

Environmental and Social Due Diligence Report

Project Number: 47083-004
December 2019

INDIA: Accelerating Infrastructure Investment Facility in India – Tranche 3 Mytrah Vayu (Pennar) Private Limited (Part 4 of 9)

Prepared by India Infrastructure Finance Company Limited for the India Infrastructure Finance Company Limited and the Asian Development Bank.

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6. That the listed category of industries or those identified later-on under different categories shall not be linked to sanction of loan/finance or bank proceedings.
7. That any further addition of any new or left-over industrial sector and their categorization which is not listed in the revised list of Red, Orange, Green and White industrial sectors, shall be done at the level of concerned SPCB / PCC following revised criteria & guidelines as detailed in the attached document and no concurrence of CPCB shall normally be required. It is further clarified that white categorization the industries, fractional numbers shall be rounded off to nearest integer.

The CPCB has also directed to submit Action Taken Report on the compliance of above directions within one month from the date of receipt.

In view of the above, all the Unit Heads, Zonal Officers and Regional Officers are directed to follow the CPCB directions with immediate effect from the date of issue of directions i.e. 07.03.2016.

All the Zonal Officers and Regional officers are directed to submit within 15 days revised lists of industries of Red, Orange, Green and White categories duly following the revised classification of CPCB. There shall be no necessity of obtaining any consent for white category of industries and an intimation to the APPCB shall be sufficient.

All the ROs shall appraise the GMs of District Industries Centres along with CPCB directions about the reclassification of industries for taking action on submission of applications of consent application as per the revised criteria.

The ROs shall also inform the Industry Associations about the revised criteria.

The ROs/ZOs shall consult concerned units heads for any clarification on the directions of CPCB.

Treat this as top priority.



MEMBER SECRETARY

Enclosure: CPCB directions dated 07.03.2016.

To

1. The Chief Environmental Engineer.
2. All the Unit Heads at Head Office.
3. All the Zonal Officers at Zonal Offices
4. All the Regional Officers at Regional Offices.
5. IT Section to upload in the Website.

ANDHRA PRADESH POLLUTION CONTROL BOARD	
LIST OF RED CATEGORY OF INDUSTRIAL SECTORS AS PER REVISED CATEGORISATION OF CPCB EFFECTIVE FROM	
SI No.	Industry Sector
1	Isolated storage of hazardous chemicals (as per schedule of manufacturing, storage of hazardous chemicals rules, 1989 as amended)
2	Automobile Manufacturing (integrated facilities) i. Such types of plants are having either one or combinations of polluting activities viz. washing, metal surface finishing operations, pickling, plating, electro-plating, phosphating, painting, heat treatment etc. ii. Some of such plants may outsource some /all of the polluting activities. In such cases, after thorough inspection of such units by concerned SPCB, re-categorization of the industry shall be made accordingly.
3	Industries engaged in recycling / reprocessing/ recovery/reuse of Hazardous Waste under schedule iv of HW(M, H& TBM) rules, 2008 - Items namely - Spent cleared metal catalyst containing copper,, Spent cleared metal catalyst containing zinc,,
4	Manufacturing of lubricating oils, grease petroleum based products
5	DG Set of capacity > 5 MVA
6	Industrial carbon including electrodes and graphite blocks, activated carbon, carbon black
7	Lead acid battery manufacturing(excluding assembling and charging of lead-acid battery in micro scale)
8	Phosphate rock processing plant
9	Power generation plant [except Wind and Solar renewable power plants of all capacities and Mini Hydel power plant of capacity <25MW]
10	Industries engaged in recycling / reprocessing/ recovery/reuse of Hazardous Waste under schedule iv of HW(M, H& TBM) rules, 2008 - Items namely - Spent catalyst containing nickel, cadmium, Zinc, copper, arsenic, vanadium and cobalt,
11	Processes involving chlorinated hydrocarbons
12	Sugar (excluding Khandsari)
13	Fibre glass production and processing (excluding moulding)
14	Fire crackers manufacturing and bulk storage facilities
15	Industries engaged in recycling / reprocessing/ recovery/reuse of Hazardous Waste under schedule iv of HW(M, H& TBM) rules, 2008 - Items namely – Dismantlers Recycling Plants -- Components of waste electrical and electronic assemblies comprising accumulators and other batteries included on list A, mercury-switches, activated glass cullets from cathode-ray tubes and other activated glass and PCB-capacitors, or any other component contaminated with Schedule 2 constituents (e.g. cadmium, mercury, lead, polychlorinated biphenyl) to an extent that they exhibit hazard characteristics indicated in part C of this Schedule.
16	Milk processes and dairy products(integrated project)
17	Phosphorous and its compounds
18	Pulp & Paper (waste paper based without bleaching process to manufacture Kraft paper)
19	Coke making , liquefaction, coal tar distillation or fuel gas making
20	Manufacturing of explosives, detonators, fuses including management and handling activities
21	Manufacturing of paints varnishes, pigments and intermediate (excluding blending/mixing)
22	Organic Chemicals manufacturing
23	Airports and Commercial Air Strips
24	Asbestos and asbestos based industries
26	Cement
27	Chlorates, per-chlorates & peroxides
28	Chlorine, fluorine, bromine, iodine and their compounds
29	Dyes and Dye- Intermediates
30	Health-care Establishment (as defined in BMW Rules) i. Mainly water polluting. ii. The water pollution score is normalized to 100 & valid for Hospitals having total waste-water generation > 100 KLD. iii. The hospitals with incinerator will be categorized as Red irrespective of the quantity of the waste -water generation. iv. The hospitals having Total waste-water generation less than 100 KLD and without incinerator, the normalized water pollution score will be 50 and will be categorized as Orange category

31	Hotels having overall waste- water generation @ 100 KLD and more. i. Mainly water polluting. Small boiler may be installed. ii. The water pollution score is normalized to 100 & valid for Hotels having waste-water generation > 100 KLD. iii. The hotels having more than 20 rooms and waste-water generation less than 100 KLD and having a coal / oil fired boiler, the pollution score will be 35/40 & are categorized as Orange. iv. The hotels having more than 20 rooms and waste-water generation less than 10 KLD and having no-boiler & no hazardous waste generation, the pollution score will be 20 & are categorized as Green.
32	Industries engaged in recycling / reprocessing/ recovery/reuse of Hazardous Waste under schedule iv of HW(M, H& TBM) rules, 2008 – Items namely - Lead acid battery plates and other lead scrap/ashes/residues not covered under Batteries (Management and Handling) Rules, 2001. [* Battery scrap, namely: Lead battery plates covered by ISRI, Code word “Rails” Battery lugs covered by ISRI, Code word “Rakes”. Scrap drained/dry while intact, lead batteries covered by ISRI, Code word “rains”.
33	Industries engaged in recycling / reprocessing/ recovery/reuse of Hazardous Waste under schedule iv of HW(M, H& TBM) rules, 2008 – Items namely – Integrated Recycling Plants -- Components of waste electrical and electronic assemblies comprising accumulators and other batteries included on list A, mercury- switches, activated glass cullets from cathode-ray tubes and other activated glass and PCB-capacitors, or any other component contaminated with Schedule 2 constituents (e.g. cadmium, mercury, lead, polychlorinated biphenyl) to an extent that they exhibit hazard characteristics indicated in part C of this Schedule.
34	Manufacturing of glue and gelatin
35	Mining and ore beneficiation
36	Nuclear power plant
37	Pesticides (technical) (excluding formulation)
38	Photographic film and its chemicals
39	Railway locomotive work shop/Integrated road transport workshop/Authorized service centers
40	Yarn / Textile processing involving any effluent/emission generating processes including bleaching, dyeing, printing and colouring
41	Chlor Alkali
42	Ship Breaking Industries
43	Oil and gas extraction including CBM (offshore & on-shore extraction through drilling wells)
44	Industry or process involving metal surface treatment or process such as pickling/ electroplating/paint stripping/ heat treatment using cyanide bath/ phosphating or finishing and anodizing / enamellings/ galvanizing
45	Tanneries
46	Ports and harbour, jetties and dredging operations
47	Synthetic fibers including rayon ,tyre cord, polyester filament yarn
48	Thermal Power Plants
49	Slaughter house (as per notification S.O.270(E)dated 26.03.2001) and meat processing industries, bone mill, processing of animal horn, hoofs and other body parts
50	Aluminium Smelter
51	Copper Smelter
52	Fertilizer (basic) (excluding formulation)
53	Iron & Steel (involving processing from ore/ integrated steel plants) and or Sponge Iron units
54	Pulp & Paper (waste paper based units with bleaching process to manufacture writing & printing paper)
55	Zinc Smelter
56	Oil Refinery (mineral Oil or Petro Refineries)
57	Petrochemicals Manufacturing (including processing of Emulsions of oil and water)
58	Pharmaceuticals
59	Pulp & Paper (Large-Agro + wood), Small Pulp & Paper (agro based- heat straw/rice husk)
60	Distillery (molasses / grain / yeast based)

LIST OF ORANGE CATEGORY OF INDUSTRIAL SECTORS AS PER REVISED CATEGORISATION OF CPCB EFFECTIVE FROM 07.03.2016

Sl. No.	Industry Sector
1	Dismantling of rolling stocks (wagons/ coaches)
2	Bakery and confectionery units with production capacity > 1 TPD. (With ovens / furnaces)
3	Chanachur and laddoo from puffed and beaten rice(muri and shira) using husk fired oven
4	Coated electrode manufacturing
5	Compact disc computer floppy and cassette manufacturing / Reel manufacturing

6	Flakes from rejected PET bottle
7	Food and food processing including fruits and vegetable processing
8	Jute processing without dyeing
9	Manufacturing of silica gel
10	Manufacturing of tooth powder, toothpaste, talcum powder and other cosmetic items
11	Printing or etching of glass sheet using hydrofluoric acid
12	Silk screen printing, sari printing by wooden blocks
13	Synthetic detergents and soaps(excluding formulation)
14	Thermometer manufacturing
15	Cotton spinning and weaving (medium and large scale)
16	Almirah, Grill Manufacturing (Dry Mechanical Process)
17	Aluminium & copper extraction from scrap using oil fired furnace (dry process only)
18	Automobile servicing, repairing and painting (excluding only fuel dispensing)
19	Ayurvedic and homeopathic medicine
20	Brickfields (excluding fly ash brick manufacturing using lime process)
21	Building and construction project more than 20,000 sq. m built up area
22	Ceramics and Refractories
23	Coal washeries
24	Dairy and dairy products (small scale)
25	DG set of capacity >1MVA but < 5MVA
26	Dry coal processing, mineral processing, industries involving ore sintering, pelletising, grinding & pulverization
27	Fermentation industry including manufacture of yeast, beer, distillation of alcohol (Extra Neutral Alcohol)
28	Ferrous and Non- ferrous metal extraction involving different furnaces through melting, refining, re-processing, casting and alloy-
29	Fertilizer (granulation / formulation / blending only)
30	Fish feed, poultry feed and cattle feed
31	Fish processing and packing (excluding chilling of fishes)
32	Forging of ferrous and non- ferrous metals (using oil and gas fired furnaces)
33	Formulation/pelletization of camphor tablets, naphthalene balls from camphor/ naphthalene powders.
34	Glass ceramics, earthen potteries and tile manufacturing using oil and gas fired kilns, coating on glasses using cerium fluorides and
35	Gravure printing, digital printing on flex, vinyl
36	Heat treatment using oil fired furnace (without cyaniding)
37	Hot mix plants
38	Hotels (< 3 star) or hotels having > 20 rooms and less than 100 rooms.
39	Ice cream
40	Industries engaged in recycling / reprocessing/ recovery/reuse of Hazardous Waste under schedule iv of HW(M, H& TBM) rules,
41	Industries engaged in recycling / reprocessing/recovery/reuse of Hazardous Waste under schedule iv of HW(M, H& TBM) rules,
42	Industry or processes involving foundry operations
43	Lime manufacturing (using lime kiln)
44	Liquid floor cleaner, black phenyl, liquid soap, glycerol mono-stearate manufacturing
45	Manufacturing of glass
46	Manufacturing of iodized salt from crude/ raw salt
47	Manufacturing of mirror from sheet glass
48	Manufacturing of mosquito repellent coil
49	Manufacturing of Starch/Sago
50	Mechanized laundry using oil fired boiler
51	Modular wooden furniture from particle board, MDF< swan timber etc, Ceiling tiles/ partition board from saw dust, wood chips
52	New highway construction project
53	Non-alcoholic beverages(soft drink) & bottling of alcohol/non alcoholic products
54	Paint blending and mixing (Ball mill)
55	Paints and varnishes (mixing and blending)
56	Ply-board manufacturing(including Veneer and laminate) with oil fired boiler/ thermic fluid heater(without resin plant)
57	Potable alcohol (IMFL) by blending, bottling of alcohol products
58	Printing ink manufacturing
59	Printing press
60	Reprocessing of waste plastic including PVC
61	Rolling mill (oil or coal fired) and cold rolling mill
62	Spray painting, paint baking, paint shipping
63	Steel and steel products using various furnaces like blast furnace /open hearth furnace/induction furnace/arc
64	Stone crushers
65	Surgical and medical products including prophylactics and latex
66	Teflon based products
67	Thermocol manufacturing (with boiler)

68	Tobacco products including cigarettes and tobacco/opium processes
69	Transformer repairing/ manufacturing (dry process only)
70	Tyres and tubes vulcanization/ hot retreating
71	Vegetable oil manufacturing including solvent extraction and refinery /hydrogenated oils
72	Wire drawing and wire netting
73	Dry cell battery (excluding manufacturing of electrodes) and assembling & charging of acid lead battery on micro scale
74	Pharmaceutical formulation and for R & D purpose (For sustained release/ extended release of drugs only and not for commercial
75	Synthetic resins
76	Synthetic rubber excluding molding
77	Cashew nut processing
78	Coffee seed processing
79	Parboiled Rice Mills
80	Foam manufacturing
81	Industries engaged in recycling / reprocessing/ recovery/reuse of Hazardous Waste under schedule iv of HW(M, H& TBM) rules,
82	Industries engaged in recycling / reprocessing/ recovery/reuse of Hazardous Waste under schedule iv of HW(M, H& TBM) rules,
83	Producer gas plant using conventional up drift coal gasification (linked to rolling mills glass and ceramic industry refectories for

