certain minimum standard should be defined and state be given power to decide its detailing and these should not be any compensation for corridor. Such compensation should not be applicable for distribution line.

xiv. **Punjab:** The State was in agreement for compensation towards tower base and line corridor and wanted that certain standard uniform norms be made for such compensation.

xv. **Nagaland:** It informed that they will come back later on after consulting all concerned.

xvi. **Maharashtra:** It also favors that it should be left to the discretion of the state and such compensation be made part of project cost.

xvii. **Telangana:** It stated that they are in favor of 85% land value for tower base but no compensation for corridor.

3.8 The views of various states have been classified in four categories and are indicated below:

Category	Name of States
Category-I: States agreeing for payment of compensation for tower base and part compensation for RoW corridor	Odisha(#), Maharashtra(#), Uttarakhand, Punjab West Bengal, Bihar, Karnataka, Kerala, Jharkhand,
Category-II: States agreeing for payment of compensation for tower base and no compensation for RoW corridor	Telangana, Andhra Pradesh
Category-III: States suggesting that decision should be left with State Govt to decide	Madhya Pradesh, Gujarat, Uttar Pradesh.
Category-IV: States to inform later	Meghalaya, Nagaland

(#) States agreed in-principle but want final decision to be left on them.

3.9 The third meeting of the Committee was held on 1st June 2015 and the issue & opinions of various states were deliberated in detail. Based on detailed deliberations, AG's Opinion and views of the states on the issue of RoW compensation and its modalities the committee finalized its recommendations.

4.0 Recommendations:

The GoI may issue following guidelines for determining the compensation payable towards "damages" as stipulated in Indian Telegraph Act which will be in addition to the compensation towards normal crop and tree damages. This amount will be payable only

for transmission Lines of 66 kV and above, and not for sub-transmission and distribution lines below 66 kV:

i. **Compensation @ 85% of land value as determined by District Magistrate or any other authority based on Circle rate/ Guideline value/ Stamp Act rates for tower base area (between four legs) impacted severely due to installation of tower/pylon structure;**

ii. **Compensation towards diminution of land value in the width of RoW Corridor due to laying of transmission line and imposing certain restriction would be decided by the States as per categorization/type of land in different places of States, subject to a maximum of 15% of land value as determined based on Circle rate/ Guideline value/ Stamp Act rates;**

iii. **In areas where land owner/owners have been offered/accepted alternate mode of compensation by concerned corporation/ Municipality under Transfer Development Rights (TDR) policy of State, the licensee /Utility shall deposit compensation amount as per (i) & (ii) above with the concerned Corporation/ Municipality/ Local Body or the State Government.**

iv. **For this purpose, the width of RoW corridor shall not be more than that prescribed in para 1.3 above, and shall not be less than the width directly below the conductors.**

IN WITNESS WHEREOF, the undersigned being duly authorized thereto have signed this Report of the Committee for payment of compensation in regard to Right of Way (RoW) for transmission lines.

(R.N.Choubey)
Chairman of the Committee
Former Special Secretary,
Ministry of Power.

(Jyoti Arora)
Member of the Committee
Joint Secretary (Trans.)
Ministry of Power

(Major Singh)
Member of the Committee
Chairperson, Central Electricity Authority

(I.C.P. Keshari)
Member of the Committee
Principal Secretary (Energy)
Government of Madya Pradesh

(Sanjay Agarwal)
Member of the Committee
Principal Secretary (Energy)
Government of Uttar Pradesh

(Mukesh Khullar)
Member of the Committee
Principal Secretary (Energy)
Government of Maharashtra

(R.Ravi Kumar)
Member of the Committee
Secretary (Energy)
Government of Karnataka

(Shivasankar)
Member of the Committee
Secretary (Power)
Government of Kerala

(I.S.Jha)
Member of the Committee
Director (Projects)
Power Grid Corporatio of India Limited.

F. No. 7-25/ 2012-FC
Government of India
Ministry of Environment and Forests
(FC Division)

Paryavaran Bhawan,
CGO Complex, Lodhi Road,
New Delhi - 110 510
Dated: 5th May, 2014

To

The Principal Secretary (Forests),
All State /Union Territory Governments

Sub: Guidelines for diversion of forest land for non-forest purposes under the Forest (Conservation) Act, 1980- Guidelines for laying transmission lines through forest areas - *reg*.

Sir,

I am directed to say that the Hon'ble National Green Tribunal in their Order dated 7th March 2012 in the Appeal No. 10 of 2012 in the matter of Janajagarithi Samiti (Regd.) versus Union of India and Others directed this Ministry to take steps and notify the detailed fresh guidelines for laying transmission lines through forest area, incorporating necessary changes to mitigate the difficulties which arise during granting forest clearance.

Accordingly, this Ministry in consultation with the Central Electricity Authority formulated revised guidelines for laying transmission lines through forest areas. **A copy of the same is enclosed**.

Yours faithfully,

Encl.: As above.

(H.C. Chaudhary)
Assistant Inspector General of Forests

Copy along with a copy of the said guidelines to:-

1. Prime Minister's Office (***Kind attn.:*** Shri Santosh D. Vaidya, Director).
2. Secretary, Ministry of Power, Government of India, Shram Shakti Bhawan, New Delhi.
3. Principal Chief Conservator of Forests, all State/UT Governments.
4. Nodal Officer, the Forest (Conservation) Act, 1980, all State/UT Governments.
5. All Regional Offices, Ministry of Environment & Forests (MoEF), Government of India (GoI).
6. Joint Secretary in-charge, Impact Assessment Division, MoEF, GoI
7. All Assistant Inspector General of Forests/ Director in the Forest Conservation Division, MoEF, GoI.

8. Director R.O. (HQ), MoEF, GoI.
9. Sr. Director (Technical), National Informatics Centre (NIC), MoEF with a request to place a copy of the letter on website of this Ministry.
10. Sr. PPS to the Secretary, Environment and Forests.
11. Sr. PPS to the Director General of Forests & Special Secretary, MoEF.
12. Sr. PPS to the Addl. Director General of Forests (Forest Conservation), MoEF.
13. PS to the Inspector General of Forests (Forest Conservation), MoEF.
14. Guard File.

(H.C. Chaudhary)
Assistant Inspector General of Forests

GUIDELINES FOR LAYING TRANSMISSION LINES THROUGH FOREST AREAS

1. Where routing of transmission lines through the forest areas cannot be avoided, these should be aligned in such a way that it involves the least amount of tree cutting

2. As far as possible, the route alignment through forest areas should not have any line deviation.

3. (i) The width of right of way for the transmission lines on forest land shall be as follows:

Transmission Voltage	Width of Right of Way (Meter)
11kV	7
33 kV	15
66 kV	18
110 kV	22
132 kV	27
220 kV	35
400 kV S/C	46
400 kV D/C	46
+/- 500 kV HVDC	52
765 kV S/C (with delta configuration)	64
765 kV D/C	67
+/- 800 kV HVDC	69
1200 kV	89

(ii) In forest areas, only vertical delta configuration of 400 kV S/C and delta configuration of 765 kV S/C shall be permitted.

4. (i) Below each conductor or conductor bundle, following width clearance would be permitted for stringing purpose:

Transmission line with conductor bundle	Width clearance below each conductor or conductor bundle (meter)
Upto 400kV twin bundle	3

400 kV triple bundle	5
400 kV /+/- 500 kV HVDC /765 kV Quadruple bundle	7
+/- 800 kV HVDC / 765 kV hexagonal bundle	10

(ii) The trees on such strips would have to be felled but after stringing work is completed, natural regeneration will be allowed to come up. Felling/ pollarding/ pruning of trees will be done with the permission of the local forest officer wherever necessary to maintain the electrical clearance. One outer strip shall be left clear to permit maintenance of the transmission line.

(iii) During construction of transmission line, pollarding/ pruning of trees located outside the above width of the strips, whose branches/ parts infringe with conductor stringing, shall be permitted to the extent necessary, as may be decided by local forest officer.

(iv) Pruning of trees for taking construction/stringing equipments through existing approach/access routes in forest areas shall also be permitted to the extent necessary, as may be decided by local forest officer. Construction of new approach/access route will however, require prior approval under the Act.

(v) In the remaining width of right of way trees will be felled or lopped to the extent required, for preventing electrical hazards by maintaining the following:

Transmission Voltage	Minimum clearance between conductor and trees (Meters)
11 kV	2.6
33 kV	2.8
66 kV	3.4
110 kV	3.7
132 kV	4.0
220 kV	4.6
400 kV	5.5
+/- 500 kV HVDC	7.4
765 kV	9.0
+/- 800 kV HVDC	10.6
1200 kV	13.0

(vi) The maximum sag and swing of the conductors are to be kept in view while

working out the minimum clearance mentioned as above.

(vii) To avoid any hazard, felling/cutting/pruning of those trees which because of their height /location may fall on conductors shall also be permitted, as may be decided by local forest office.

(viii) In the case of transmission lines to be constructed in hilly areas, where adequate clearance is already available, trees will not be cut except those minimum required to be cut for stringing of conductors.