LIST OF GREEN CATEGORY OF INDUSTRIAL SECTORS AS PER REVISED CATEGORISATION OF CPCB EFFECTIVE FROM 07.03.2016

Sl. No.	Industry Sector
1	Aluminium utensils from aluminium circles by pressing only (dry mechanical operation)
2	Ayurvedic and homeopathic medicines (without boiler)
3	Bakery /confectionery /sweets products (with production capacity 1 tpd (with gas or electrical oven)
4	Bi-axially oriented PP film along with metalizing operations
5	Biomass briquettes (sun drying) without using toxic hazardous wastes
6	Blending of mela mine resins & different powder, additives by physical mixing
7	Brass and bell metal utensils manufacturing from circles(dry mechanical operation without re-rolling facility)
8	Candy
9	Cardboard or corrugated box and paper products (excluding paper or pulp manufacturing and without using boilers)
10	Carpentry & wooden furniture manufacturing (excluding saw mill) with the help of electrical (motorized) machines such as electrical wood planner, steel saw cutting circular blade, etc.
11	Cement products (without using asbestos / boiler / steam curing) like pipe ,pillar, jafri, well ring, block/tiles etc.(should be done in closed covered shed to control fugitive emissions)
12	Ceramic colour manufacturing by mixing & blending only (not using boiler and wastewater recycling process)
13	Chilling plant, cold storage and ice making
14	Coke briquetting (sun drying)
15	Cotton spinning and weaving (small scale)
16	Dal Mills
17	Decoration of ceramic cups and plates by electric furnace
18	Digital printing on PVC clothes
19	Facility of handling, storage and transportation of food grains in bulk
20	Flour mills (dry process)
21	Glass , ceramic, earthen potteries, tile and tile manufacturing using electrical kiln or not involving fossil fuel kiln
22	Glue from starch (physical mixing) with gas / electrically operated oven /boiler.
23	Gold and silver smithy (purification with acid smelting operation and sulphuric acid polishing operation) (using less or equal to 1 litre of sulphuric acid/ nitric acid per month)
24	Heat treatment with any of the new technology like ultrasound probe , induction hardening , ionization beam, gas carburizing etc .
25	Insulation and other coated papers (excluding paper or pipe manufacturing)
26	Leather foot wear and leather products (excluding tanning and hide processing except cottage scale)
27	Lubricating oil, greases or petroleum based products (only blending at normal temperature)
28	Manufacturing of pasted veneers using gas fired boiler or thermic fluid heater and by sun drying
29	Oil mill Ghani and extraction (no hydrogenation / refining)
30	Packing materials manufacturing from non asbestos fibre, vegetable fibre yarn
31	Phenyl/toilet cleaner formulation and bottling
32	Polythene and plastic processed products manufacturing (virgin plastic)
33	Poultry, Hatchery and Piggery

34	Power looms (without dye and bleaching)
35	Puffed rice (muri) (using gas or electrical heating system)
36	Pulverization of bamboo and scrap wood
37	Ready mix cement concrete
38	Reprocessing of waste cotton
39	Rice mill (Rice hullers only)
40	Rolling mill (gas fired) and cold rolling mill
41	Rubber goods industry (with gas operated baby boiler)
42	Saw mills
43	Soap manufacturing (hand made without steam boiling / boiler)
44	Spice grinding (upto-20 HP motor)
45	Spice grinding (>20 hp motor)
46	Steel furniture without spray painting
47	Steeping and processing of grains
48	Tyres and tube retreating (without boilers)
49	Chilling plant and ice making without using ammonia
50	CO2 recovery
51	Distilled water (without boiler) with electricity as source of heat
52	Hotels (up to 20 rooms and without boilers)
53	Manufacturing of optical lenses (using electrical furnace)
54	Mineralized water
55	Tamarind powder manufacturing
56	Cutting, sizing and polishing of marble stone
57	Emery powder (fine dust of sand) manufacturing
58	Flyash export, transport & disposal facilities
59	Mineral stack yard / Railway sidings
60	Oil and gas transportation pipeline
61	Seasoning of wood in steam heated chamber
62	Synthetic detergent formulation
63	Tea processing (with boiler) With boiler, it is an orange category industry. Without boiler, it will be green category industry.

LIST OF WHITE CATEGORY OF INDUSTRIAL SECTORS AS PER REVISED CATEGORISATION OF CPCB EFFECTIVE FROM 07.03.2016	
Sl. No.	Industry Sector
1	Assembly of air coolers /conditioners ,repairing and servicing
2	Assembly of bicycles ,baby carriages and other small non motorizing vehicles
3	Bailing (hydraulic press)of waste papers
4	Bio fertilizer and bio-pesticides without using inorganic chemicals
5	Biscuits trays etc from rolled PVC sheet (using automatic vacuum forming machines)
6	Blending and packing of tea
7	Block making of printing without foundry (excluding wooden block making)
8	Chalk making from plaster of Paris (only casting without boilers etc. (sun drying / electrical oven)
9	Compressed oxygen gas from crude liquid oxygen (without use of any solvents and by maintaining pressure & temperature only for separation of other gases)
10	Cotton and woolen hosiery making (Dry process only without any dyeing / washing operation)
11	Diesel pump repairing and servicing (complete mechanical dry process)
12	Electric lamp (bulb) and CFL manufacturing by assembling only
13	Electrical and electronic item assembling (completely dry process)
14	Engineering and fabrication units (dry process without any heat treatment / metal surface finishing operations / painting)
15	Flavoured betel nuts production/ grinding (completely dry mechanical operations)
16	Fly ash bricks/ block manufacturing
17	Fountain pen manufacturing by assembling only
18	Glass ampoules and vials making from glass tubes
19	Glass putty and sealant (by mixing with machine only)
20	Ground nut decorticating
21	Handloom/ carpet weaving (without dyeing and bleaching operation)
22	Leather cutting and stitching (more than 10 machine and using motor)
23	Manufacturing of coir items from coconut husks
24	Manufacturing of metal caps containers etc
25	Manufacturing of shoe brush and wire brush

26	Medical oxygen
27	Organic and inorganic nutrients (by physical mixing)
28	Organic manure (manual mixing)
29	Packing of powdered milk
30	Paper pins and u clips
31	Repairing of electric motors and generators (dry mechanical process)
32	Rope (plastic and cotton)
33	Scientific and mathematical instrument manufacturing
34	Solar module non conventional energy apparatus manufacturing unit
35	Solar power generation through solar photovoltaic cell, wind power and mini hydel power (less than 25 MW)
36	Surgical and medical products assembling only (not involving effluent / emission generating processes)

FORM-10

[See Rule 19 (1)]

Hazardous Waste Manifest

(Information of hazardous waste for disposal)

1. Occupier Name & Mailing address : SUZLAI GLOBAL SERVICES LTD 33/12 KVA SUB STATION GADENATH HILL VATRAKARUR, URAKONDA, 512 612		2. Occupier's Registration No.	
4. Transporters Name & address : (Including Phone No.)		3. Manifest Document No. 806	
5. Type of Vehicle Truck Tanker Special Vehicle		6. Transporters Registration No.	
8. Designated Facility Name & Address Sri Lakshmi Refineries Industries No. I.P.34, Kudumalakunte, KIADB Industrial Area, Gouribidanur Taluk, Chickaballapur Dist.		7. Vehicle Registration No.	
		9. Facility's Registration No. PCB/117/WMC103618 PCB/117/WMC/ Authorization / 2016	
11. Waste Description : Hazardous Waste		10. Facility's Phone : 8722216262	
		12. Total Quantity of Waste 5374 KG	
		13. Consistency : Solid Semi-Solid Sludge Oily Tarry Slurry	
11. Transport Description of Waste :	15. Containers No. Type	16. Total Quantity	17. Unit Wt/Vol.
Waste Oil			18. Waste Category No.
Used Oil		5374	5 : 1
Residue / Sludge / Spent oil			5 : 2
19. Special Handling Instructions & Additional Information :			
20. OCCUPIERS CERTIFICATE : I hereby declare that the contents of this consignment are fully & accurately described above by proper shipping name and are categorised, packed, maker and labeled and in all respect in proper condition for transport by road according to applicable national government regulations			
Typed Name & Stamp		Signature Month Day Year 04 13 2018	
21. Transporter's Acknowledgment of Receipt Materials		Signature Month Day Year 04 13 2018	
Typed Name & Stamp		Signature Month Day Year 04 13 2018	
22. Discrepancy Note Space			
23. Facility Owner or Operator's Certification of Receipt of Hazardous Waste			
Typed Name & Stamp		Signature Month Day Year 04 13 2018	
Copy 1 White - Forwarded to KSPCB by the Occupier Copy 2 Yellow - Signed by Transporter & Returned by Occupier Copy 3 Pink - Retained by Operator of Facility Copy 4 Orange - Retained to Transporter by Operator of facility on accepting waste Copy 5 Green - Forwarded to KSPCB by the Operator of facility after disposal Copy 6 Blue - Blue Returned by Operator of facility after disposal			





SUBJ

Decla

FORM - 13
[See Rule 21 (1)]

HAZARDOUS WASTE MANIFEST

1.	Occupier's Name and Mailing Address (Including Phone No.)	Suxion Global Services Pvt 23/220 KV Substation Belugurra, Belugurra Uranakonda-515741 Andrapradesh - 818591296				
2.	Occupier's Registration No.					
3.	Manifest Documents No.	SGLSL/BLCIP/2018/19 / Scrap / 001				
4.	Transporter's Name and Address: (Including Phone No.)	Rajeshwariah - 9494578994 Uranakonda - Anantapur (AP)				
5.	Type of Vehicle	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
		Truck	Tanker	Special Vehicle		
6.	Transporter's Registration No.					
7.	Vehicle Registration No.	APDQ U7888				
8.	Designated Facility Name and Site Address	Century Plot # 17 RI & of Jineres Pvt Ltd Plot # 17 RI & of Jineres, KINAD Industrial Area Hosakote, Bangalore - 562114 - Karnataka				
9.	Facility's Registration No.	50768 / 11867				
10.	Facility's Phone no.:					
11.	Waste Description :	used Cotton waste				
12.	Total Quantity of Waste	in M ³ or Tons				
13.	Consistency :	Solid Cotton waste				
		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
		Solid	Semi-Solid	Sludge	Oily	Tarry
14.	Transport Description of Waste	used Cotton waste				
15.	Containers	Number		Type		
	N/A					
16.	Total Quantity	4000		m ³ or MT		
17.	Unit Wt/ Vol.	Kg		m ³ or MT		
18.	Waste Category Number	52091000 (HSN Code)				

19.	Special Handling Instructions and Additional Information :				
20.	<p>OCCUPIER'S CERTIFICATE:</p> <p>I hereby declare that the contents of the consignment are fully and accurately described above by proper shipping name and are categorized, packed, marked, and labeled, and are in all respects in proper condition for transport by road according to applicable national government regulations.</p>				
			August	17	2018
	Typed Name and Stamp	Signature	Month	Day	Year
21.	Transporter's Acknowledgement of Receipt of Wastes				
	Typed Name and Stamp	Signature	Month	Day	Year
22.	Discrepancy Note Space				
23.	Facility Owner or Operator's Certification of Receipt of Hazardous Waste				
	 				
	Typed Name and Stamp	Signature	Month	Day	Year



भारत का राजपत्र The Gazette of India

असाधारण

EXTRAORDINARY

भाग II—खण्ड 3—उप-खण्ड (i)

PART II—Section 3—Sub-section (i)

प्राधिकार से प्रकाशित

PUBLISHED BY AUTHORITY

सं. 158]

नई दिल्ली, मंगलवार, मार्च 5, 2019/फाल्गुन 14, 1940

No. 158]

NEW DELHI, TUESDAY, MARCH 5, 2019/PHALGUNA 14, 1940

पर्यावरण, वन और जलवायु परिवर्तन मंत्रालय

अधिसूचना

नई दिल्ली, 1 मार्च, 2019

सा.का.नि. 178(अ).—केंद्रीय सरकार, पर्यावरण (संरक्षण) अधिनियम, 1986 (1986 का 29) की धारा 6, 8 और 25 द्वारा प्रदत्त शक्तियों का प्रयोग करते हुए, उक्त नियमों के नियम 5 के उप-नियम (3) के खण्ड (क) के अधीन नोटिस की अपेक्षा को समाप्त करते हुए जन हित में परिसंकटमय और अन्य अपशिष्ट (प्रबंधन और सीमापार संचलन) नियम, 2016 में और संशोधन करने के लिए निम्नलिखित नियम बनाती है, अर्थात् :-

- (1) इन नियमों का संक्षिप्त नाम परिसंकटमय और अन्य अपशिष्ट (प्रबंधन और सीमापार संचलन) संशोधन नियम, 2019 है।
(2) ये राजपत्र में उनके प्रकाशन की तारीख को प्रवृत्त होंगे।
- परिसंकटमय और अन्य अपशिष्ट (प्रबंधन और सीमापार संचलन) नियम, 2016 में -
(i) नियम 3 में, खण्ड 39 के पश्चात्, निम्नलिखित खंड अन्तःस्थापित किया जाएगा, अर्थात् :-
"40 "अपशिष्ट संग्राहक" से ऐसा व्यक्ति अभिप्रेत है जो अधिभोगी से वास्तविक प्रयोक्ता या निपटान सुविधा के प्रचालक की ओर से परिसंकटमय और अन्य अपशिष्ट एकत्रित करता हो।"

(ii) नियम 6 में, उप-नियम (1) के पश्चात्, निम्नलिखित अन्तःस्थापित किया जाएगा, अर्थात् :-

"(1क) ऐसा अधिभोगी जिनसे राज्य प्रदूषण नियंत्रण बोर्ड या प्रदूषण नियंत्रण समिति से जल (प्रदूषण निवारण और नियंत्रण) अधिनियम, 1974 (1974 का 25) और वायु (प्रदूषण निवारण और नियंत्रण) अधिनियम, 1981 (1981 का 21) के अंतर्गत स्थापना हेतु सहमति या प्रचालन के लिए सहमति प्राप्त करने की अपेक्षा न हो, के लिए इन नियमों के अंतर्गत प्राधिकार अभिप्राप्त करने की अपेक्षा नहीं होगी;

परंतु अधिभोगी द्वारा उत्पन्न परिसंकटमय और अन्य अपशिष्ट को वास्तविक प्रयोक्ताओं, अपशिष्ट संग्राहकों या निपटान सुविधा के प्रचालकों को केन्द्रीय प्रदूषण नियंत्रण बोर्ड के दिशानिर्देशों के अनुसार दिया जाएगा।"

(iii) नियम 12 में, उप-नियम "6क" का लोप किया जाएगा;

(iv) अनुसूची III में, भाग ख में, -

(क) प्रविष्टि

"

ख3010	ठोस प्लास्टिक अपशिष्ट पॉलिमिथाइल मेथाक्राइलेट
-------	--

"

का लोप किया जाएगा।

(ख) बेसल सं. "ख3030" के सामने, "सिल्क अपशिष्ट (रीलिंग के लिए अनुपयुक्त कुसवारी, धागा अपशिष्ट और तामड़ित स्टॉक सहित) शब्दों तथा कोष्ठकों के स्थान पर शब्दों तथा कोष्ठकों

- धुने या साफ नहीं किए हुए
- अन्य", के लिए निम्नलिखित रखो अर्थात् :-

"सिल्क अपशिष्ट (रीलिंग के लिए अनुपयुक्त कुसवारी, धागा अपशिष्ट और तामड़ित स्टॉक सहित)"

- धुने या साफ नहीं किए हुए
- अन्य

"सिल्क अपशिष्ट के निर्यात को पर्यावरण, वन और जलवायु परिवर्तन मंत्रालय से अनुमति की अपेक्षा से छूट प्राप्त है।"

(v) अनुसूची III में, भाग घ में, स्तंभ (2) में बेसल सं. ख1110 के सामने, प्रविष्टियों के पश्चात् अंत में निम्नलिखित प्रविष्टियां अन्तःस्थापित की जाएंगी, अर्थात् :-

"यदि भारत में विनिर्मित और निर्यातित इलैक्ट्रिकल और इलैक्ट्रॉनिक असेम्बली और संघटक त्रुटिपूर्ण या त्रुटिपूर्ण पाया जाता है तो ये निर्यात की तारीख से बारह माह के भीतर मूल उपस्कर विनिर्माता (ओईएम) द्वारा वापस आयात किए जा सकते हैं।"

(vi) अनुसूची VI में, बेसल सं. ख3010 के सामने, स्तंभ (2) में,-

(क) टिप्पण.- "टिप्पण,-विशेष आर्थिक ज़ोन वाली इकाइयों और केंद्रीय सरकार द्वारा अधिसूचित निर्यात अभिमुख इकाइयों को आयात की अनुमति है।" का लोप किया जाएगा।

(ख) "पॉलीसिलोक्सेन्स" शब्द के पश्चात्, "पॉलिमिथाइल मेथाक्राइलेट" शब्द अंतःस्थापित किए जाएंगे।

(vii) प्ररूप 1 में, भाग घ के उप-शीर्षक के अधीन शीर्षक में निम्नलिखित रखा जायेगा, अर्थात् :-

“भाग घ: परिसंकटमय और अन्य अपशिष्टों के पुनर्चक्रणकर्ताओं या पूर्व-प्रसंस्करणकर्ताओं या सह-प्रसंस्करणकर्ताओं या अपशिष्ट संग्राहकों या प्रयोक्ताओं द्वारा भरा जाए”

[फा.सं. 23/4/2009-एचएसएम]

रितेश कुमार सिंह, संयुक्त सचिव

टिप्पण : मूल नियम भारत के राजपत्र, असाधारण, भाग II, खंड 3, उप-खंड (i) में, सा.का.नि. 395(अ) तारीख 04 अप्रैल, 2016 द्वारा प्रकाशित किए गए थे और तत्पश्चात सा.का.नि. 670(अ) तारीख 6 जुलाई, 2016; सा.का.नि. 177(अ) तारीख 28 फरवरी, 2017; और सा.का.नि. 544(अ) तारीख 11 जून, 2018 द्वारा संशोधित किए गए थे।

MINISTRY OF ENVIRONMENT, FOREST AND CLIMATE CHANGE

NOTIFICATION

New Delhi, the 1st March, 2019

G.S.R. 178(E).—In exercise of powers conferred by sections 6, 8 and 25 of the Environment (Protection) Act, 1986 (29 of 1986), the Central Government, after having dispensed with the requirement of notice under clause (a) of sub-rule (3) of rule 5 of the said rule in public interest, hereby makes the following rules further to amend the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016, namely: -

1. (1) These rules may be called the Hazardous and Other Wastes (Management and Transboundary Movement) Amendment, Rules, 2019.
(2) They shall come into force on the date of their publication in the Official Gazette.

2. In the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016: -

(i) in rule 3, after clause 39, the following clause shall be inserted, namely: -

“40. “waste collector” means a person who collects hazardous and other wastes on behalf of actual user or operator of disposal facility from the occupier;”;

(ii) in rule 6, after sub-rule (1), the following shall be inserted, namely: -

“(1A) An occupier shall not be required obtain an authorisation under this rule, from the State Pollution Control Board, in case the consent to establish or consent to operate, is not required from the State Pollution Control Board or Pollution Control Committee under the Water (Prevention and Control of Pollution) Act, 1974 (25 of 1974) and Air (Prevention and Control of Pollution) Act, 1981 (21 of 1981);

Provided that the hazardous and other wastes generated by the occupier shall be given to the actual user, waste collector or operator of the disposal facility, in accordance with the Central Pollution Control Board guidelines.”;

(iii) in rule 12, sub-rule “6A” shall be omitted;

(iv) in Schedule III, in Part B, -

(a) the entry

“

B3010	Solid plastic waste Polymethyl methacrylate
-------	--

”

shall be omitted;

(b) against the Basel No. “B3030”, for the words and brackets “Silk waste (including cocoons unsuitable for reeling, yarn waste and garneted stock)

- Not carded or combed
- Other”, the following shall be substituted, namely: -

“Silk waste (including cocoons unsuitable for reeling, yarn waste and garneted stock) **

- Not carded or combed
- Other

** Export of silk waste is exempted from requiring permission from the Ministry of Environment, Forest and Climate Change.”;

(v) in Schedule III, in Part D, against Basel No. B1110, in column (2), after the entries, at the end the following entries shall be inserted, namely: -

“Electrical and electronic assemblies and components manufactured in and exported from India if found defective or non-functional can be imported back by Original Equipment Manufacturers (OEMs) within twelve months from the date of export.”

(vi) in Schedule VI, against Basel No. B3010, in column (2), -

(a) the Note “**Note.** -Import is permitted to the units in Special Economic Zones and Export Oriented Units notified by the Central Government.” shall be omitted;

(b) after the word “Polysiloxanes”, the words “Polymethyl methacrylate” shall be inserted.

(vii) in Form 1, in the heading under sub-heading Part D the following shall be substituted, namely: -

“Part D: To be filled by recyclers or pre-processors or co-processors or waste collectors or users of hazardous and other wastes”

[F. No. 23/4/2009-HSM]

RITESH KUMAR SINGH, Jt. Secy.

Note: The principal rules were published in the Gazette of India, Extraordinary, Part II, Section 3, Sub-section (i), *vide* number G.S.R. 395 (E), dated the 4th April 2016 and subsequently amended *vide* G.S.R. 670(E) dated the 6th July, 2016; G.S.R. 177(E) dated the 28th February, 2017; and G.S.R. 544(E) dated the 11th June 2018.



TRANSMISSION CORPORATION OF ANDHRA PRADESH LIMITED

From:
Chief Engineer,
Construction,
Vidyut Soudha,
Hyderabad -500 082.

To
M/s Suzlon Infrastructures Services Limited,
H.No.1-8-304/307, 3rd Floor, Kamala Towers,
Pattigadda Street No-1,
Secunderabad. -500 003.

Lr.No.CPT 150/ SE/PM-II/Suzlon-Vajrakarur/D.No. 220 / 2010 dt. 11.11.2010

Sir,

Sub:- Evacuation of power from proposed 100MW wind farms to be set up by M/s.Suzlon Infrastructures Services Limited at Vajrakarur 33/220KV pooling station in Anantapur District - Approval of Scheme - Payment of amounts towards Supervision charges - Reg.

Ref:- Your Letter No dt.21.7.2010.

As per your request cited above, APTRANSCO has approved the scheme for power evacuation of 100 MW wind power at Vajrakarur 33/220kV pooling station in Anantapur district.

The details of charges to be paid for erection of the above evacuation facility are as follows.

S.No.	Name of work	Tentative cost of estimate Rs.in lakhs	Supervision charges including Service Tax & Spares Rs.in lakhs
1	33/220 KV SS at Pooling Station Vajrakarur with 3x 40/50 MVA upto metering point	2567.09	141.57
2	After Metering Point .220/33 KV Pooling Station	1365.81	191.62
3	220 KV DC line (6 Km)	394.07	55.29
4	220 KV Bay Extension 2Nos.	304.4	42.71
5	Providing OFC equipment	72.03	10.10
	Total	4703.40	441.29

Contd...



::2::

The above work can be executed by you on turnkey basis provided you deposit an amount of Rs.441.29 Lakhs towards Supervision charges including Spares & Service Tax in the form of DD in favour of PAY OFFICER, APTRANSCO, VIDYUT SOUDHA, HYDERABAD payable at Hyderabad. The work can be executed as per terms & conditions of turnkey (enclosed) by any agency who has experience in execution of similar works duly obtaining approval of APTransco. Equipment and materials shall be procured from the list of approval manufactures only (enclosed) for the subject work.

Encl: (i) Terms and Conditions and
(ii) List of manufacturer for
equipment & material

K. S. S. R. 12/11/10
CHIEF ENGINEER/CONSTRUCTION
2
10

Copy to:

The Chief Engineer/IPC/Vidyut Soudha /Hyderabad.
The Chief General Manager (Projects)/APCPDCL/Mint Compound/Hyderabad.
The Chief Engineer Zone/Kadapa.
The Superintending Engineer/TLC/Kadapa.
The Executive Engineer/TLC/Kurnool

ఆంధ్ర ప్రదేశ్ ప్రభుత్వము

విద్యుత్ భద్రతా సంఘాలకుల శాఖ

From,

The Deputy Electrical Inspector,

H.No. 79/72, Krishnanagar,

KURNOOL 518 002,

Mobile 7382618565.

To,

M/S. Mytrah(Loc No.38,39,40,208, 209

18,23,24),Vajrakarur

Anantapur,

Anantapur District

లేఖ సంఖ్య : ఉపనిత అ/ కర్నూలు / వి.స్థా/బ.సంఖ్య: 79 /2018తేది 30-01-2018

ఆర్యా:

విషయము: విద్యుచ్ఛక్తి చట్టము, 2003 – కేంద్ర విద్యుత్ అధారిటీ (భద్రత మరియు విద్యుత్ సరఫరా) నిబంధనావళి 2010 లోని 30వ నిబంధన క్రింద మీ యొక్క 650వోల్టులు మించిన విద్యుత్ స్థావరము నియమితకాల పరిశీలన 2018-2019సంవత్సరమునకు తనిఖీ రుసుమును కోరుట – గురించి.

Inspection Fees for the year 2018-2019

నిర్దేశము: 1. జి. బి. ఎం. ఎస్. నెం. 28 తేది. 21.07.2012

2. జి. బి. ఎం. ఎస్. నెం. 08 తేది 13.02.2012.

మీ యొక్క 650వోల్టులు మించిన విద్యుత్ స్థావరము, కేంద్ర విద్యుత్ అధారిటీ (భద్రత మరియు విద్యుత్ సరఫరా) నిబంధనావళి 2010 లోని 30వ నిబంధన ప్రకారము తనిఖీ చేయవలసియున్నది. ఇందు నిమిత్తముగా ఆంధ్రప్రదేశ్ ప్రభుత్వ ట్రిజిస్ట్రీలో గాని ఏదేని స్టేట్ బ్యాంకు ఆఫ్ ఇండియా / హైదరాబాద్ బ్రాంచిలో గాని దిగువనీయబడిన పద్ధతు తనిఖీ రుసుము రూ. 40000=00 చెల్లించి ఒరిజినల్ చలానును 31-03-2018తేదీన లేక ఆ తేదీలోపున ఈ కార్యాలయమునకు పంపవలెను.

చలాను: పెద్ద పద్దు : 0043 Taxes and Duties on Electricity

చిన్న పద్దు: 102 Fee for Services of Electrical Inspector, Rules,2012 and C.E.A.Regulations.

ఉప పద్దు: 01 Fee for Services of Electrical Inspector, Rules,2012 and C.E.A.Regulations.

DDO Code: 0901-0502-002

చలాను ఈ కార్యాలయముకు పైన తెలిపిన తేదీలోగా చేరునట్లు పంపనిచో, జి.బి.ఎం.ఎస్.నెం.8 తేది.13-02-2012 ప్రకారము మొదటి 30 రోజులకు గాను 15%, తదుపరి 30 రోజులకు గాను 30% అపరాధ రుసుముగా చెల్లించవలసియుండును. అటుల చెల్లించనియెడల మీ స్థావరమునకు విద్యుత్ సరఫరా నిలిపివేయుటకు బోర్డు అధికారులను కోరవలసియుండును.

You are requested to submit the original challan on or before 31-03-2018. In the event of failure to pay the fees on or before the due date, as per GO.Ms.No.8 Dt: 13-02-2012 a penal fee of 15% of the fee (max of Rs10000) for the first 30 days and 30% of the fee (max of Rs20000/-) for the next 30 days will be levied, failing which the supply to your installation will be recommended for disconnection.