(ix) In case of transmission lines passing through National Parks, Wildlife Sanctuaries and Wildlife Corridors, insulated conductors shall only be used to prevent electrocution of animals.

5. Where the forest growth consists of coconut groves or similar tall trees, widths of right of way greater than those indicated at Sl. No.3 may be permitted in consultation with CEA.

*****

Annex-I

No 3/7/2015-Trans
Government of India
Ministry of Power
Shram Shakti Bhawan, Rafi Marg
New Delhi-110001

Dated: 15th April, 2015

To

As per distribution list

Sir,

Subject:- Constitution of the Committee for finalization of compensation in regard to Right of Way for transmission lines

I am directed to inform that during the Power Ministers' Conference held on 9th and 10th April, 2015 at Guwahati with States/UTs, it has *inter alia* been decided to constitute a Committee under the chairmanship of Shri R.N.Choubey, Special Secretary, Ministry of Power to analyse the issues relating to Right of Way for laying of transmission lines in the country and to suggest a uniform methodology for payment of compensation on this account.

2. Accordingly, a Committee is hereby constituted with the following composition:-

1. Shri R.N. Choubey, Special Secretary, Ministry of Power – Chairman
2. Chairperson, Central Electricity Authority
3. Principal Secretary/ Secretary (Energy), Madhya Pradesh
4. Secretary/ Principal Secretary (Energy), U.P.
5. Secretary/Principal Secretary (Energy), Maharashtra
6. Secretary/Principal Secretary (Energy), Karnataka
7. Secretary/Principal Secretary (Energy), Kerala
8. Joint Secretary (Trans), Ministry of Power
9. CMD/Director (Projects), PGCIL
10. Shri K.K.Arya, Chief Engineer (SP&PA), CEA – Convener & Member Secretary

3. Representative from EPTA (Electric Power Transmission Association) may also be called as a special invitee as and when required.

4. The Committee shall meet once in a week and submit the report within a month. The first meeting of the Committee shall be held at 3.00 pm on 20.4.2015. You are, therefore, requested to attend the meeting in NPMC Room 2nd Floor, Shram Shakti Bhavan, New Delhi.

Jyoti Arora
(Jyoti Arora)
Joint Secretary (Trans)
Tele: 011-2371 0389

To

1. Chairperson, Central Electricity Authority, New Delhi
2. Principal Secretary/ Secretary (Energy), Madhya Pradesh
3. Principal Secretary/ Secretary (Energy), U.P.
4. Principal Secretary/ Secretary (Energy), Maharashtra
5. Principal Secretary/ Secretary (Energy), Karnataka
6. Principal Secretary/ Secretary (Energy), Kerala
7. CMD/Director (Projects), PGCIL
8. Shri K.K.Arya, Chief Engineer, Chief Engineer (SP&PA), CEA, New Delhi

Copy to Sr PPS to SS (RNC)/ JS(Trans) / Director (Trans)/ US (Trans)

Annex-II

No.3/7/2015-Trans
Government of India
Ministry of Power
Shram Shakti Bhawan, Rafi Marg,
New Delhi-110001

Dated 30th April, 2015

Office Memorandum

Sub: Minutes of the meeting held on 20.04.2015 under the chairmanship of Shri R.N. Choubey, Special Secretary, Ministry of Power regarding finalization of compensation in regard to Right of Way for transmission lines.

Ref: Ministry of Power letter of even number dated 15.4.2015 from Joint Secretary(Trans), Ministry of Power, New Delhi

****

The undersigned is directed to forward herewith a copy of the minutes of meeting taken by Shri R.N. Choubey, Special Secretary, Ministry of Power on 20.4.2015 on the above mentioned subject, for information and necessary action, if any.

(S. Venkateshwarlu)
Under Secretary (Trans)
E-mail: transdesk-mop@nic.in
Telefax: 011-2332 5242

To

1. Chairperson, Central Electricity Authority, New Delhi
2. Principal Secretary/ Secretary (Energy), Madhya Pradesh
3. Principal Secretary/ Secretary (Energy), U.P.
4. Principal Secretary/ Secretary (Energy), Maharashtra
5. Principal Secretary/ Secretary (Energy), Karnataka
6. Principal Secretary/ Secretary (Energy), Kerala
7. CMD/Director (Projects), PGCIL
8. Shri K.K.Arya, Chief Engineer, Chief Engineer (SP&PA), CEA, New Delhi

Copy to Sr PPS to SS (RNC)/ JS(Trans) / Director (Trans)/ US (Trans).

Minutes of the meeting taken by Shri R.N. Choubey, Special Secretary, Ministry of Power (MoP) on 20.4.2015 regarding finalization of compensation in regard to Right of Ways (RoW) for transmission line

List of participant is given at **Annex-I**

2. Special Secretary, MoP welcomed the participants and informed that the issue of Right of Ways and its compensation was recently discussed in Power Ministers' Conference held at Guwahati on 9-10th April 2015 and it was desired to resolve the issue at the earliest. He requested Director (Projects), PGCIL to present brief on the issue.

3. Director(Projects), PGCIL explained the process followed by POWERGRID and other Licensees in respect of compensation for damages reported during the construction of Transmission Lines. He also explained the difficulties faced by POWERGRID in more or less all the States regarding inadequacy of compensation and severe resistance posed by Land Owners/Farmers which is affecting implementation/ commissioning of many important lines in Maharashtra, U.P., Karnataka, Andhra Pradesh, Kerala etc.

4. He also explained that the problem is aggravated because the provisions of Indian Telegraph Act, 1885 are followed for compensation. The provision of the said Act provides that all damages have to be compensated but there is no specific procedure or definition of damages. This ambiguity have been interpreted differently by various courts and DMs/DCs who has ordered compensation for tower base as well as diminishing land value for Corridor. Such orders of different DMs/DCs are also in variance from each other and the difference in compensation cost also varies greatly.

5. He further stated that due to above referred reasons, POWERGRID has approached Attorney General of India (AG) for his opinion on the definition of damages and possibility of payment of compensation towards corridor.

AG opined the following:

- In my view, it is logical to hold that the land underneath the legs of the tower (permanently fixed to the earth) is permanently lost by the owner. Even though those pieces of land are not required for acquisition and the ownership remains with the owner yet all incidence of the ownership, enjoyment and free use of those pieces of land becomes severely

restricted. In such case, compensation ought to be as near as the present value of the land. The compensation of land under the corridor is entirely different. Such land is conveniently usable for agriculture. However, there would be of course diminution of land value due to placing of line over it with certain restriction on land use as brought out in para 9 (In case of Agricultural land, it may have restriction for placing tall trees, pump house and future prospects in corridor area. In case of Residential and Commercial plot, there will be severe restriction to meet the safety guidelines) and also any future prospects for usage other than agriculture. The usage of such land/cost may vary depending upon its location in urban or rural area. The compensation for such diminution in land value for the line corridor is also payable to land owners, quantum of which should commensurate to the damage depending upon the type/location of land and its intended/recorded land use.

- In case of Residential / Industrial area, there is severe restriction on usage for safety of human life & electrical clearance hence compensation need to be commensurate with the damages.
- I am also of the considered view that due to case specific nature of valuation of compensation, State has vested such powers with District Authorities. However, the Authorities have to take a balance view considering intended purpose and reasons mentioned above."

6. Secretary (Energy), Karnataka stated that securing the Right of Way for transmission projects of 66KV and above is getting difficult in recent times. This is more so in the areas which are closer to urban areas and in lands where horticulture and plantation crops are grown. Taking shelter under the Indian Telegraph Act, 1885 may not be correct now when the land prices have become very high. Once a transmission line is drawn across the land, there are number of restrictions in the corridor and additionally the land around would lose its value.

7. In the case of Livisha Vs.KSEB (2007) etc, the Hon'ble Supreme Court has talked about compensating diminution of the value of land and payment of compensation. States like Kerala, Maharashtra and Andhra Pradesh have passed orders for compensation of land for the corridor under the transmission lines. Government of Karnataka is proposing compensation to the extent of 50% of the value for agricultural land in rural areas and 75% of the value for non-agricultural properties in urban areas. In addition, 100% of the cost of the land in the tower footing area is proposed to be paid.

8. In case the transmission lines are drawn in Forest land, the transmission utility has to pay cost of afforestation, cost for environmental protection works in the corridor

and also provide to the Forest Dept. land for compensatory afforestation equal to the land diverted for transmission corridor.

9. Since a number of Transmission projects under the TBCB route are being taken up, it may be better to discuss the issue with private developers and major contractors also. Therefore, this is a strong case for payment of compensation for the Right of Way for laying transmission lines. Necessary legal framework has to be built for the payment of compensation. Amendment to the Indian Telegraph Act/Electricity Act is necessary.

10. Principal Secretary (Power), U.P. was of the view that compensation falls under the preview of State and it should be left to the concerned State to formulate the policy. He has informed that as per his experience, 90 to 95% POWERGRID lines are completed without such resistance and it is in the 5% that the problem of farmer resistance and compensation is experienced.