గమనిక : ఈ లేఖ అందినట్లు ప్రత్యుత్తరమియ్యగలరు.

The receipt of this letter shall be acknowledged.

రుసుము వివరములు:

HV: 8x2500 KVA

Rs 24000=00

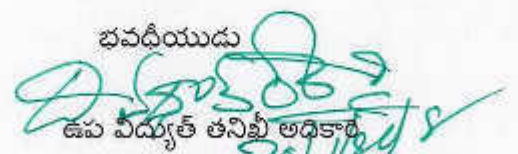
DG Set: 8x2100 KW

Rs 16000=00

Total :

Rs. 40000=00

భవదీయుడు



ఉప విద్యుత్ తనిఖీ అధికారి

కర్నూలు ఉపవిభాగము

ఆంధ్ర ప్రదేశ్ ప్రభుత్వము

విద్యుత్ భద్రతా సంచాలకుల శాఖ

From,

The Deputy Electrical Inspector,
H.No. 79/72, Krishnanagar,
KURNOOL 518 002.
Mobile 7382618565.

To,

M/S. Mytrah(Loc No.16,15,203 to 204,VK 108
to 110),Vajrakarur
Anantapur,
Anantapur District

లేఖ సంఖ్య : ఉపవితి అ/ కర్నూలు / వి.స్థా/బ.సంఖ్య: 77 /2018తేది:30-01-2018

ఆర్య:

విషయము: విద్యుచ్ఛక్తి చట్టము, 2003 - కేంద్ర విద్యుత్ అధారిటీ (భద్రత మరియు విద్యుత్ సరఫరా) నిబంధనావళి 2010 లోని 30వ నిబంధన క్రింద మీ యొక్క 650వోల్టులు మించిన విద్యుత్ స్థావరము నియమితకాల పరిశీలన 2018-2019సంవత్సరమునకు తనిఖీ రుసుమును కోరుట - గురించి.

Inspection Fees for the year 2018-2019

నిర్దేశము: 1. జి. బి. ఎం. ఎస్. నెం. 28 తేది. 21.07.2012

2. జి. బి. ఎం. ఎస్. నెం. 08 తేది 13.02.2012.

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చలాను: పెద్ద పద్దు : 0043 Taxes and Duties on Electricity

చిన్న పద్దు: 102 Fee for Services of Electrical Inspector, Rules,2012 and C.E.A.Regulations.

ఉప పద్దు: 01 Fee for Services of Electrical Inspector, Rules,2012 and C.E.A.Regulations.

DDO Code: 0901-0502-002

చలాను ఈ కార్యాలయముకు పైన తెలిపిన తేదీలోగా చేరునట్లు పంపనిచో, జి.బి.ఎం ఎస్.నెం.8 తేది.13-02-2012 ప్రకారము మొదటి 30 రోజులకు గాను 15%, తదుపరి 30 రోజులకు గాను 30% అపరాధ రుసుముగా చెల్లించవలసియుండును. అటుల చెల్లించనియెడల మీ స్థావరమునకు విద్యుత్ సరఫరా నిలిపివేయుటకు బోర్డు అధికారులను కోరవలసియుండును.

You are requested to submit the original challan on or before 31-03-2018. In the event of failure to pay the fees on or before the due date, as per GO.Ms.No.8 Dt: 13-02-2012 a penal fee of 15% of the fee (max of Rs10000) for the first 30 days and 30% of the fee (max of Rs20000/-) for the next 30 days will be levied, failing which the supply to your installation will be recommended for disconnection.

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The receipt of this letter shall be acknowledged.

రుసుము వివరములు:

HV: 8x2500 KVA

Rs 24000=00

DG Set: 8x2100 KW

Rs 16000=00

Total :

Rs. 40000=00

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కర్నూలు ఉపవిభాగము



**MYTRAH VAYU (PENNAR) PRIVATE LIMITED &
MYTRAH VAYU (INDRAVATI) PRIVATE LIMITED**

**LONG TERM BIRD AND BAT STUDY FOR THE 63 MW WIND POWER
PROJECT AT VAJRAKARUR-I AND 105 MW WIND POWER PROJECT
AT VAJARAKARUR-II IN DISTRICT ANANTAPUR,
ANDHRA PRADESH, INDIA**

FINAL BIRD AND BAT STUDY REPORT



SUBMITTED BY

MARCH, 2018



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Long Term Bird and Bat Study



MARCH, 2018

IND: Long Term Bird and Bat Study for the 63 MW Vajrakarur-I and 105 MW Vajrakarur-II Wind Power Project in District Anantapur, Andhra Pradesh, India

FINAL BIRD AND BAT STUDY REPORT

Site Name:	Vajrakarur, Andhra Pradesh, India
Report Title:	Long Term Bird and Bat Study for the 63 MW Wind Power Project at Vajrakarur-I and 105 MW Vajrakarur-II in District Anantapur, Andhra Pradesh, India
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ABBREVIATIONS

Abbreviated Form	Full Form
amsl	above mean sea level
BAT	Best Available Technology
BNHS	Bombay Natural History Society
CAF	Central Asian Flyway
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CMS	Convention on Migratory Species
CR	Critically Endangered
DFIG	Doubly-Fed Induction Generator
DSLR	Digital Single-Lens Reflex
EIA	Environmental Impact Assessment
EIB	European Investment Bank
EN	Endangered
GPS	Global Positioning System
IBA	Important Bird Areas
IBAT	Integrated Biodiversity Assessment Tool
IEC	International Electro-technical Commission
IMD	Indian Meteorological Department
IUCN	International Union for Conservation of Nature
kW	Kilo Watt
LC	Least Concern
M	Meters
m/s	Meters per Second
MEIPL	Mytrah Energy (India) Pvt. Ltd.
MEL	Mytrah Energy Limited
MoEF&CC	Ministry of Environment, Forest and Climate Change
MVIPL	Mytrah Vayu (Indravati) Private Limited
MVPPL	Mytrah Vayu (Pennar) Private Limited
MW	Mega Watt
NH	National Highways
NT	Near Threatened
OEM	Original Equipment Manufacturers
UK	United Kingdom
UNEP	United Nations Environment Programme
V	Vulnerable
VSPL	Voyants Solutions Private Ltd.
WII	Wildlife Institute of India
WTG	Wind Turbine Generator

0 EXECUTIVE SUMMARY

Mytrah Energy (India) Pvt. Ltd. through a Special Purpose Vehicle, Mytrah Vayu (Pennar) Private Limited and Mytrah Vayu (Indravati) Private Limited has established Vajrakarur-I (63 MW capacity) and Vajrakarur-II (105 MW capacity) Wind Power Project in Vajrakarur mandal, Anantapur District of Andhra Pradesh (hereinafter referred to as the 'Project'). The Vajrakarur-I comprises of 30 WTG's of Suzlon Model: S-88 with unit rated capacity of 2.1 MW each and Vajrakarur-II comprises of 50 WTG's of Suzlon Model: S-97 with unit rated capacity of 2.1 MW each.

The present long-term bird and bat survey was undertaken by Voyants Solutions Pvt. Ltd. (VSPL) to study the potential impact of wind turbines (80) on bat and avifauna population of the project area, covering both projects. The area acquired for the projects is generally flat private rain-fed agricultural, fallow and barren land interspersed with sparsely distributed patches of natural vegetation. Habitat type of the study area is modified to varying extents primarily due to agricultural and intersected human habitations and other buildup area. The plains are used for agriculture purposes whereas; uncultivated patches are mainly covered by open thorny scrub.

Moka Reserve Forest, located nearly 34 Km north-west of study area is the nearest protected area from project area location. The nearest Important Bird Area (IBA) w.r.t project is Hampi, located approximately 65 Km from the project area. The major observations of the present survey are:

- i. A total of 56 bird species including 52 residents and 04 migrant species, were recorded in the project study area during the primary survey carried out in Winter (January, 2017) & Monsoon (July, 2017) seasons study. No bat species was sighted during the primary investigation, however 01 bat species (Indian Fulvous Fruit Bat-*Rousettus leschenaultia*) is reported to be present in the study area as per the consultation with local inhabitants.
- ii. Out of the 56 species, 35 resident bird species and 04 migratory bird species were recorded in the winter season (January, 2017) whereas a total of 38 resident bird species were recorded during the monsoon season (July 2017). No migratory bird species was recorded during the Monsoon season (July, 2017) study.
- iii. Apart from the bird and bat species recorded during primary field survey in Winter & Monsoon seasons, various publically available secondary sources are also explored to understand the presence of other bird and bat species in the project area and its influence zone, which is considered to be 02 Km for this study. The analysis of secondary data reveals that about 108 resident bird species, 76 migratory bird species and 25 bat species of possible occurrence are reported to be present in the study area and its environs of upto 2 kms (**Annexure-I**). The number of resident, migratory and bat species enumerated in **Annexure-I** in accordance to the secondary sources does not include the bird & bat species recorded during the primary field survey carried out during Winter & Monsoon Seasons.
- iv. Desktop survey as well as primary observation suggest that project area does not coincide with any major migratory route.

- v. The entire Indian subcontinent, including the study area, falls within Central Asian Flyway (CAF)¹, which is one of the eight globally identified flyways. This flyway covers a large part of the continental area of Eurasia and includes the whole of the Indian sub-continent. Thus, the study-area is very likely to be situated in the flight-path of the various winter, summer and passage visitor-birds migrating either to or through the region in which it is situated. However, considering the limited rainfall and major water bodies within the 02 km periphery of the study area, it is unlikely that, the study area is being used as resting or staging point by migratory birds. Therefore, based on the available information and site observations, it is suggesting that study area may not coincide with any major migratory route;
- vi. As per the conservation status criteria's consider for the 56 bird species (consisting 52 resident birds and 04 migratory bird species) recorded in the project study area during the winter & monsoon seasons study. Out of 52 resident Birds & 04 Migratory bird species recorded during the study period (winter & monsoon seasons), only 04 Resident bird species i.e. Shikra (*Accipiter badius*), Little Ringed Plover (*Charadrius dubius*), Black-winged Kite (*Elanus caeruleus*) and Black Kite (*Milvus migrans*) fall under species of conservation importance (**Please Refer Table 4-2**) as per IUCN Red list category, Indian Wildlife (Protection) Act, 1972 (As amended up to, 2006), CITES APPENDIX: I, II and II and; CMS APPENDIX: II. No Migratory bird species is reported to falls under CITES APPENDIX: I, II and II and; CMS APPENDIX: II. However, one migratory bird species (Asian Brown Flycatcher- *Muscicapa dauurica*) is listed under category IV of the Indian Wildlife (Protection) Act, 1972-As amended up to, 2006).
- vii. All the 52 resident bird species & 04 Migratory bird species recorded during the study period (winter & monsoon seasons belongs to **"Least Concern"** category in accordance to IUCN Red list category.
- viii. The IBAT screening of the project study area confirm that, the study area does not form part of any critical habitat including IUCN protected area, Key Biodiversity Areas and Ramsar Wetland Site etc.
- ix. The impact identified on bat and bird population of the study area due to project mainly consist mortality due to collision with turbine rotor or electrocution with high tension transmission line or in general disturbance in the flight route of local bat and birds due to presence of wind turbine in the area.

Based on the findings of the survey undertaken during Winter Season from (25th to 30th January 2017) and Monsoon season from (19th to 22nd July 2017), it is suggested that, the Project will not threaten the long-term viability/function of any of bird and bat species recorded in the area. However, mitigation measures are suggested to minimize the project impact on bat and avifauna. Further, as a way forward, global best practices to avoid and minimize the mortality due to collision with turbine rotor and electrocution with high tension transmission lines is also given in the Mitigation Measures section of the report.

¹ Photo-log showing Central Asian Flyway is attached as ANNEXURE IV

1 INTRODUCTION

Mythrah Energy (India) Pvt. Ltd. (hereinafter referred to as “MEIPL”), a wholly owned subsidiary of Mytrah Energy Limited (hereinafter referred to as “MEL” / “Mytrah”) formerly known as Caparo Energy Limited, MEL is a public limited company incorporated in Guernsey, United Kingdom. MEIL has built a portfolio of over 500 MW of operating wind farms in India, with projects running in Eight states - Rajasthan, Gujarat, Maharashtra, Andhra Pradesh, Karnataka, Madhya Pradesh, Telangana and Tamil Nadu. The company aims to own and operate 5000 MW of renewable power in India.

Mytrah through a Special Purpose Vehicle, Mytrah Vayu (Pennar) Private Limited (hereinafter referred to as “MVPPL”) and Mytrah Vayu Indravati Private Limited (hereinafter referred to as “MVIPL”) has established Vajrakarur-I (63 MW capacity) and Vajrakarur-II (105 MW capacity) Wind Power Project in Vajrakarur mandal, Anantapur District of Andhra Pradesh (hereinafter referred to as the ‘Project’). Total 30, Suzlon S-88 and 50, Suzlon S-97 Wind Turbine Generators (WTG) with a rated capacity of 2.1 MW each has been installed for Vajrakarur-I, 63 MW and Vajrakarur-II, 105 MW respectively.

MVPPL and MVIPL both, has signed a power purchase agreement (PPA) with M/s Transmission Corporation of Andhra Pradesh limited (AP-TRANSCO), Government of Andhra Pradesh. The PPA specifies sale of 100% power generated to AP-TRANSCO on tariff determined in accordance with Andhra Pradesh State Electricity Board guideline.

Mytrah intends to carry out a long term Bird and Bat Study to assess the impacts of project on Birds and Bats. Mytrah has retained the services of Voyants Solutions Pvt. Ltd. (VSPL) to undertake the long-term bird and bat survey for both Wind Power Project in Vajrakarur. The Bird and Bat Study has been conducted as per the requirement of Mytrah and scope of work agreed by Mytrah and the Consultant.

The Report has been prepared based on the data collected during site survey undertaken in Winter & Monsoon seasons at Project area to study the natural habitat conditions, bird and bat profile of the area, and their behavior, etc. Bird and bat monitoring relies on direct field observations, indirect evidences, credible information, and desktop study of available relevant literature as well as subject expert’s professional judgments.

1.1 PROJECT DETAILS

Both, 63 MW Vajrakarur-I and 105 MW Vajrakarur-II Wind Power Project is located in Vajrakarur Mandal in Anantapur District in the state of Andhra Pradesh, India. Vajrakarur-I is spread over six villages namely: Chabala, Uravakonda, Chinnahotur, P.C. Pyapili, Gade Hotur and Veligonda while, Vajrakarur-II is spread over seven villages namely: Thatrakal, Vajrakarur, Gade Hothur, Pottipadu, Gulapalem, Konakondla and Kamalpadu.

The total area acquired for Vajrakarur-I is 60.7 Hectares including 15.22 ha of Govt. allotted revenue land (Revenue Land: 15.22 ha and Private Land: 45.48 ha). The total area acquired for Vajrakarur-II is 60.5 Hectares. The land acquired for both projects is predominantly private land and generally

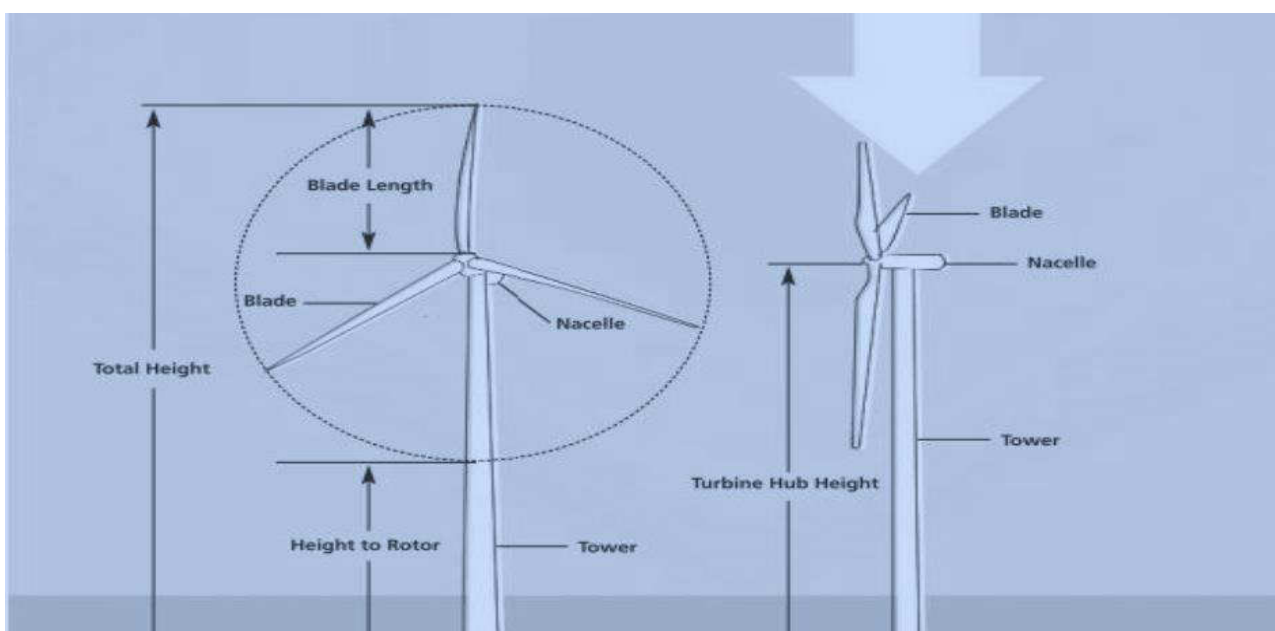
flat, rain-fed agricultural, fallow and barren land interspersed with sparsely distributed patches of natural vegetation.

The Vajrakarur-I comprises of 30 WTG's of Suzlon Model: S-88 with unit rated capacity of 2.1 MW each and Vajrakarur-II comprises of 50 WTG's of Suzlon Model: S-97 with unit rated capacity of 2.1 MW each. The major component of a typical turbine is illustrated in the **Figure 1-1** while; the key technical details of the wind turbine are provided in **Table 1.1** as below.

Table 1-1: Technical Details on Wind Turbine Generator

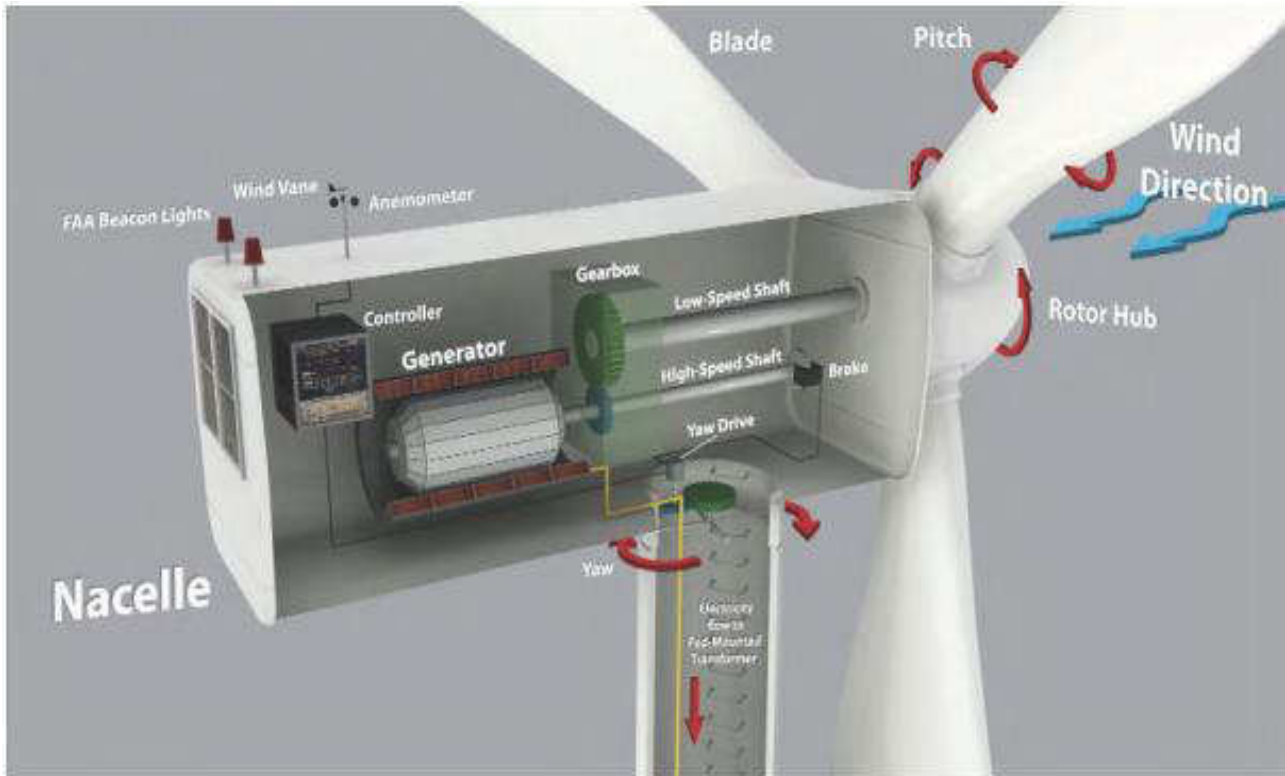
Technical Aspect	Details	
	Vajrakarur-I	Vajrakarur-II
No. of WTG	30	50
Turbine Model	S-88	S-97
Rotor diameter	88 m	97 m
Installed electrical output	2100 Kw	2100 Kw
Cut-in wind speed	4 m/s	3.5 m/s
Cut-out wind speed	25 m/s	25 m/s
Rated wind speed	14 m/s	11 m/s
Rotor swept area	6082 m ²	7386 m ²
Hub Heights	120 m	90 m
Rotational speed	15.47 rpm	12.0 to 15.5 rpm
Frequency	50 Hz	50 Hz

Figure 1-1: Wind turbine and its components



**Source: EIA guidelines, Wind Power by Centre for Science and Environment, New Delhi*

Figure 1-2: Working of Wind Turbine



**Source: EIA guidelines, Wind Power by Centre for Science and Environment, New Delhi*

1.2 BACKGROUND OF BIRD AND BAT MONITORING STUDY

Voyants Solutions Private Ltd. (VSPL) herein termed as “Consultant” has been entrusted by Mytrah to carry out the long-term bird and bat survey for the project. The present long-term bird and bat survey conducted to study the potential impact of wind turbines on bat and avifauna population of both projects. Wind turbine generators generally are considered a threat to the movements of local avifauna and bat and to the migratory route of avifauna (if, any). Continuous whistling noise from WTG’s may influence the natural habitat of avifauna as well. The present survey conducted to study the natural habitat conditions, bat and bird species profile, their behavior, etc. to assess the potential impacts of WTG’s on the bat and avifauna population.

Bird and bat monitoring plan rely on direct field observations, indirect evidences, authentic information and desktop study of available relevant published literature as well as subject expert’s professional judgments. After review of relevant secondary information available for the project area and its environs, first season study was carried out in late winters from 25th to 30th January 2017 followed by a second (monsoon) season study in July, 2017 (i.e. 19th-22nd July 2017). In first season study, the study area for undertaking the bird and bat assessment was delineated w.r.t to project site, reconnaissance survey was conducted to evaluate the land use and vegetation of the within the study area and 10 locations (05 locations each in Vajrakarur-I & Vajrakarur-II) were identified for vantage point studies within the Project area.

The second season survey, mainly focused on making inventory of species sighted/recorded during the survey and to study the natural habitat conditions at the time of survey.

Monitoring undertook include survey around 2 km radius of the project area, vantage point survey, water-body survey and carcass survey at operational WTGs to record issues of bird/bat collision.

1.3 OBJECTIVE AND SCOPE OF WORK

The main objective of long-term bird and bat study is to identify areas of ornithological interest, assess the potential impact of wind turbines on avifauna population of the project area and to provide recommendations to minimize identified impacts.

The scope of work for the study includes:

- i. Desktop study to obtain existing records of bird and bat species having range that coincides with the study area, with special reference to species of conservation importance;
- ii. Habitat and flight path survey of bird and bat population to assess likelihood of impact due to WTG's locations;
- iii. Consultation with officials at District Forest office Anantapur to get information on wildlife of the area recorded in Forest Working Plan, information on flight paths/migratory route in the study area and to recognize their concerns with respect to project;
- iv. Discussion with local NGO's to collect the information on conservation status of birds and bats in the study area;
- v. Appraisal of issues of bird/bat collision in areas of operational turbines;
- vi. Vantage point survey following procedure detailed in SNH 2010, 2014; Band et al. 2007, 2012.
- vii. Study of water bodies within 2 km radius of the project site;
- viii. Evaluation of the migratory routes of avifauna, if any;
- ix. Carcass monitoring at the operational WTG's locations.

1.4 LIMITATION OF STUDY

Information about the project, such as location and size of the facility and type of turbines were drawn from information provided by Mytrah and any significant change in the shared information may result in variation of outcome. Secondly, it is to be noted that, seasonal constraints and local climatic conditions can influence the detection of certain species. Further, majority of species including threatened species are extremely secretive and difficult to observe even during exhaustive field surveys. Therefore, lack of signs of any particular species does not confirm its absence, merely because there was no indication of its presence during this survey. The results of the study are therefore an outcome of surveys undertaken at project site and, desk research as well as professional judgments of the expert. Presence of bird and bat species on site is assessed mainly on habitat availability and suitability.

1.5 REPORT STRUCTURE

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

Executive Summary: This section concisely describes the significant findings of the bird and bat survey conducted for the project.

Chapter-1: Introduction: This chapter provides project details, description of background, objectives, and scope of the bird and bat study undertaken for the project.

Chapter-2: Study Area: This chapter provides the description of bio-geographical settings of the project area, study area specified for the bird and bat assessment and project components etc.

Chapter-3: Approach and Methodology: This chapter defines the approach and methodology adopted for the bird and bat assessment undertaken for the project.

Chapter-4: Observation and Analysis: This chapter lists out the major observations of bird and bat assessment undertaken for the project, primary data findings, its analysis and results.

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

Chapter-6: Closure: The conclusion drawn from the bird and bat assessment study has been presented in this chapter.

2 PROJECT AND STUDY AREA

2.1 BIO-GEOGRAPHIC SETTINGS OF PROJECT AREA

The area covered by both projects respectively, along with the distance between the projects sites (nearly 2 km) is referred as project area for this study. The project area is located in south of Guntakal Town and approximately 45 km, North-West to Anantapur city. The Project area has good road connectivity from Anantapur City through Bellary-Anantapur highway, which transverse through the western boundary of project. Urvakonda is the nearest town to project area, which is located at a distance of about 18 km from the project site.

The project area comprises of rain-fed agricultural, fallow and barren land interspersed with sparsely distributed patches of natural vegetation. The terrain is mainly plain to gently undulating at some area, with few small ridges and rocky outcrops. The area predominantly has black and red soils. The area is drought-prone, characterized by hot summers, and is generally dry, except during the southwest monsoon season. Due to drought conditions and lack of adequate irrigation facilities, farmers in the area cultivate their lands only in the rainy season and mostly grow Cotton, Maize, Sunflower, Tur Dal, Castor and Groundnut in the fields. The pictorial view of the WTGs location is presented in below photographs (**Figure 2.1**). The project location map is illustrated in **Figure 2.2** as follows:

Figure 2-1: Pictorial view of the Project Area



Figure 2-2: Indicative Location of the Project are



2.2 CLIMATOLOGICAL SETTING

Anantapur district falls in arid agro-ecological zone² and is marked by hot arid bioclimatic condition with dry summers and mild winters. Being far from the east coast, the district is deprived of monsoons (both Northeast and Southwest) and subjected to droughts due to bad seasons. The normal rainfall of the district is 553.0 mm. The normal rainfall for the Southwest monsoon period (June-September) is 338 mm, which is 61.2 per cent of the total rainfall for the year. The rainfall for Northeast monsoon period (October-December) is 156 mm only, which is 28.3 per cent of total annual rainfall (Government of Andhra Pradesh, 2009)³.