11. Secretary (Power), Kerala stated as under:

- Considering the high land cost, perceived and actual fall in land value consequent to the drawing of transmission lines, and fragmented nature of land holdings with individuals having only 15-20 percent of land, acquiring right of way with the present level of compensation is impractical.

- It is also submitted that RoW sought is almost three times the distance between conductor tips. For Kochi - Edamon line the tip to tip conductor spacing is only 16m, whereas the RoW sought is at a width of 45 m. This needs to be technically reviewed and possibility of adoption of technology to reduce the land requirements need to be seriously explored.

- If this can be done and the total land requirement brought down by 50%, obviously the issues are also reduced by 50%.

- For the reduced land required, tower standing area may be given full compensation as if it is acquired. For the land below the conductors, a reasonable proportion of market value may be provided. Depending on local conditions, any enhancement above this would have to be provided by the state government, but the decision in this regard would have to be taken in a time bound manner.

- Rather than restricting the compensation to a down payment, if an annuity payment can be offered, say by having a 5 to 10 paise as a transmission surcharge per unit of power transmitted and apportioning the same to all the landholders along the RoW, the issue of perceived reduction of land value can be addressed.

- The possibility of setting up solar panel underneath the transmission lines and sharing part of the revenue to landowners may be considered, especially since the evacuation of power through the land under RoW is much easier.

- CEA may compile a list of permissible activities that can be taken up in the land below the conductors and in the buffer area beyond the conductor tips, which can be taken up by other departments/ state governments. For instance can we have roads constructed along the buffer zone, which will invariably increase the land value.

12. MD, MPPTCL stated that as per Indian Electricity Act and Rules in vogue, the cost of keeping dedicated corridor of transmission line along EHV transmission line works out to 100% to 115% of cost of line based on rate of land including irrigated, non-irrigated, barren etc. as per guidelines issued by Collector. Depending on area, where the EHV transmission line is passing and cost of land, this cost shall vary. In case only the area under Transmission line towers is considered for compensation, then the cost of land for area under the towers works out to 1.5% to 2.5% of cost of transmission lines (**Statement –I attached**).

13. Keeping above in view, the compensation of complete corridor along the transmission lines shall result in large increase in cost of transmission line. Keeping separate corridor for EHV transmission line may also result in non-utilization of land in the corridor for fruitful purposes and there could be chances of encroachment in the land of the corridor after construction of the transmission lines. The transmission tariff for Transmission Companies is on cost plus basis and the transmission charges are ultimately payable by the consumer of the state. Additional cost for dedicated corridor along the transmission line shall result in large burden on the consumers.

14. In view of above, MPPTCL proposed that compensation payment for RoW could be given to farmers for installation of tower (i.e. only area for tower base) by the transmission company based on guidelines of the Collector. This shall help the farmer to get cost of land used for erection of tower, as the farmer is not able to utilize the land at tower location for farming and agriculture purposes. The farmers are currently getting compensation for crop during the erection of transmission line, based on estimation by revenue authorities and the crop compensation may be continued.

15. Principal Secretary, Govt of Maharashtra informed that in the state of Maharashtra using powers u/s 67(2) of the Electricity Act, Maharashtra Electricity Work of Licencees Rules, 2012 have been notified. These rules mandate the distribution and the transmission licencees to carry out works to lay down overhead or underground electric supply lines over any land or building. Collector is authorized to remove any obstacles coming in the way of execution of work. Collector has to settle the amount of compensation to be paid by licencees to the land owner. There is power given to State Electricity regulatory commission to revise the order of the Collector in case a representation is made to it by any aggrieved party.

16. MD, Mahatransco informed that it was not possible for Collector to award compensation without any specific directions or formula for working out the amount. State Government had issued an order that guides the settlement of award. But, the farmers were demanding much higher compensation than that fixed in the Government order. He said that a uniform compensation policy should be in place across States. He proposed that full cost of the land coming under the transmission towers should be awarded to the farmers and that for the corridor 10% of the land cost should be awarded. Cost could be determined as per the ready reckoner created for registration purpose.

17. Principal Secretary, Maharashtra suggested that at the Central level a uniform policy should be in place in terms of fixed percentages of market value of the land under Transmission towers and under Corridor. State could set up a Committee to settle the compensation especially in urban areas for which an appropriate mechanism for monetizing the Transfer of Development Rights (TDRs) could be developed for the cost payable by the Licencees to the State Government.

18. Principal Secretary(Power), Maharashtra further stated that progress of many transmission projects in Maharashtra has been affected due to severe RoW issues particularly in Western Maharashtra and land owners have been demanding exorbitant compensation. Therefore, there is a need for review of provision of compensation given in Electricity Act, 2003 as only crop compensation is being paid.

19. Chairperson, CEA stated that there should be uniformity in compensation paid for RoW issues in rural as well as urban area to avoid any dispute.

20. Special Secretary, MoP desired to call private developer separately to discuss the compensation issue and advised PGCIL to prepare a note on policy and practice being followed by each State for paying the compensation towards darrages and formulate norms for land compensation alongwith crop compensation. CEA was advised to identify possibility to reduce the transmission corridor width as per international practice.

21. The meeting ended with a vote of thanks to the chair.

STATEMENT-I

RoW Cost for 220 KV Ashta Indore-II line in MP

(A) **ROW cost for dedicated corridor all along Transmission Line :**

Sl. No.	Particular	Quantity
1	Length of line	99.69 Kms
2	Width of line for ROW corridor	35 M
3	Total land in ROW along the line	(99.69x1000x35)/10,000 = 348.9 hectare
4	Average rate of land including irrigated, non irrigated, barren etc	Rs. 16 Lacs per hectare
5	Total value of Land for Corridor	348.9 x 16 Lacs = 55.82 Cr
6	Estimated cost of Line	56.03 Cr
7	Percent age of compensation against estimated cost of Line	99.63%

(B) **ROW cost for Tower area for Transmission Line :**

Sl. No.	Particular	Quantity
1	No of Tower location 320 Location of 150 * sq.mtr area at base of tower	48000 sq.mtr or 4.8 Hectare
2	Cost of Land	16 Lacs/ Hectare
3	Total value of land at tower base	76.8 Lacs
4	Estimated cost of line	Rs. 56.03 Crore
5	Percentage of compensation against estimated cost	1.5%

*based on average base area of different type of towers

Annex-I

Date/time of the meeting: 20.04.2015 at 4.30 pm
Venue: Ministry of Power, NPMC Room, Shram Shakti Bhawan, New Delhi-110001

List of Participants

Ministry of Power

1. Shri R.N. Choubey Special Secretary (Power) – In the chair
2. Shri S. Venkateshwarlu, Under Secretary (Trans)

Central Electricity Authority (CEA)

3. Shri Major Singh, Chairperson
   Phone : 011-26102721/Email : memberplanningcea@yahoo.com
4. Shri K.K. Arya, Chief Engineer (SP&PA)
   Phone : 26102045/Email : kkarya_2003@rediffmail.com
5. Shri B.K. Arya, Chief Engineer (IC) (PSPM)
   Mobile: 9868438594/Email: bkarya1664@gmail.com

Power Grid Corporation of India Limited (PGCIL)

6. Shri I.S. Jha, Director (Projects)
   Phone : 0124-2571930/Email : isjha@powergridindia.com
7. Dr. R.K. Srivastava, AGM (ESMD)
   Mobile : 9910378134

Govt. of Karnataka, Bengaluru

8. Shri P. Ravi Kumar, Secretary (Energy)
   Mobile : 09448124242/Email : prs-energy@karnataka.gov.in

Government of Uttar Pradesh, Lucknow

9. Shri Sanjay Agarwal, Principal Secretary (Power)
   Mobile : 09651789119/Email : sagsal50@yahoo.com

Govt. of Maharashtra/MAHATRANSCO

10. Shri Mukesh Khullar, Principal Secretary (Energy)
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11. Shri Rajeev Kumar Mital, CMD
    Phone : 022-26591253/26595000/Fax : 022-26598595
    Email : md@mahatransco.in

Government of Kerala

12. Shri Sivasankar, M. Secretary (Power)
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Government of Madhya Pradesh/MPPTCL, Jabalpur

13. Shri Umesh Rautji, MD
    Mobile : 09425805124

RoW COMPENSATION
And
DIMINUTION OF LAND VALUE DUE TO PLACING OF TRANSMISSION LINE / TOWER
AN OVERVIEW

LEGAL /REGULATORY FRAMEWORK FOR LAYING OF TRANSMISSION LINES

- The provisions of section 67 & 68 of the **Electricity Act, 2003 followed** for laying of transmission lines and compensation thereof;
- MoP vide notification dt. 18.4.2006 notified rules for all licensees for laying of transmission lines and compensation thereof;
- The appropriate Govt. has been given powers under section 164 of the Electricity Act, 2003 to grant/vest powers of The Telegraph Act 1885 to licensees for laying of transmission lines too for proper coordination of works;
- Licensees vested with the powers of telegraph authority under section 164 of the Electricity act use provisions of **The Indian Telegraph Act, 1885** for placing of towers /lines and compensation;
- POWERGRID vested with the powers of Telegraph Authority vide MOP's Gazette Notification dated 24.12.03 under section 164 of the Electricity Act ;
- Other licensees viz. Private Entities engaged in power transmission have also been vested with such powers after complying the laid down procedure

ISSUES AGREVATING THE PROBLEM

- **Handsome Compensation by Private Entity (Licensee) for Placing Tower:**
  - ✓ Licensees not covered under 164 of EA, 2003 paying mutually settled compensation to the land owner for placing tower and laying of overhead transmission in accordance with MOP notification;
- **Damages its extent not defined for calculating compensation;**
- **Placement of towers/pylon require much larger land area (144 – 400 sq m) and increased Right of way extending from 27 meter to 69 meter for 132 kV to 800 kV HVDC line;**
- **Substantial increase in No. of Projects**
- **Restriction imposed for use of land under transmission line affect land value;**
- **Farmers getting united/forming joint front for enhanced bargaining power**

State Policies Regarding Compensation

1. **UPPCL:**

- ✓ Cash assistance of **10%** (owners having >1 ha) **& 20%** (owners having <1 ha.) of the registered value for the area occupied by the tower;
- ✓ In case of loss of standing crop and / trees, compensation will be paid at market value of allowed to harvest the final crop.

- **Policy provisions not applied to POWERGRID and were asked to pay for both tower base @ Rs. 5 lakh for ABC type & Rs. 6 lakh for D and for 25 m wide corridor @ actual based on type of crop viz. Rs.26.57/Sq m. for S'cane.**

2. **APTRANSCO:**

- ✓ Exgratia at the rate of Rs 3.25 per sq.mt for the area occupied by the tower;
- ✓ In case of loss of standing crop and or trees, compensation will be paid at market value as determined by the MRO/Dept of Agriculture or allowed to harvest the final crop

- **Policy provisions not applied to POWERGRID and were asked to pay for both tower base @ 60% of market value.**

3. **Maharashtra:**

- ✓ As per classification mentioned below and land used by the tower (by not acquiring the proposed land) and as per prevailing market rate of the proposed land.

Land Classification	Type of land	Compensation to be paid
A	Non Cultivable agricultural land	25%
B	Cultivable agricultural land	50%
C	Fruit bearing agricultural land	60%
D	Non-agricultural land	85%

- ❑ **Not applied to POWERGRID lines in case of Solapur-Pune, Pune-Parli lines and were asked to pay additional compensation for tower base Rs. 7.5-9 lakhs and corridor Rs. 3-4 lakh to all farmers whose land falls between two towers.**

4. **Chhattisgarh*:**

- ✓ 50% of land cost for tower base;
- ✓ 20% of land value for corridor restricting to outer point of conductor.

* Not applicable to distribution lines.

VARIOUS COURT DIRECTIVES / JUDGMENTS

Kerala High Court in their various orders opined that owner can claim compensation for diminishing of land value subject to certain conditions.

Such judgment / orders were challenged in the Hon'ble Supreme Court (SC) and got stayed.

SC observed that there can be no fix formula or policy to arrive the rate of compensation and is of the view that each case is required to be taken on its own merit on following parameters:

- ✓ situation of land;
- ✓ distance between high voltage electricity line laid there over;
- ✓ extent of the line there on as also the fact whether the high voltage line passes over a small track of land or through the middle of the land and other similar relevant factors;
- ✓ The land value is also a relevant factor and whether the owner of the land losses its substantial right to use the property.

The case still pending with Kerala High Court for final judgment.

RECENT DEVELOPMENTS

- ✓ **Government of Kerala addressing similar problem in POWERGRID lines associated with Kudankulam transmission system issued series of Government Order (G.O.) directing POWERGRID to pay compensation towards damages caused at each tower location in addition to normal crop/tree compensation and have framed a criteria for considering some percentage of prevailing land value (5 times of fair value) in the district as a basis for calculating such damages by the District Collector/Revenue Authority.**
- ✓ **The SC order dated May 8, 2009 in writ petition filed by a Private company against POWERGRID also deals with the issue of compensation and as per this order compensation as per the provision of Section 10'(d)' of Indian Telegraph Act, 1885 are due to land owner on whose land the tower has been placed.**
- ✓ **District Magistrate of Kutch, Gujarat on representation of affected persons ordered POWERGRID to pay addl. Compensation vide its order dt.25.03.10 @ of Rs. 1 lakh for A type tower, Rs.1.10 lakh for B type tower, Rs. 1.25 lakh for C type of tower and Rs. 1.40 lakh for D type of tower for lines associated with Mundra UMPP.**

RECENT DEVELOPMENTS

- ✓ Collector Visakhapatnam, Andhra Pradesh vide its order dt. 21.10.10 has awarded to land owners an additional compensation towards land damages @ 60% of basic land value considering that such damages are covered under damages as contained in the Section 10'(d)' of Indian Telegraph Act, 1885.
- ✓ District Magistrate, Nellore vide order dated 24.08.2013 for 400 KV D/c Vijaywada-Nellore and Nellore-Thiruvallam transmission line fixed compensation amount Rs. 3,50,000 per tower location to farmers in Nellore district for all towers of 400/765 kV lines
- ✓ DC, South District, Sikkim ordered for payment of complete land value and surface damages as compensation and levied 35 years value of yield as compensation towards crop damages and 8 years yield for fruit bearing trees
- ✓ District Magistrate, Tumkur vide order dated 08.07.2014 for tower base:

Category of tower Structure	Compensation Amount Decided
Category A	Rs. 2.25 lakhs
Category B	Rs. 2.50 lakhs
Category C	Rs. 3.00 lakhs
Category D	Rs. 4.00 Lakhs

- ✓ The additional compensation of Rs. 2.00 Lakh per acre each to land owners for damages to land during stringing.
- ✓ Different rates for trees with 10% exgratia.

RECENT DEVELOPMENTS

✓ **District Magistrate, Ranga Reddy vide** order dt.08.08.2014 for 400 KV D/C Suryapet - Shankarpally line of TRANSCO with following compensation

A. **For Tower base:**

Type of Land	Category-I Area of damage up to 350 sq. yds. (A, B & C Type tower)	Category-II Area of damage above 350 sq. yds. (D Type tower)
a) Land facing to Highways. (up to 0.5 km distance) b) Nearer to the Housing layouts/Indl Areas/ Commercially developed Areas c) Land through which more than one transmission line is passing Rate @Rs. 1000/- per sq. yds	Rs. 3.5 lakh per tower	Rs. 4.5 lakh per tower
Interior Lands (All other lands) Rate@Rs. 700 per sq.yds	Rs. 2.45 lakh per tower	Rs. 3.15 lakh per tower

B. **For line Corridor:**

Damage in 20 meter (10 meters on either side from the centre of the line), at Rs. 60 per sq. meter

OPINION OF ATTORNEY GENERAL OF INDIA

- **It is logical to hold that the land underneath the legs of the tower (permanently fixed to the earth) is permanently lost by the owner. Even though those pieces of land are not required for acquisition and the ownership remains with the owner yet all incidence of the ownership, enjoyment and free use of those pieces of land becomes severely restricted. In such case, compensation ought to be as near as the present value of the land.**
- **The compensation of land under the corridor is entirely different. Such land is conveniently usable for agriculture. However, there would be of course diminution of land value due to placing of line over it with certain restriction on land use and also any future prospects for usage other than agriculture. The compensation for such diminution in land value for the line corridor is also payable to land owners, quantum of which should commensurate to the damage depending upon the type/location of land and its intended/recorded land use.**
- **In case of Residential / Industrial area, there is severe restriction on usage for safety of human life & electrical clearance hence compensation need to be commensurate with the damages.**

PROPOSAL OF POWERGRID

- Provisions of act provides compensation only towards damages and there is no mention for compensation towards diminution of land value explicitly though it is a reality;
- In absence of clarity and notified procedures, the provisions of existing acts are being differently interpreted by concerned DC/Revenue Authorities that too varies/fluctuate heavily thus causing unrest and delay in resolving RoW issue resulting in delay.
- POWERGRID in order to resolve this issue in line with AG's opinion proposes that MoP by amending rules framed under section 67 of EA act may provide for a following standard minimum compensation to be paid by all licensee
  - shall pay 100% cost of land for tower base area as compensation based on the market rate as ascertain by the local Revenue Authorities.
  - shall also pay 10% land value* (of ascertained rate) for line corridor (RoW) towards land value diminution;
  - The respective DC/DM or their authorized representatives shall complete above evaluation of compensation within 30 days.
  - * **In case enhanced demand by land owners the respective State may review it and if found justified may pay from own resources directly as has been agreed by the State of Kerala.**

Impact on tariff due to Tower Base & RoW Corridor Compensation @ 10%
Compensation @ 15 Lakhs/ acre (Mostly agricultural land in rural setting)