The minimum and maximum temperatures range between 17°C to 39°C. April and May are warm months when the normal daily maximum temperature ranges between 29°C to 39°C. November, December and January are cooler months when the temperature falls about 17.3°C.

2.3 STUDY AREA

The entire project area, along with the area falling within 2 km in outward direction from the outermost wind-turbine of the projects was subjected to bat and bird assessment. This area collectively referred to as 'Study Area' hereinafter.

The study-area falls in the drought-prone area in Rayalaseema Plateau regions of Andhra Pradesh characterized by hills, ridges, and gently sloping lands. The study area and its surroundings predominantly comprises of private agricultural land, which is being cultivated only during rainy season and for rest part of the year it is used for grazing activity. The general vegetation represents the degraded and sparse thorny scrubland and no pristine patch of vegetation was found during the survey. There are a few dispersed human habitations, mostly small villages, in the form of closely clustered homesteads. The study area is intersected by Bellary – Guntakal – Tadpatri highway, which runs from West to the North of the study-area, while Bellary-Anantapur highway, transverse through the western boundary of the study area. In addition to these major roads, a few minor metalled roads also run through the survey-area joining major towns, besides a number of dirt roads and foot-trails. Therefore, habitat type of the study area is modified to varying extents primarily due to agricultural and intersected human habitations and other buildup area. The plains are used for agriculture purposes whereas; uncultivated patches are mainly covered by open thorny scrub.

According to the Champion and Seth Classification of Indian Forests (1968), the natural vegetation of the survey area represents the following forest-types:

Type 6A/C1 (Sub-group 6A - Southern Tropical Thorn Forest, Sub-division C1 – Southern Thorn Forest): These forests are seen in peninsular India, throughout the dry tract to the lee of the Western Ghats. They are met with on shallow dry soil, or deep but sandy soil. The ground is usually

² and ³ Designing Rural Technology Delivery Systems for Mitigating Agricultural Distress: A study of Anantapur District, (2009)

flat or in the form of low undulating hills and plateau.

It is an open and low forest dominated by thorny species. The trees tend to be short with low-branching crowns that rarely meet to form a canopy. There is an ill-defined lower storey of large and small shrubs which tend to be spiny and show various xerophytic characters. A thin growth of grass appears during the moist season, but the ground remains largely bare through the rest of the year. Climbers are few, with most of the ones present also showing xerophytic adaptations.

Species associated with this type include:

Trees like *Acacia catechu*, *Acacia leucophloea*, *Acacia nilotica*, *Aegle marmelos*, *Ailanthus excelsa*, *Albizia spp.*, *Azadirachta indica*, *Balanites aegyptica*, *Chloroxylon swietenia*, *Dichrostachys cinerea*, *Dolichandrone falcata*, *Ficus spp.*, *Flacourtia indica*, *Grewia spp.*, *Ixora arborea*, *Randia spp.*, *Santalum album*, *Strychnos potatorum* and *Zizyphus spp.*;

Shrubs: *Capparis decidua*, *Carissa spp.*, *Cassia auriculata*, *Dodonaea viscosa*, *Euphorbia nivulia*, *Lantana camara* and *Opuntia elatior*;

Grasses: *Aristida spp.*, and *Heteropogon contortus*; and;

Climbers: *Ziziphus oenoplia*.

Type 6/DS2 (Group 6 – Southern Tropical Thorn Forest, Degradation Stage DS2 – Southern Euphorbia Scrub): This type of forest may represent either the ultimate stage in degradation of the previous forest type or extremely poor soil conditions. Though the *Acacia* and their associates continue to occur even in this stage, the trees are very stunted and take on a bush-like form. It is a very open form of forest in which the presence of fleshy Euphorbias is characteristic. Most of the soil is bare, with only a thin cover of wiry grasses. Species associated with this type include:

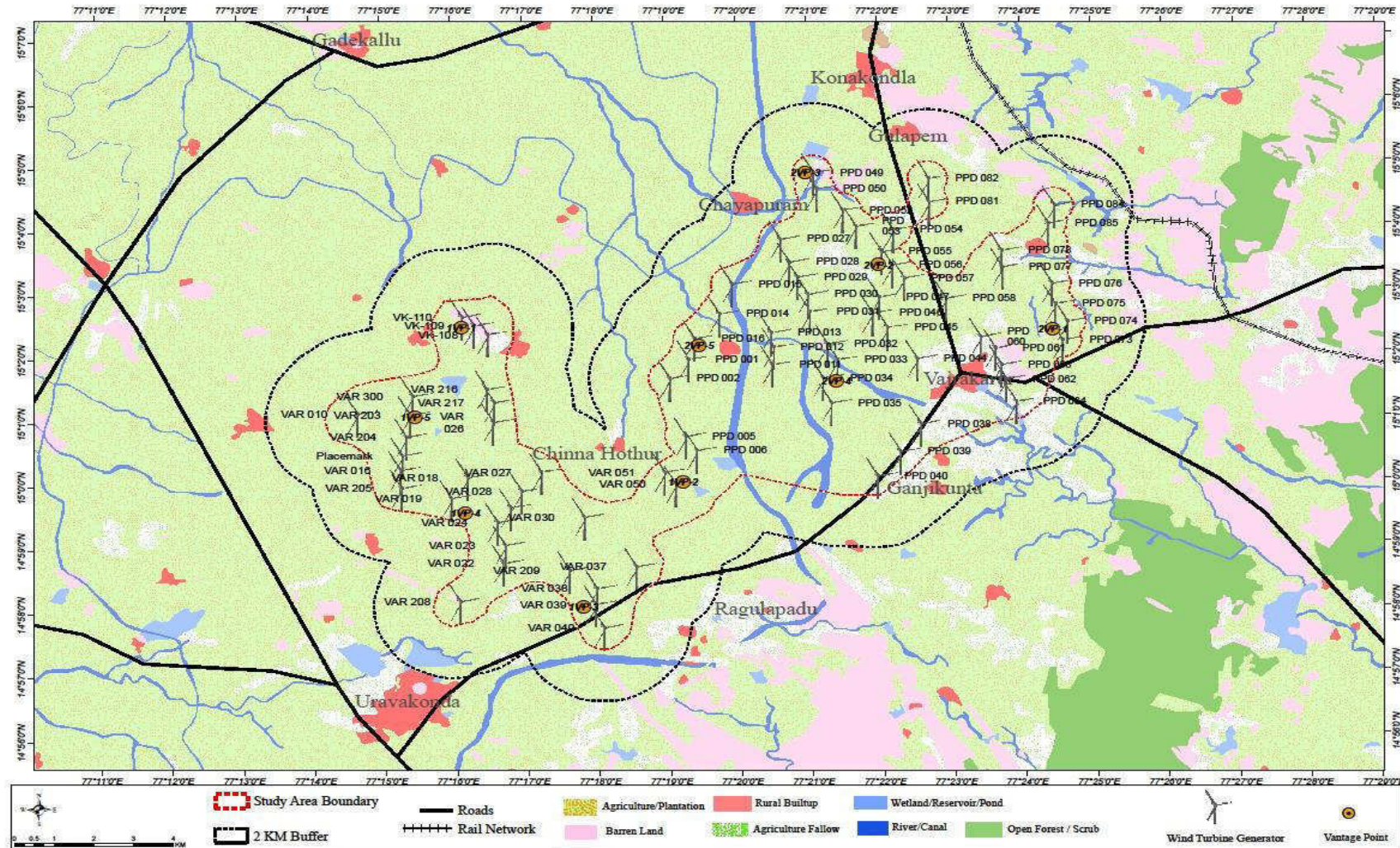
Large shrubs: *Calotropis gigantea*, *Capparis decidua*, *Euphorbia antiquorum* and *Euphorbia tirucalli*;

Small shrubs: *Barleria buxifolia*, *Cassia auriculata*, *Dodonaea viscosa* and *Opuntia elatior*; and;

Grasses: *Aristida spp.* and *Cymbopogon spp.* (*Source: H. G. Champion & S. K. Seth, A Revised Survey of the Forest Types of India)

There are few seasonal shallow streams in the study area forming catchments and draining into either Hagari River to its west or the Penner River to its east. Entire study area is intersected by handri Neeva Sujala Sravanthi (HNSS) Canal however, no major natural lakes/ponds or any other natural water body were recorded in the study area during the course of survey except a small artificial pond near WTG VAR 300, a drinking water supply project named as 'Satya Sai Reservoir', located at a distance of 2.8 km from WTG No. PPD 049 and a pond in Pottipadu village. In addition, there is no ecological sensitive/legally protected area such as; National Park, Wildlife Sanctuary and/or Reserve Forest etc., within 2 km radius of the project. The nearest legally protected area is Moka Reserve Forest which is about 34 Km north of study area. The nearest Important Bird Area (IBA) w.r.t project is Hampi, located approximately 65 Km from the project area. The majority of the study area is identified as low bird activity zone mainly because; the general vegetation of the area is poor and does not support microhabitats to attract large populations of bird. Map showing the boundary and physical features of the study area is presented in **Figure 2-3** as below.

Figure 2-3: Map showing study area boundary and physical features within



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 Vajrakarur-I and Vajrakarur-II project. To achieve the mentioned objective, general reconnaissance survey in and around the project sites was carried out between 19th to 22nd July, 2017. Identification of bats and avifauna species in the field was carried out with the help of the following field guides:

- Birds of the Indian Subcontinent by R. Grimmett, C. Inskipp & T. Inskipp (Second Edition, 2014);
- Salim Ali's Book of Indian Birds Indian Bird by Salim Ali (Thirteenth Revised Edition, 2002);
- Bats of the Indian Subcontinent by Bates and Harrison (1997);
- A Field Guide to Indian Mammals by Vivek Menon (2014);
- Scientific publications of Zoological Survey of India (Subsidiary Govt. organization under the control of Ministry of Environment and Climate Change (MoEF&CC), Govt. of India, New Delhi);
- Scientific publications of Bombay Natural History Society (BNHS) and;
- Scientific publications of Wildlife Institute of India (WII).

Comet 10x50 DPSI power (Night vision) standard binocular was used to scan the area to spot bird-species and Cannon EOS 1300D, 18 megapixel DSLR (digital single-lens reflex) Camera was used for taking pictures during the survey. The details on methods adopted for the present study is enumerate below:

Review of Secondary Literature: An extensive desktop review of available published literature (books, websites, scientific papers, articles etc.) was conducted. The Forest Working Plans of the Forest Divisions falling in the project area were also referred to for secondary information. Additional information was sourced from the project proponent, state forest department and local residents of the survey-area. The secondary data was appropriately supplemented by a field survey for primary data collection.

Reconnaissance Survey:

To get an overview of the overall ecological setting of the project area, reconnaissance survey of all the 80 WTGs locations and associated facilities, such as the pooling substation, was carried out in winter season from 25th to 30th January 2017 followed by a monsoon season study in July, 2017 (i.e. 14th-18th July 2017). Accessible turbine locations were covered using a vehicle, while inaccessible areas were covered on foot. The survey was focused on evaluating existing land use and vegetation of the site and its surroundings. Transect walk was undertaken to collect visual information about

the species composition of bats and birds. Based on this survey, ten (10) sites for both projects were identified for vantage point studies within the project area (**Please refer Figure 2-3**).

Identification of Species: Identification of the species sighted in the field was carried out with help of published field guides mentioned above. Identification of a species based on indirect evidence (Feathers, nests, carcass) was also carried in the field wherever applicable.

Identification of important birds & bats habitats, hotspots: The distances of the study area from ecological sensitive areas such as; Important Bird Areas (IBAs), classified by Birdlife International, legally protected areas (National Parks, wildlife Sanctuaries etc.), wetlands, and grassland areas were measured using GPS.

Vantage Point Survey: Vantage point survey was undertaken at ten (10) locations that were identified during reconnaissance surveys. Each vantage point was scanned for a short period, with 10x50 DPSI power (Night vision) standard binocular, to spot bird-species. At each location, one uninterrupted focused watch was conducted for one and half-hour.

Water body survey: Water bodies in and around the project sites were surveyed with a view to identify aquatic and water dependent bird species in the area.

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

Carcass Survey: Carcass Surveys were carried out in the study area and operational WTG's to identify bird and bat collision/carcass.

Consultation with State Forest and Wildlife Department: Consultation with local State forest and wildlife department located at Anantapur was undertaken to identify issues of local concern with respect to bird and bat population of the study area.

Preparation of Inventory: Based on the field identification, studies carried out during transect walk, primary surveys, and secondary data from the available literature an inventory of bird and bat species associated with the project area was prepared.

Mapping of Migratory Routes of Avifauna: Mapping of Migratory routes of bird and bat population was done by review of available secondary information, information sourced from local people, routing of large water bodies and by applying professional judgments.

Report Preparation: The report includes detailed 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 both projects. The report also includes recommendations to avoid any long-term potential impact on bird and bat population of the project area.

4 OBSERVATION AND ANALYSIS

This chapter provides the baseline data generated based on the findings of desktop review and the subsequent data recorded during winter season from 25th to 30th January 2017 followed by a monsoon season study in July, 2017 (i.e. 14th-18th July 2017). Details of data illustrating birds and bats species associated with the study area, which is identified through secondary data and primary survey, are provided below in respective sections of this chapter. The species associated with the study area is categorized with respect to their conservation status considering following criteria:

1. **IUCN Red Data List:** The International Union for Conservation of Nature (IUCN) Red List of Threatened Species provides taxonomic, conservation status and distribution information on plants and animals that have been globally evaluated using the IUCN Red List Categories and Criteria. This system is designed to determine the relative risk of extinction and the main purpose of the IUCN Red List is to catalogue and highlight those plants and animals that are facing a higher risk of global extinction (i.e., those listed as Critically Endangered and Endangered).
2. **The Wildlife Protection Act (1972), India:** The Wildlife Protection Act, 1972 is an Act of the Parliament of India enacted for protection of plants and animal species. Before 1972, India only had five designated national parks. Among other reforms, the Act established schedules of protected plant and animal species; hunting or harvesting these species was largely outlawed. The Act provides for the protection of wild animals, birds and plants; and for matters connected therewith or ancillary or incidental thereto. It extends to the whole of India, except the State of Jammu and Kashmir which has its own wildlife act. The Act has six (VI) schedules which give varying degrees of protection. Schedule I and part II of Schedule II provide absolute protection-offences under these are prescribed the highest penalties. Species listed in Schedule III and Schedule IV are also protected, but the penalties are much lower. Schedule V includes the animals which may be hunted. The plants in Schedule VI are prohibited from cultivation and planting. The hunting to the Enforcement authorities have the power to compound offences under this Schedule (i.e. they impose fines on the offenders). Up to April 2010 there have been 16 convictions under this act relating to the death of tigers.
3. **Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES):** CITES is an international treaty to prevent species from becoming endangered or extinct because of international trade. Under this treaty, countries work together to regulate the international trade of animal and plant species and ensure that this trade is not detrimental to the survival of wild populations. It is administered through the United Nations Environment Programme (UNEP). Species for which trade is controlled are listed in one of three Appendices to CITES, each conferring a different level of regulation and requiring CITES permits or certificates:
 - **Appendix I:** Include species threatened with extinction and provides the greatest level

of protection, including restrictions on commercial trade.