Voltage	Cost/km (Rs. in Lakh)	Tariff on capital cost (Rs. in Cr) @ average 18%	Comp'tion cost for tower base/ km (Rs. in Lakh)	Compensation cost for RoW Corridor (Rs. in Lakh)	Total addl. Comp'tion for 1 km (T base & Corridor) (Rs. in Lakh)	Additional Compensation for 100 km line (Rs. in Lakh)	Revised Capital Cost of 100 km Line (Rs. in Cr)	Tariff on revised capital cost (Rs. in Cr)	% Increase in Tariff
400 KV D/c Twin	140	25.2	15 X 0.172 = **2.58**	11.19 X 1.5 = **16.785**	2.58 + 16.785 = **19.365**	**1936.5**	159.36	28.68	**13.8%**
400 KV D/c Quad	250	45	15 X 0.172 = **2.58**	11.19 X 1.5 = **16.785**	2.58 + 16.785 = **19.365**	**1936.5**	269.36	48.48	**7.7%**
400 KV D/c HTLS	340	61.2	15 X 0.172 = **2.58**	11.19 X 1.5 = **16.785**	2.58 + 16.785 = **19.365**	**1936.5**	359.36	64.68	**5.68%**
765 KV D/c	458	82.44	15 X 0.414 = **6.21**	16.135 X 1.5 = **24.2025**	6.21 + 24.2025 = **30.4125**	**3041.25**	488.41	87.91	**6.63%**

Voltage	Land area for tower base per km (1 Acre = 4047 Sq. m.)	Total RoW Corridor area required for 1 km line (1 ha. = 2.47 Acres)
400 KV D/c	2.5 X 278.88 = 697,225 Sq. m = **0.172 Acres**	4.6 X 2.47 = 11.362 ha = **11.362 Acres**
765 KV D/c	2.5 X 670.81 = 1677,025 Sq. m = **0.414 Acres**	6.7 X 2.47 = 16.549 ha = **16.549 Acres**

Impact on tariff due to Tower Base & RoW Corridor Compensation @ 10%

Compensation @ 25 Lakhs/ acre (Mostly Urban/Semi-urban land near Cities/Towns)

Voltage	Cost/km (Rs. in Lakh)	Tariff on capital cost (Rs. in Cr) @ average 18%	Comp'tion cost for tower base/ km (Rs. in Lakh)	Compensation cost for RoW Corridor (Rs. in Lakh)	Total addl. Comp'tion for 1 km (T base & Corridor) (Rs. in Lakh)	Additional Compensation for 100 km line (Rs. in Lakh)	Revised Capital Cost of 100 km Line (Rs. in Cr)	Tariff on revised capital cost (Rs. in Cr)	% Increase in Tariff
400 KV D/c Twin	140	25.2	25 X 0.172 = **4.3**	11.19 X 2.5 = **27.975**	4.3 + 27.975= **32.275**	**3227.5**	172.28	31.01	**23.1%**
400 KV D/c Quad	250	45	25 X 0.172 = **4.3**	11.19 X 2.5 = **27.975**	4.3 + 27.975= **32.275**	**3227.5**	282.28	50.81	**12.9%**
400 KV D/c HTLS	340	61.2	25 X 0.172 = **4.3**	11.19 X 2.5 = **27.975**	4.3 + 27.975= **32.275**	**3227.5**	372.28	67.01	**9.49%**
765 KV D/c	458	82.44	25 X 0.414 = **10.35**	16.135 X 2.5 = **40.337**	10.35+40.3375 = **50.6875**	**5068.75**	508.69	91.56	**11.06%**

Impact on tariff due to Tower Base & RoW Corridor Compensation @ 10%

Compensation @ 50 Lakhs/ acre (Mostly Urban land near Big Cities/Metro Towns)

Voltage	Cost/km (Rs. in Lakh)	Tariff on capital cost (Rs. in Cr) @ average 18%	Comp'tion cost for tower base/ km (Rs. in Lakh)	Compensation cost for RoW Corridor (Rs. in Lakh)	Total addl. Comp'tion for 1 km (T base & Corridor) (Rs. in Lakh)	Additional Compensation for 100 km line (Rs. in Lakh)	Revised Capital Cost of 100 km Line (Rs. in Cr)	Tariff on revised capital cost (Rs. in Cr)	% Increase in Tariff
400 KV D/c Twin	140	25.2	**11.19 X 5 = 55.95**	**8.6 + 55.95= 64.55**	**6455**	**3227.5**	284.55	36.82	**46.1%**
400 KV D/c Quad	250	45	**11.19 X 5 = 55.95**	**8.6 + 55.95= 64.55**	**6455**	**3227.5**	314.55	56.82	**25.8%**
400 KV D/c HTLS	340	61.2	**11.19 X 5 = 55.95**	**8.6 + 55.95= 64.55**	**6455**	**3227.5**	404.55	72.82	**18.99%**
765 KV D/c	458	82.44	**16.135 X 5 = 80.675**	**20.7+80.675 = 101.375**	**10137.5**	**5068.75**	559.39	100.68	**22.12%**

THANKS

PROVISIONS OF ELECTRICITY ACT, 2003 Part-VIII, SECTION 67 & 68

Section 67 (3-5):
Quote:

(3) A licensee shall, in exercise of any of the powers conferred by or under this section and the rules made thereunder, **cause as little damage, detriment and inconvenience as may be, and shall make full compensation** for any damage,detriment or inconvenience caused by him or by any one employed by him.

(4) Where any difference or dispute [including amount of compensation under sub -section (3)] arises under this section, the matter shall be determined by the Appropriate Commission.

(5) The Appropriate Commission, while determining any difference or dispute arising under this section in addition to any compensation under sub-section (3), may impose a penalty not exceeding the amount of compensation payable under that sub-section.

Section 68 (5 & 6):

(5) Where any tree standing or lying near an overhead line or where any structure or other object which has been placed or has fallen near an overhead line subsequent to the placing of such line, interrupts or interferes with, or is likely to interrupt or interfere with, the conveyance or transmission of electricity or the accessibility of any works, **an Executive Magistrate or authority specified by the Appropriate Government may, on the application of the licensee, cause the tree, structure or object to be removed or otherwise dealt with as he or it thinks fit.**

(6) When disposing of an application under sub-section (5), an Executive Magistrate or authority specified under that sub-section shall, in the case of any tree in existence before the placing of the overhead line, award to the person interested in the tree **such compensation as he thinks reasonable**, *and such person may recover the same from the licensee.*

Explanation. - For purposes of this section, the expression ? tree? shall be deemed to include any shrub, hedge, jungle growth or other plant.

Unquote.

GOVERNMENT OF INDIA
MINISTRY OF POWER

New Delhi, the 18th April 2006.

NOTIFICATION

G S R 217(E). - In exercise of the powers conferred by clause (e) of sub-section (2) of section 176 read with sub-section (2) of section 67 of the Electricity Act, 2003 (36 of 2003), the Central Government hereby makes the following rules regarding the works of licensees, namely :-

1. Short title and commencement– (1) These rules may be called the Works of Licensees Rules, 2006.

2. Definitions- (1) In these rules unless the context otherwise requires-

(a) "The Act" means the Electricity Act, 2003.
(b) "occupier" of any building or land means a person in lawful occupation of that building or land.

(2) All other words and expression used herein and not defined in these rules, shall have the meanings respectively assigned to them in the Act.

3. Licensee to carry out works.- (1) A licensee may –

(a) carry out works, lay down or place any electric supply line or other works in, through, or against, any building, or on, over or under any land whereon, whereover or whereunder any electric supply-line or works has not already been lawfully laid down or placed by such licensee, with the prior consent of the owner or occupier of any building or land;

(b) fix any support of overhead line or any stay or strut required for the purpose of securing in position any support of an overhead line on any building or land or having been so fixed, may alter such support.

(2) When making an order under sub-rule (1), the District Magistrate or the Commissioner of Police or the officer so authorised, as the case may be, shall fix , after considering the representations of the concerned persons ,if any, **the amount of compensation or of annual rent, or of both, which should in his opinion be paid by the licensee to the owner or occupier.**

(3) Every order made by a District Magistrate or a Commissioner of Police or an authorised officer under sub-rule (1) shall be subject to revision by the Appropriate Commission.

(4) **Nothing contained in this rule shall effect the powers conferred upon any licensee under section 164 of the Act.**

PROVISIONS OF TELGRAPH ACT FOR COMPENSATION:

The Indian Telegraph Act, 1885, Part-III, Section 10:

Quote:

10. Power for telegraph authority to place and maintain telegraph lines and posts – The telegraph authority may, from time to time, place and maintain a telegraph line under, over, along, or across, and posts in or upon any immovable property: Provided that –

(a)) the telegraph authority shall not exercise the powers conferred by this section except for the purposes of a telegraph established or maintained by the [Central Government], or to be so established or maintained;

(b) the [Central Government] **shall not acquire any right other than that of user only** in the property under, over, along, across in or upon which the telegraph authority places any telegraph line or post: and

(c) except as hereinafter provided, the telegraph authority shall not exercise those powers in respect of any property vested in or **under the control or management of any local authority, without the permission of that authority**; and

(d) in the exercise of the powers conferred by this section, the telegraph authority shall do as little damage as possible, and, when it has exercised those powers in respect of any property other than that referred to in clause (c), **shall pay full compensation to all persons interested for any damage sustained** by them by reason of the exercise of those powers.

Section 16:

(1) If the exercise of the powers mentioned in section 10 in respect of property referred to in clause (d) of that section is resisted or obstructed, the **District Magistrate may, in his discretion, order that the telegraph authority shall be permitted to exercise them;**

(2) If, after the making of an order under sub section (1), any person resists the exercise of those powers, or, having control over the property, does not give all facilities for this being exercised, he shall be **deemed to have committed an offence under section 188 of the Indian Penal Code (45 of 1860).**

Unquote.

Annex-IV

No.3/7/2015-Trans
Government of India
Ministry of Power
Shram Shakti Bhawan, Rafi Marg
New Delhi-110001

Dated, 8th May, 2015

Office Memorandum

Sub: Minutes of the meeting held on 30.04.2015 under the chairmanship of Shri R.N. Choubey, Special Secretary, Ministry of Power regarding finalization of compensation in regard to Right of Way for transmission lines.

****

The undersigned is directed to forward herewith a copy of the minutes of meeting taken by Shri R.N. Choubey, Special Secretary, Ministry of Power on 30.4.2015 on the above mentioned subject, for information and necessary action.

(S. Venkateshwarlu)
Under Secretary (Trans)
E-mail: transdesk-mop@nic.in
Telefax: 011-2332 5242

To

1. Chairperson, Central Electricity Authority, New Delhi
2. Principal Secretary/ Secretary (Energy), Madhya Pradesh
3. Principal Secretary/ Secretary (Energy), U.P.
4. Principal Secretary/ Secretary (Energy), Maharashtra
5. Principal Secretary/ Secretary (Energy), Karnataka
6. Principal Secretary/ Secretary (Energy), Kerala
7. CMD/Director (Projects), PGCIL
8. Shri K.K.Arya, Chief Engineer, Chief Engineer (SP&PA), CEA, New Delhi

Copy to Sr PPS to SS (RNC)/ JS(Trans) / Director (Trans)/ US (Trans).

Minutes of the meeting taken by Shri R.N. Choubey, Special Secretary, Ministry of Power (MoP) on 30.4.2015 regarding finalization of compensation in regard to Right of Ways (RoW) for transmission line

List of participant is given at **Annex-I**

2. Special Secretary, MoP welcomed the participants and informed that in the last meeting held on 20.04.2015 two views were immersed as under:

(i) 100 % compensation for land should be paid for tower footing and 10% for corridor under the line.

(ii) Policy should not be changed as state authority is solving the compensation issues and it will also affect the financial viability of transmission projects.

2.1 Special Secretary, MoP has requested Director (Projects), PGCIL to present brief on policy and practice being followed by the State for paying the compensation towards damages as discussed in last meeting.

3. Director (Projects), PGCIL presented a detailed presentation including Legal & Regulatory framework about the compensation, policies of various States as well as the brief on the Supreme Court order on compensation issues and various other orders of different DMs/DCs regarding compensation and interpretation of present clause(copy of presentation **attached**).

4. The summary of AG's opinion on legal position and coverage/inclusions of various aspects while deciding compensation including land value diminution was also informed by POWERGRID.

5. Members also discussed about the requirement of prior approval of appropriate government under Section 68(1) of Electricity Act as in their opinion all due diligence is applied during the process of grant of License.

6. PGCIL's proposal regarding full compensation for tower base and at least 10% for RoW Corridor was also discussed in detail.

7. The private entities, M/s. Sterlite and M/s.Essel Infra also emphasized that there should be a standard norms for calculating compensation for transmission line and it should also be revised, reviewed periodically for its regular updation keeping in mind the market rate. M/s Sterlite also suggested that instead of land cost, corridor compensation per km rate may be fixed based on voltage of line.

8. Chairperson, CEAinformed that possibility of reduction in RoW width is minimal as it has already been fixed based on the required Electricity Safety norms.

9. The Committee also opined that payment of full value of land cost, tower base seems justified due to severe restriction put in by placing of tower which heavily impact the productivity/use of land area falling below tower base.

2/-

10 Principal Secretary (Power), U.P. however, expressed his reservation and stated thatpayment of 100% compensation for the tower base without acquisition of land may be a difficult proposition due to ongoing complication regarding compensation under new Land Acquisition Act.

11 Principal Secretary (Power),U.P. and Principal Secretary (Power),M.P. expressed their apprehension about the proposal of RoW Corridor payment as in their view such payment may also hamper the implementation of distribution lines and may also put additional financial burden on distribution company. Moreover, they were also of the opinion that we may not be able to resolve compensation issue by paying 10% as in all probabilities the farmers/land owners will demand more as has already been stipulated in the different State policies and DCs orders.

12. Due to sensitivity of the proposal and its implementation by the different State Govt., it was decided that this issue may also be discussed during the forthcoming Power Secretaries meetings for wider consultation and acceptance and PCWERGRID was advised to prepare a detailed agenda note in this regard.

Annex-I
No.3/7/2015-Trans

Date/time of the meeting: 30.04.2015 at 3.00 pm
Venue: Ministry of Power, NPMC Room, Shram Shakti Bhawan, New Delhi-110001

List of Participants

Ministry of Power

1. Shri R.N. Choubey, Special Secretary (Power) - In the chair
2. Smt. Jyoti Arora, Joint Secretary (Trans)
3. Shri Ghanshyam Prasad, Director (Trans)
4. Shri S. Venkateshwarlu, Under Secretary (Trans)

Central Electricity Authority (CEA)

5. Shri Major Singh, Chairperson
   Phone : 011-26102721/Email : memberplanningcea@yahoo.com
6. Shri K.K. Arya, Chief Engineer (SP&PA)
   Phone : 26102045/Email : kkarya_2003@rediffmail.com
7. Shri B.K. Arya, Chief Engineer (IC) (PSPM)
   Mobile: 9868438594/Email: bkarya1664@gmail.com

Power Grid Corporation of India Limited (PGCIL)

8. Shri I.S. Jha, Director (Projects)
   Phone : 0124-2571930/Email : isjha@powergridindia.com
9. Dr. R.K. Srivastava, AGM (ESMD)
   Mobile : 9910378134/Email : rks@powergridindia.com

Govt. of Karnataka, Bengaluru

10. Shri P. Ravi Kumar, Secretary (Energy)
    Mobile : 09448124242/Email : prs-energy@karnataka.gov.in

Government of Uttar Pradesh, Lucknow

11. Shri Sanjay Agarwal, Principal Secretary (Power)
    Mobile : 09651789119/Email : sagsal50@yahoo.com
12. Shri Shrikrishna, CE(TW), Meerut
    Mob 09412749801/Email : cetw@upptcl.org

Govt. of Maharashtra/MAHATRANSCO

13. Shri Rajeev Kumar Mital, CMD
    Phone : 022-26591253/26595000/Fax : 022-26598595
    Email : md@mahatransco.in

Government of Kerala

14. Shri Sivasankar, M., Secretary (Power)
    Mobile : 09847797000/Email : sivasankar@kseb.in

Government of Madhya Pradesh/MPPTCL, Jabalpur

15. Shri I.C.P. Keshari, Principal Secretary (Energy)
    Mobile : 09425234600
16. Shri R. Sethi, C.E. (Planning & Design)
    Mobile : 09425805228/Email : ceps321@yahoo.com
17. Shri M.M. Dhoke, SE (PSS)
    Mobile : 09425805237/Email : ceps321@yahoo.com

Sterlite Grid Limited (SGL)

18. Shri Ajay Bhardwaj, Business Head
    Mobile : 9810446758
19. Shri T.A. Reddy, V.P.
    Mobile: 9310490976/Email: tan.reddy@sterlite.com

Essel Infra (DMTCL)

20. Shri Sudip Dutta
    Mobile : 9650516244/Email : sudipdutta@esselinfraproject.com
21. Shri Rajnish Mahajan, Essel Infra (NRSS-XXXI (B)
    Mobile : 8558889504/Email : rajnish.mahajan@infra.esselgroup.com

RoW COMPENSATION
And
DIMINUTION OF LAND VALUE DUE TO PLACING OF TRANSMISSION LINE / TOWER
AN OVERVIEW

LEGAL AND REGULATORY FRAMEWORK FOR IMPLEMENTATION OF TRANSMISSION PROJECT AND COMPENSATION.

- Prior Permission of Appropriate Govt. under **Section-68 (1)**;
- **Obtain License** from Appropriate Commission under **Section 14**;
- **Central Transmission Utility (CTU)** and **State Transmission Utility (STU)** are deemed to be a transmission licensee under this Act.
- The appropriate Govt. has powers under **Section 164** to grant/vest powers of The Telegraph Act 1885 to licensees for laying of transmission lines too for proper coordination of works.
- Licensees vested with the powers of telegraph authority under **Section 164** of the Electricity act use provisions of **The Indian Telegraph Act, 1885** for placing of towers /lines and compensation.
- Other licensees viz. Private Entities engaged in power transmission have also been vested with such powers after complying the laid down procedure.
- The Central Government may, by notification, make rules under **Section 176(1 & 2 (e)}**for carrying out the provisions of this Act.
  - (e) the works of licensees affecting the property of owner or occupier under sub-section (2) of section 67.