- **Appendix II:** Include species that although currently not threatened with extinction, may become so without trade controls. It also includes species that resemble other listed species and need to be regulated in order to effectively control the trade in those other listed species.
- **Appendix III:** Include species for which a range country has asked other Parties to help in controlling international trade. Species falling under Appendix I and II only, have been considered in this report.

4. Species identified under Convention on Migratory Species (CMS): CMS aims to conserve terrestrial, marine and avian migratory species throughout their range. It is an intergovernmental treaty, concluded under the aegis of the United Nations Environment Programme (UNEP), concerned with the conservation of wildlife and habitats on a global scale. The CMS species of concern are categorized under **Appendix I** and **Appendix II**:

- **Appendix I** of the CMS provides list of Migratory species threatened with extinction;
- **Appendix II** of CMS lists the migratory species that need or would significantly benefit from international co-operation

For the current study, the Integrated Biodiversity Assessment Tool (IBAT) is also referred. IBAT is a unique web-based tool, which provides spatial information about protected and unprotected areas of the terrestrial and marine biodiversity globally. Along with IBAT the information on the bird species is also sourced from Avibase checklist⁴, which is an extensive database information system of bird species. Both the tools provide a basic risk screening of regional biodiversity of an area. The result of Vantage Point Survey conducted at Ten (10), identified vantage point and Carcass Survey conducted within the study area are also provided in the following sections of this chapter.

4.1 BIRD AND BAT SURVEYS

This sub-section presents the details on birds and bats species having recorded ranges that include the study area and/or recorded during the field survey.

4.1.1 BIRDS

The avifaunal profile of the study area gives details of resident and migratory bird species having recorded ranges that include the study area.

Resident Avifauna

Resident bird species identified through secondary data and primary survey with conservation status of the species are provided below in **Table 4.1**. The species sighted during the primary survey and that of conservation status as per the criteria mentioned above are also listed in separate column of the table and are typed in **bold Letters**. Similarly, as per the publically available secondary sources the resident

⁴ Provides latest updated list of species as per Clements, version 2016

bird species reported from the project area and its influence zone, which is considered to be 2 Km for this study is given in Annexure-I with their conservation status in accordance to the criteria described above.

Table 4-1: Resident Avifauna associated with the Study Area

S.No.	Scientific Name	Common Name	Order	IUCN Status*	WPA Schedule	CITES status	CMS Appendix	Recorded during Jan-17	Recorded During Jul-17
1.	<i>Accipiter badius</i>	Shikra	Accipitriformes	LC	IV	II	II	--	Recorded
2.	<i>Acridotheres tristis</i>	Common Myna	Accipitriformes	LC	IV	--	--	Recorded	Recorded
3.	<i>Aegithina tiphia</i>	Common Iora	Passeriformes	LC	IV	--	--	--	Recorded
4.	<i>Ammomanes phoenicurus</i>	Rufous-tailed Lark	Passeriformes	LC	IV	--	--	Recorded	--
5.	<i>Anthus rufulus</i>	Paddyfield Pipit	Passeriformes	LC	IV	--	--	Recorded	--
6.	<i>Apus affinis</i>	Little Swift	Apodiformes	LC	--	--	--	--	Recorded
7.	<i>Ardea cinerea</i>	Grey Heron	Pelecaniformes	LC	IV	--	--	--	Recorded
8.	<i>Ardeola grayii</i>	Indian Pond Heron	Pelecaniformes	LC	IV	--	--	Recorded	Recorded
9.	<i>Bubulcus ibis</i>	Cattle Egret	Pelecaniformes	LC	IV	--	--	Recorded	--
10.	<i>Casmerodius albus</i>	Great Egret	Pelecaniformes	LC	IV	--	--	Recorded	--
11.	<i>Charadrius dubius</i>	Little Ringed Plover	Charadriiformes	LC	IV	--	II	--	Recorded
12.	<i>Cinnyris asiaticus</i>	Purple Sunbird	Passeriformes	LC	IV	--	--	Recorded	Recorded
13.	<i>Columba livia</i>	Rock Dove	Columbiformes	LC	IV	--	--	Recorded	Recorded
14.	<i>Copsychus saularis</i>	Oriental Magpie Robin	Passeriformes	LC	IV	--	--	Recorded	Recorded
15.	<i>Coracias benghalensis</i>	Indian Roller	Coraciiformes	LC	IV	--	--	Recorded	Recorded
16.	<i>Corvus splendens</i>	House Crow	Passeriformes	LC	V	--	--	Recorded	Recorded
17.	<i>Corvus culminatus</i>	Indian Jungle Crow	Passeriformes	LC	V	--	--	--	Recorded
18.	<i>Cypsiurus balasiensis</i>	Asian Palm Swift	Apodiformes	LC	--	--	--	Recorded	--
19.	<i>Dicrurus macrocercus</i>	Black Drongo	Passeriformes	LC	IV	--	--	Recorded	Recorded
20.	<i>Egretta garzetta</i>	Little Egret	Pelecaniformes	LC	IV	--	--	--	Recorded



S.No.	Scientific Name	Common Name	Order	IUCN Status*	WPA Schedule	CITES status	CMS Appendix	Recorded during Jan-17	Recorded During Jul-17
21.	<i>Elanus caeruleus</i>	Black-winged Kite	Accipitriformes	LC	IV	II	--	Recorded	--
22.	<i>Eremopterix griseus</i>	Ashy-crowned Sparrow Lark	Passeriformes	LC	IV	--	--	Recorded	--
23.	<i>Eudynamys scolopaceus</i>	Asian Koel	Cuculiformes	LC	IV	--	--	--	Recorded
24.	<i>Francolinus pndicerianus</i>	Grey Francolin	Galliformes	LC	IV	--	--	Recorded	Recorded
25.	<i>Galerida deva</i>	Sykes's Lark	Passeriformes	LC	IV	--	--	--	Recorded
26.	<i>Halcyon smyrnensis</i>	White-throated Kingfisher	Coraciiformes	LC	IV	--	--	Recorded	--
27.	<i>Lanius meridionalis</i>	Southern Grey Shrike	Passeriformes	LC	--	--	--	Recorded	Recorded
28.	<i>Lanius vittatus</i>	Bay-backed Shrike	Passeriformes	LC	--	--	--	Recorded	Recorded
29.	<i>Leptocoma zeylonica</i>	Purple-rumped Sunbird	Passeriformes	LC	IV	--	--	Recorded	Recorded
30.	<i>Lonchura malacca</i>	Black-headed Munia	Passeriformes	LC	IV	--	--	--	Recorded
31.	<i>Microcarbo niger</i>	Little Cormorant	Pelecaniformes	LC	IV	--	--	--	Recorded
32.	<i>Milvus migrans</i>	Black Kite	Accipitriformes	LC	IV	II	II	Recorded	--
33.	<i>Mirafra erythroptera</i>	Indian Bushlark	Passeriformes	LC	IV	--	--	Recorded	Recorded
34.	<i>Motacilla madaraspatensis</i>	White-browed Wagtail	Passeriformes	LC	IV	--	--	Recorded	Recorded
35.	<i>Oriolus xanthornus</i>	Black-hooded Oriole	Passeriformes	LC	IV	--	--	Recorded	--
36.	<i>Passer domesticus</i>	House Sparrow	Passeriformes	LC	--	--	--	--	Recorded
37.	<i>Pericrocotus cinnamomeus</i>	Small Minivet	Passeriformes	LC	--	--	--	--	Recorded
38.	<i>Ploceus philippinus</i>	Baya Weaver	Passeriformes	LC	IV	--	--	--	Recorded
39.	<i>Psittacula krameri</i>	Rose-ringed Parakeet	Psittaciformes	LC	IV	--	--	--	Recorded
40.	<i>Ptyonoprogne concolor</i>	Dusky Crag Martin	Passeriformes	LC	--	--	--	Recorded	--
41.	<i>Pycnonotus cafer</i>	Red-vented Bulbul	Passeriformes	LC	IV	--	--	Recorded	Recorded
42.	<i>Saxicola caprata</i>	Pied Bush Chat	Passeriformes	LC	IV	--	--	--	Recorded
43.	<i>Saxicoloides fulicatus</i>	Indian Robin	Passeriformes	LC	IV	--	--	Recorded	Recorded



S.No.	Scientific Name	Common Name	Order	IUCN Status*	WPA Schedule	CITES status	CMS Appendix	Recorded during Jan-17	Recorded During Jul-17
44.	<i>Streptopelia chinensis</i>	Spotted Dove	Columbiformes	LC	IV	--	--	Recorded	--
45.	<i>Streptopelia decaocto</i>	Eurasian Collared Dove	Columbiformes	LC	IV	--	--	Recorded	Recorded
46.	<i>Streptopelia senegalensis</i>	Laughing Dove	Columbiformes	LC	IV	--	--	Recorded	Recorded
47.	<i>Sturnia pagodarum</i>	Brahminy Starling	Passeriformes	LC	IV	--	--	Recorded	--
48.	<i>Tephrodornis pondicerianus</i>	Common Woodshrike	Passeriformes	LC	--	--	--	--	Recorded
49.	<i>Turdoides caudatus</i>	Common Babbler	Passeriformes	LC	IV	--	--	Recorded	Recorded
50.	<i>Turdoides malcolmi</i>	Large Grey Babbler	Passeriformes	LC	IV	--	--	Recorded	--
51.	<i>Upupa epops</i>	Common Hoopoe	Bucerotiformes	LC	--	--	--	Recorded	Recorded
52.	<i>Vanellus indicus</i>	Red-wattled Lapwing	Charadriiformes	LC	IV	--	--	Recorded	Recorded

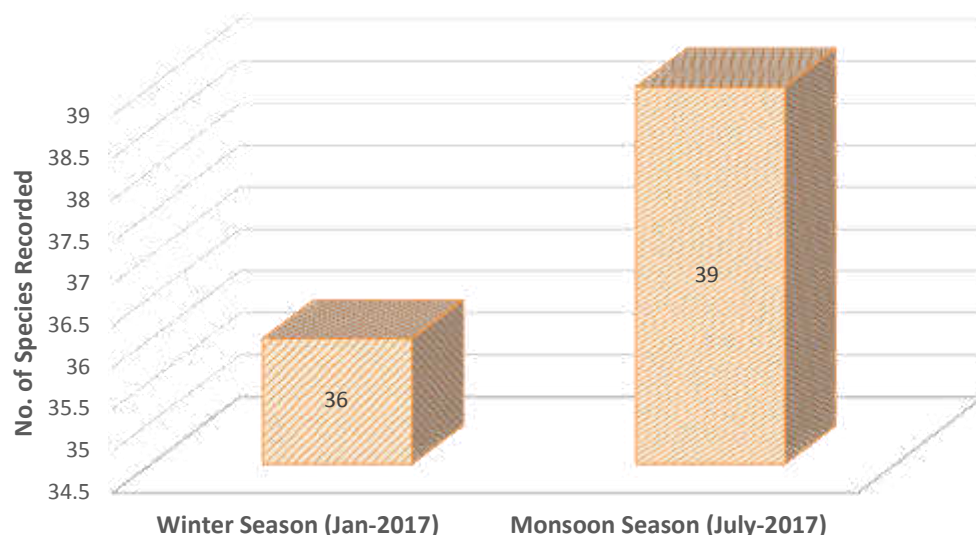
*Status assigned by the International Union for Conservation of Nature and Natural Resources, where; LC – Least Concern

*Sources: R. Grimmett, C. Inskipp & T. Inskipp, *Birds of the Indian Subcontinent*; Salim Ali, *Book of Indian Birds*; IUCN Red Data List, <https://www.cites.org/>, www.cms.int/en/species

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Table 4-1 presented in the preceding pages reveals that a total of 52 resident bird species recorded during both winter & monsoon seasons. Out of the 52 species, 35 resident bird species were recorded in the winter season (January 2017) whereas a total of 38 resident bird species were recorded during the monsoon season (July 2017).

Figure 4-1: Number of Resident Bird Species recorded during Winter & Monsoon Seasons



Species diversity shows that all the 35 bird species reported in the project study area during the winter season (January, 2017) belongs to 10 orders with maximum 19 species (53%) from Order-Passeriformes presented in **Figure 4-2**. Further, it is revealed that all the 38 resident bird species recorded in the study area during the monsoon season (July 2017) belongs to 11 orders with maximum 21 species (55%) from Order-Passeriformes as presented in **Figure 4-3**.