PROVISIONS OF ELECTRICITY ACT, 2003 Part-VIII,SECTION 67 & 68

Section 67 (2-5):
Quote:

(2) **The Appropriate Government may, by rules made by it in this behalf, specify:**

(a) the cases and circumstances in which the consent in writing of the Appropriate Government, local authority, owner or occupier, as the case may be, shall be required for carrying out works;
(b) the authority which may grant permission in the circumstances where the owner or occupier objects to the carrying out of works;
(c) the nature and period of notice to be given by the licensee before carrying out works;
(d) the procedure and manner of consideration of objections and suggestion received in accordance with the notice referred to in clause (c);
(e) the determination and payment of compensation or rent to the persons affected by works under this section.

- **MoP vide notification dt. 18.4.2006 notified rules for all licensees for laying of transmission lines and compensation thereof:**

(3) A licensee shall, in exercise of any of the powers conferred by or under this section and the rules made thereunder, cause as little damage, detriment and inconvenience as may be, and shall make full compensation for any damage, detriment or inconvenience caused by him or by any one employed by him.

(4) Where any difference or dispute [including amount of compensation under sub-section (3)] arises under this section, the matter shall be determined by the Appropriate Commission.

The Appropriate Commission, while determining any difference or dispute arising under this section in addition to any compensation under sub-section (3), may impose a penalty not exceeding the amount of compensation payable under that sub-section.

Section 68 (5 & 6):

(5) Where any tree standing or lying near an overhead line or where any structure or other object which has been placed or has fallen near an overhead line subsequent to the placing of such line, interrupts or interferes with, or is likely to interrupt or interfere with, the conveyance or transmission of electricity or the 36 to interrupt or interfere with, the conveyance or transmission of electricity or the accessibility of any works, an Executive Magistrate or authority specified by the Appropriate Government may, on the application of the licensee, cause the tree, structure or object to be removed or otherwise dealt with as he or it thinks fit.

(6) When disposing of an application under sub-section (5), an Executive Magistrate or authority specified under that sub-section shall, in the case of any tree in existence before the placing of the overhead line, award to the person interested in the tree such compensation as he thinks reasonable, *and such person may recover the same from the licensee.*

Explanation. - For purposes of this section, the expression ? tree? shall be deemed to include any shrub, hedge, jungle growth or other plant.

PROVISIONS OF TELGRAPH ACT FOR COMPENSATION: COMPENSATION ISSUES ARE DEALT IN SECTION-10 OF THE ACT

The Indian Telegraph Act, 1885, Part-III, Section 10:

10. Power for telegraph authority to place and maintain telegraph lines and posts – The telegraph authority may, from time to time, place and maintain a telegraph line under, over, along, or across, and posts in or upon any immovable property: Provided that –

(a)) the telegraph authority shall not exercise the powers conferred by this section except for the purposes of a telegraph established or maintained by the [Central Government], or to be so established or maintained;

(b) the [Central Government] shall not acquire any right other than that of user only in the property under, over, along, across in or upon which the telegraph authority places any telegraph line or post; and

(c) except as hereinafter provided, the telegraph authority shall not exercise those powers in respect of any property vested in or under the control or management of any local authority, without the permission of that authority, and

(d) in the exercise of the powers conferred by this section, the telegraph authority shall do as little damage as possible, and, when it has exercised those powers in respect of any property other than that referred to in clause (c), shall pay full compensation to all persons interested for any damage sustained by them by reason of the exercise of those powers.

Section 16:

(1) If the exercise of the powers mentioned in section 10 in respect of property referred to in clause (d) of that section is resisted or obstructed, the **District Magistrate may, in his discretion, order that the telegraph authority shall be permitted to exercise them.**

(2) If, after the making of an order under sub section (1), any person resists the exercise of those powers, or, having control over the property, does not give all facilities for this being exercised, he shall be **deemed to have committed an offence under section 188 of the Indian Penal Code (45 of 1860).**

ISSUES AGREVATING THE PROBLEM

- Damages its extent not defined for calculating compensation;
- Substantial increase in No. of Projects;
- Placement of towers/pylon require much larger land area (144 – 400 sq m) and increased Right of way extending from 27 meter to 69 meter for 132 kV to 800 kV HVDC line;
- Restriction imposed for use of land under transmission line affect land value;
- Farmers getting united/forming joint front for enhanced bargaining power ;
- Activist and NGOs intervention.

State Policies Regarding Compensation

1. UPPCL:

- Cash assistance of **10%** (owners having >1 ha) **& 20%** (owners having <1 ha) of the registered value for the area occupied by the tower
- In case of loss of standing crop and / trees, compensation will be paid at market value of allowed to harvest the final crop

- POWERGRID in western UP asked to pay for both tower base @ Rs. 5 lakh for ABC type & Rs. 6 lakh for D and for 25 m wide corridor still work heldup.

2. APTRANSCO:

- Exgratia at the rate of Rs 3.25 per sq mt for the area occupied by the tower
- In case of loss of standing crop and or trees, compensation will be paid at market value as determined by the MRO/Dept of Aghculture or allowed to harvest the final crop

- POWERGRID asked by DM V'patnam to pay for tower base @ 60% of market value and for Vijayawada-Nellore line asked to pay huge compensation for corridor too in Vijayawada area.

3. **Maharashtra:**

- ✓ As per classification mentioned below and land used by the tower (by not acquiring the proposed land) and as per prevailing market rate of the proposed land

Land Classification	Type of land	Compensation to be paid
A	Non Cultivable agricultural land	25%
B	Cultivable agricultural land	50%
C	Fruit bearing agricultural land	60%
D	Non-agricultural land	65%

❑ **In case of Solapur-Pune, Pune-Parli lines and were asked to pay additional compensation for tower base Rs. 7.5-9 lakhs and corridor Rs. 3-4 lakh to all farmers whose land falls between two towers.**

4. **Chhattisgarh*:**

- ✓ 50% of land cost for tower base;
- ✓ 20% of land value for corridor restricting to outer point of conductor

* Not applicable to distribution lines

VARIOUS COURT DIRECTIVES / JUDGMENTS

Kerala High Court in their various orders opined that owner can claim compensation for diminishing of land value subject to certain conditions

Such judgment / orders were challenged in the Hon'ble Supreme Court (SC) and got stayed.

SC observed that there can be no fix formula or policy to arrive the rate of compensation and is of the view that each case is required to be taken on its own merit on following parameters

- ✓ situation of land
- ✓ distance between high voltage electricity line laid there over
- ✓ extent of the line there on as also the fact whether the high voltage line passes over a small track of land or through the middle of the land and other similar relevant factors.
- ✓ The land value is also a relevant factor and whether the owner of the land losses its substantial right to use the property

The case still pending with Kerala High Court for final judgment.

RECENT DEVELOPMENTS

- Government of Kerala addressing similar problem in POWERGRID lines associated with Kudankulam transmission system issued series of Government Order (G.O.) directing POWERGRID to pay compensation towards damages caused at each tower location in addition to normal crop/tree compensation and have framed a criteria for considering some percentage of prevailing land value (5 times of fair value) in the district as a basis for calculating such damages by the District Collector/Revenue Authority.
- The SC order dated May 8, 2009 in writ petition filed by a Private company against POWERGRID also deals with the issue of compensation and as per this order compensation as per the provision of Section 10'(d)' of Indian Telegraph Act, 1885 are due to land owner on whose land the tower has been placed.
- District Magistrate of Kutch, Gujarat on representation of affected persons ordered POWERGRID to pay addl. Compensation vide its order dt.25.03.10 @ of Rs. 1 lakh for A type tower, Rs 1.10 lakh for B type tower, Rs. 1.25 lakh for C type of tower and Rs. 1.40 lakh for D type of tower for lines associated with Mundra UMPP.

RECENT DEVELOPMENTS

- Collector Visakhapatnam, Andhra Pradesh vide its order dt. 21.10.10 has awarded to land owners an additional compensation towards land damages @ 80% of basic land value considering that such damages are covered under damages as contained in the Section 10'(d)' of Indian Telegraph Act, 1885.
- District Magistrate, Nellore vide order dated 24.08.2013 for 400 KV D/c Vijaywada-Nellore and Nellore-Thiruvallam transmission line fixed compensation amount Rs. 3,50,000 per tower location to farmers in Nellore district for all towers of 400/765 kV lines.
- ✓ DC, South District, Sikkim ordered for payment of complete land value and surface damages as compensation and levied 35 years value of yield as compensation towards crop damages and 8 years yield for fruit bearing trees.
- ✓ District Magistrate, Tumkur vide order dated 08.07.2014 for tower base

Category of tower Structure	Compensation Amount Decided
Category A	Rs. 1.25 lakhs
Category B	Rs. 1.40 lakhs
Category C	Rs. 1.60 lakhs
Category D	Rs. 2.00 lakhs

- ✓ The additional compensation of Rs. 2.00 Lakh per acre each to land owners for damages to land during stringing.
- ✓ Different rates for trees with 10% exgratia.

RECENT DEVELOPMENTS

✓ **District Magistrate, Ranga Reddy vide** order dt.08.08.2014 for 400 KV D/C Suryapet - Shankarpally line of TRANSCO with following compensation

A. For Tower base:

Type of Land	Category-I Area of damage up to 350 sq. yds. (A, B & C Type tower)	Category-II Area of damage above 350 sq. yds. (D Type tower)
a) Land facing to Highways (up to 0.5 km distance) b) Nearer to the Housing /Layouts/Indl Areas/ Commercially developed Areas c) Land through which more than one transmission line is passing Rate @Rs. 1000/- per sq. yds	Rs. 3.5 lakh per tower	Rs. 4.5 lakh per tower
Interior Lands (All other lands) Rate@Rs. 700 per sq yds	Rs. 2.45 lakh per tower	Rs. 3.15 lakh per tower

B. For line Corridor:

Damage in 20 meter (10 meters on either side from the centre of the line), at Rs. 80/- per sq. meter

OPINION OF ATTORNEY GENERAL OF INDIA

- It is logical to hold that the land underneath the legs of the tower (permanently fixed to the earth) is permanently lost by the owner. Even though those pieces of land are not required for acquisition and the ownership remains with the owner yet all incidence of the ownership, enjoyment and free use of those pieces of land becomes severely restricted. In such case, compensation ought to be as near as the present value of the land.

- The compensation of land under the corridor is entirely different. Such land is conveniently usable for agriculture. However, there would be of course diminution of land value due to placing of line over it with certain restriction on land use and also any future prospects for usage other than agriculture. The compensation for such diminution in land value for the line corridor is also payable to land owners, quantum of which should commensurate to the damage depending upon the type/location of land and its intended/recorded land use.

- In case of Residential / Industrial area, there is severe restriction on usage for safety of human life & electrical clearance hence compensation need to be commensurate with the damages.

PROPOSAL OF POWERGRID

- Provisions of act provides compensation only towards damages and there is no mention for compensation towards diminution of land value explicitly though it is a reality.
- In absence of clarity and notified procedures, the provisions of existing acts are being differently interpreted by concerned DC/Revenue Authorities that too varies/fluctuate heavily, thus causing unrest and delay in resolving RoW issue resulting in delay.
- POWERGRID in order to resolve this issue in line with AG's opinion proposes that MoP by amending rules framed under section 67 of EA act may provide for a following standard minimum compensation to be paid by all licensee
  - 100% cost of land for tower base area as compensation based on the market rate as ascertain by the local Revenue Authorities.
  - Certain % say 10% land value* (of ascertained rate) for the corridor (RoW) towards land value diminution.
  - The respective DC/DM or their authorized representatives shall complete above evaluation of compensation within 30 days.
  - **In case enhanced demand by land owners the respective State may review it and if found justified may pay from own resources directly as has been agreed by the State of Kerala.**

Impact on tariff due to Tower Base & RoW Corridor Compensation @ 10%
Compensation @ 15 Lakhs/ acre (Mostly agricultural land in rural setting)

Voltage	Cost/km (Rs. in Lakh)	Tariff on capital cost (Rs. in Cr) @ average 18%	Compn. cost for tower base/ km (Rs. in Lakh)	Compensation cost for RoW Corridor (Rs. in Lakh)	Revised Capital Cost of 100 km Line (Rs. in Cr)	Tariff on revised capital cost (Rs. in Cr)	% increase in Tariff
400 KV D/c Twin	140	25.2	2.58	16.785	159.36	28.68	13.8%
400 KV D/c Quad	220	40	2.58	16.785	209.26	38.04	7.7%
400 KV D/c HTLS	340	61.2	2.58	16.785	359.36	64.68	5.98%
765 KV D/c	459	82.62	6.21	24.2025	499.31	89.88	6.63%

Voltage	Land area for tower base per km (3 Acre x 4047 Sq.m.)	Total RoW Corridor area required for 2 ckt line (3.84 x 2.37 Acres)
400 kV D/c	0.172 Acres	11.362 Acres
765 kV D/c	0.424 Acres	18.548 Acres

Impact on tariff due to Tower Base & RoW Corridor Compensation @ 10%

Compensation @ 25 Lakhs/ acre (Mostly Urban/Semi-urban land near Cities/Towns)

Voltage	Cost/km (Rs. in Lakh)	Tariff on capital cost (Rs. in Cr) @ average 15%	Compn cost for tower base/ km (Rs. in Lakh)	Compensation cost for RoW Corridor (Rs. in Lakh)	Revised Capital Cost of 100 km Line (Rs. in Cr)	Tariff on revised capital cost (Rs. in Cr)	% increase in Tariff
400 KV D/c Twin	140	25.2	25 X 0.172 = 4.3	11.19 X 2.5 = 27.975	172.28	31.01	23.15%
400 KV D/c Quad	250	45	25 X 0.172 = 4.3	11.19 X 2.5 = 27.975	282.28	50.81	12.9%
400 KV D/c HTLS	340	61.2	25 X 0.172 = 4.3	11.19 X 2.5 = 27.975	372.28	67.01	9.49%
765 KV D/c	458	82.44	25 X 0.414 = 10.35	16.135 X 2.5 = 40.337	508.69	91.56	11.06%

Impact on tariff due to Tower Base & RoW Corridor Compensation @ 10%

Compensation @ 50 Lakhs/ acre (Mostly Urban land near Big Cities/Metro Towns)

Voltage	Cost/km (Rs. in Lakh)	Tariff on capital cost (Rs. in Cr) @ average 18%	Compn cost for tower base/ km (Rs. in Lakh)	Compensation cost for RoW Corridor (Rs. in Lakh)	Revised Capital Cost of 100 km Line (Rs. in Cr)	Tariff on revised capital cost (Rs. in Cr)	% increase in Tariff
400 KV D/c Twin	140	25.2	11.19 X 5 = 55.95	8.6 + 55.95= 64.55	304.55	54.82	46.1%
400 KV D/c Quad	250	45	11.19 X 5 = 55.95	8.6 + 55.95= 64.55	314.55	56.62	25.8%
400 KV D/c HTLS	340	61.2	11.19 X 5 = 55.95	8.6 + 55.95= 64.55	404.55	72.82	18.99%
765 KV D/c	458	82.44	16.135 X 5 = 80.675	20.7+80.675 = 101.375	559.39	100.69	22.12%

THANKS

GOVERNMENT OF INDIA
MINISTRY OF POWER

New Delhi, the 18th April 2006

NOTIFICATION

G S R 217(E) - In exercise of the powers conferred by clause (e) of sub-section (2) of section 176 read with sub-section (2) of section 67 of the Electricity Act, 2003 (36 of 2003), the Central Government hereby makes the following rules regarding the works of licensees, namely :-

1. Short title and commencement.- (1) These rules may be called the Works of Licensees Rules, 2006.

2. Definitions.- (1) In these rules unless the context otherwise requires -

(a) 'The Act' means the Electricity Act, 2003;
(b) 'occupier' of any building or land means a person in lawful occupation of that building or land.

(2) All other words and expression used herein and not defined in these rules, shall have the meanings respectively assigned to them in the Act.

3. Licensee to carry out works.- (1) A licensee may -

(a) carry out works, lay down or place any electric supply line or other works in, through, or against, any building, or on, over or under any land whereon, wherever or whereunder any electric supply-line or works has not already been lawfully laid down or placed by such licensee, with the prior consent of the owner or occupier of any building or land;

(b) fix any support of overhead line or any stay or strut required for the purpose of securing in position any support of an overhead line on any building or land or having been so fixed, may alter such support.

(2) When making an order under sub-rule (1), the District Magistrate or the Commissioner of Police or the officer so authorised, as the case may be, shall fix, after considering the representations of the concerned persons, if any, **the amount of compensation or of annual rent, or of both, which should in his opinion be paid by the licensee to the owner or occupier.**

(3) Every order made by a District Magistrate or a Commissioner of Police or an authorised officer under sub-rule (1) shall be subject to revision by the Appropriate Commission.

(4) **Nothing contained in this rule shall effect the powers conferred upon any licensee under section 164 of the Act.**

Annex-2

Extract of para 1.3 of the Report

1.3 The maximum width of RoW corridor is calculated on the basis of tower design, span, and wind speed, maximum sag of conductor and its swing plus other requirement of electric safety. The requirement of ROW for different voltage types under standard conditions is as follows:

ROW width for different voltage line*

Transmission Voltage	Width of Right of Way (in Meters)
66 kV	18
110 kV	22
132 kV	27
220 kV	35
400 kV S/C	46
400 kV D/C	46
+/-500 kV HVDC	52
765 kV S/C (with delta configuration)	64
765 kV D/C	67
+/-800 kV HVDC	69
1200 kV	89

* Width of Right of Way is as per the MoEF guidelines dated 5.5.2014.