Figure 4-2: Bird Species Diversity of the Study Area during Winter Season (January, 2017)

- Accipitriformes ■ Apodiformes ■ Bucerotiformes ■ Charadriiformes ■ Columbiformes
- Coraciiformes ■ Galliformes ■ Passeriformes ■ Pelecaniformes ■ Psittaciformes

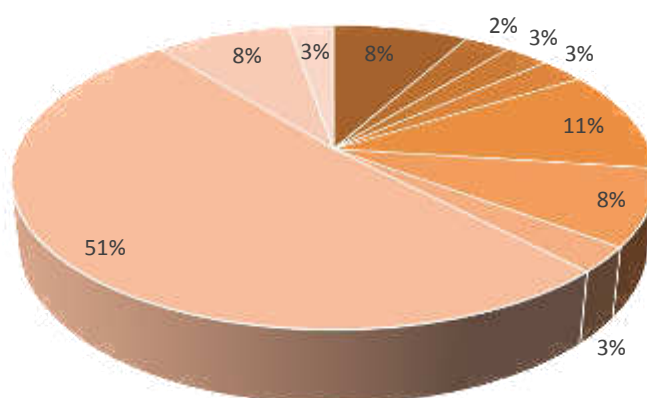
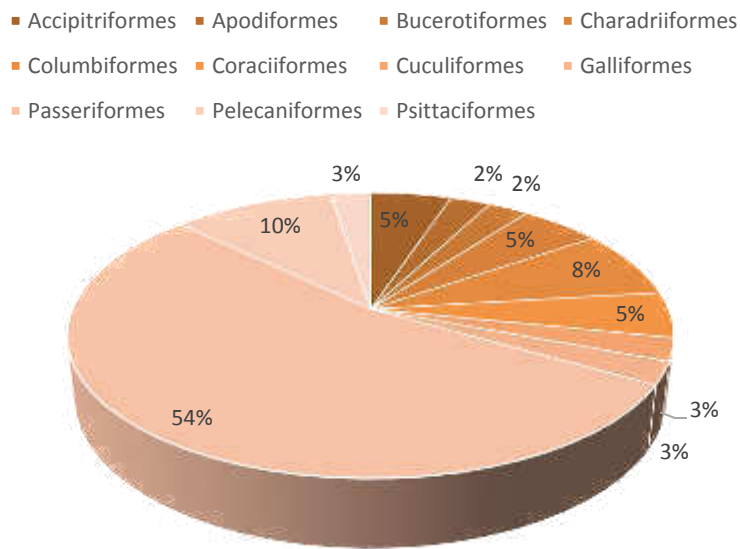


Figure 4-3: Bird Species Diversity of the Study Area during Monsoon Season (July, 2017)



The data exhibits that, out of 52 Resident Birds species recorded during the study period (winter & monsoon seasons) only 04 species fall under species of conservation importance (**Please Refer Table 4-2**) as per IUCN Red list category, Indian Wildlife (Protection) Act, 1972 (As amended up to, 2006), CITES APPENDIX: I, II and II and; CMS APPENDIX: II.

As estimated, all the 52 resident bird species recorded during the study period (winter & monsoon seasons) belongs to **“Least Concern”** category in accordance to IUCN Red list category.

Details on conservation status of resident bird species recorded during the monitoring seasons (winter & monsoon) are provided in **Table 4-2** as follows:

Table 4-2: List of Identified Bird Species of Concern based on Higher Threat Categories of Conservation and Migration Status

S.No.	Scientific Name	Common Name	Order	IUCN Status*	WPA Schedule	CITES status	CMS Appendix	Recorded during Jan-17	Recorded During Jul-17
1.	<i>Accipiter badius</i>	Shikra	Accipitriformes	LC	IV	II	II	--	Recorded
2.	<i>Charadrius dubius</i>	Little Ringed Plover	Charadriiformes	LC	IV	--	II	--	Recorded
3.	<i>Elanus caeruleus</i>	Black-winged Kite	Accipitriformes	LC	IV	II	--	Recorded	--
4.	<i>Milvus migrans</i>	Black Kite	Accipitriformes	LC	IV	II	II	Recorded	--

*Status assigned by the International Union for Conservation of Nature and Natural Resources, where - LC – Least Concern;

*Sources: R. Grimmett, C. Inskipp & T. Inskipp, *Birds of the Indian Subcontinent*; Salim Ali, *Book of Indian Birds*; IUCN Red Data List, <https://www.cites.org/>, www.cms.int/en/species

Forest Working Plan Anantapur district, 2010-11

Migratory Bird Species

The entire Indian subcontinent, including the study area, falls within the limits of the Central Asian Flyway (CAF)⁵, one of the eight globally identified flyways. The CAF connects a large swathe of the Palearctic region with the Indian subcontinent and contains several well-established routes along which a number of bird-species migrate annually. This flyway covers a large part of the continental area of Eurasia and includes the whole of the Indian sub-continent. Thus, the study-area is very likely to be situated in the flight-path of the various winter, summer and passage visitor-birds migrating either to or through the region in which it is situated.

The Migratory bird species sighted during the primary field survey during both the monitoring seasons (Winter & Monsoon) in the study area or water bodies in the catchments of the study area are listed in **Table 4-3**. The season of migration, the conservation status as per the criteria listed above is also detailed in **Table 4-3**. Further, as per the publically available secondary sources, the migratory bird species reported from the project area and its environs is enumerated in **Annexure-II** with their conservation status in accordance to the criteria described above.

Table 4-3: Migratory Bird species associated with the Study Area

S.No.	Scientific Name	Common Name	Order	Migratory Status	IUCN Status *	WPA Schedule	CITES status	CMS Appendix	Recorded during Jan-17	Recorded During Jul-17
1.	<i>Cecropis daurica</i>	Red-rumped Swallow	Passeriformes	Winter	LC	-	--	--	Recorded	--
2.	<i>Motacilla flava</i>	Yellow Wagtail	Passeriformes	Winter	LC	-	--	--	Recorded	--
3.	<i>Muscicapa dauurica</i>	Asian Brown Flycatcher	Passeriformes	Winter	LC	IV	--	--	Recorded	--
4.	<i>Merops orientalis</i>	Green Bee-eater	Coraciiformes	Winter	LC	--	--	--	Recorded	--

*Status assigned by the International Union for Conservation of Nature and Natural Resources, where - LC – Least Concern

*Sources: R. Grimmett, C. Inskipp & T. Inskipp, *Birds of the Indian Subcontinent*; Salim Ali, *Book of Indian Birds*; IUCN Red Data List, <https://www.cites.org/>, www.cms.int/en/species

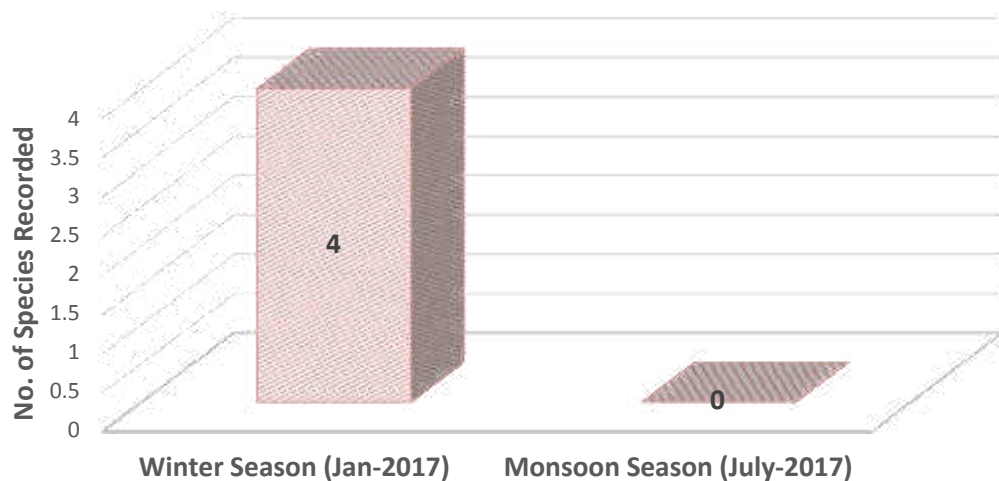
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⁵ Photo-log showing Central Asian Flyway is attached as ANNEXURE IV

Table 4-3 presented above describes that a total of 04 migratory bird species recorded during winter season, while, no presence of any migratory bird species is recorded in the study area during the monsoon season study.

Species diversity indicates that all the 04 migratory bird species reported in the project study area during the winter season (February, 2017) belongs to Order-Passeriformes. As described above, no migratory bird has been recorded in the study area during the Monsoon Season study.

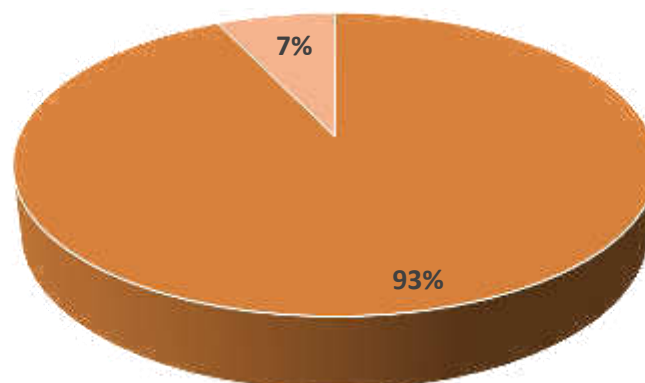
Figure 4-4: Number of Migratory Bird Species recorded during Winter & Monsoon Seasons



Based on the analysis of available data for both resident and migratory bird species recorded during the primary field survey during the study period (winter & monsoon seasons), it is revealed that about 93% (52) species belongs to the resident (non-migratory) birds, whereas only 7% (04) species reported were migratory birds.

Figure 4-5: Percentage Population of Resident & Migratory Birds in the Study Area

■ Resident (Non-Migratory) Bird Species ■ Migratory Bird Species



4.1.2 BATS

Table 4.4 below lists the species of bats having recorded ranges that falls in the study area. No bat species were sighted during the survey however, as per discussions held with villagers residing within the study area, 1 bat species i.e. Indian Fulvous Fruit Bat (*Rousettus leschenaultii*) is reported to be present within the study area during both winter & monsoon seasons. The species reported during the field are also listed in separate column and are typed in **BOLD FONT**.

Table 4-4: List of Bat Species associated with the Study Area

S. N.	Common Name	Scientific Name	Order	IUCN Status*	WPA Schedule	CITES status	CMS Appendix	Recorded/ Reported during January 2017	Recorded/ Reported during July 2017
1.	Indian Fulvous Fruit Bat	<i>Rousettus leschenaultii</i>	Chiroptera	LC	V	--	--	Reported by local inhabitants	Reported by local inhabitants

* Status assigned by the International Union for Conservation of Nature and Natural Resources (IUCN), where - LC – Least Concern

*Sources: Vivek Menon, A Field Guide to Indian Mammals (2014); IUCN Red Data List, <https://www.cites.org/>, www.cms.int/en/species

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4.1.3 FINDINGS OF THE PRIMARY SURVEY

This sub-section describes the findings of the primary survey only (i.e. bird and bat species which were identified by VSPL in the winter & monsoon seasons field survey completed in January 2017 & July 2017 respectively. The list of the birds and bats species recorded in the study area during the field survey is presented in **Table 4-5** with their conservation as well as migration status. A total of 56 bird species were recorded during the monitoring seasons (winter & monsoon). Out of 56 bird species, 4 species of birds were Winter Migrants and 52 species were local resident birds. Of these 56 species, 04 bird species are of conservation importance as per criteria of CITES APPENDIX: II and; CMS APPENDIX: II. These species are Shikra (*Accipiter badius*), Little Ringed Plover (*Charadrius dubius*), Black-winged Kite (*Elanus caeruleus*) and Black Kite (*Milvus migrans*). No bat species were sighted during the survey, however Indian Fulvous Fruit Bat (*Rousettus leschenaultiis*) reported by the local inhabitants in the study area and its environs.

Table 4-5: List of Bat and Bird Species recorded during Field Survey

S.No.	Scientific Name	Common Name	Order	IUCN Status*	WPA Schedule	CITES status	CMS Appendix	Migratory Status
Bat Species Reported in Study Area								
1.	<i>Rousettus leschenaultii</i>	Indian Fulvous Fruit Bat	Chiroptera	LC	V	--	--	
Bird Species Recorded in Study Area								
1.	<i>Accipiter badius</i>	Shikra	Accipitriformes	LC	IV	II	II	Resident
2.	<i>Acridotheres tristis</i>	Common Myna	Accipitriformes	LC	IV	--	--	Resident
3.	<i>Aegithina tiphia</i>	Common Iora	Passeriformes	LC	IV	--	--	Resident
4.	<i>Ammomanes phoenicurus</i>	Rufous-tailed Lark	Passeriformes	LC	IV	--	--	Resident
5.	<i>Anthus rufulus</i>	Paddyfield Pipit	Passeriformes	LC	IV	--	--	Resident
6.	<i>Apus affinis</i>	Little Swift	Apodiformes	LC	--	--	--	Resident
7.	<i>Ardea cinerea</i>	Grey Heron	Pelecaniformes	LC	IV	--	--	Resident
8.	<i>Ardeola grayii</i>	Indian Pond Heron	Pelecaniformes	LC	IV	--	--	Resident
9.	<i>Bubulcus ibis</i>	Cattle Egret	Pelecaniformes	LC	IV	--	--	Resident
10.	<i>Casmerodius albus</i>	Great Egret	Pelecaniformes	LC	IV	--	--	Resident
11.	<i>Cecropis daurica</i>	Red-rumped Swallow	Passeriformes	LC	--	-	--	Winter
12.	<i>Charadrius dubius</i>	Little Ringed Plover	Charadriiformes	LC	IV	--	II	Resident
13.	<i>Cinnyris asiaticus</i>	Purple Sunbird	Passeriformes	LC	IV	--	--	Resident
14.	<i>Columba livia</i>	Rock Dove	Columbiformes	LC	IV	--	--	Resident
15.	<i>Copsychus saularis</i>	Oriental Magpie Robin	Passeriformes	LC	IV	--	--	Resident
16.	<i>Coracias benghalensis</i>	Indian Roller	Coraciiformes	LC	IV	--	--	Resident
17.	<i>Corvus culminatus (macrorhynchos)</i>	Indian Jungle Crow	Passeriformes	LC	V	--	--	Resident
18.	<i>Corvus splendens</i>	House Crow	Passeriformes	LC	V	--	--	Resident
19.	<i>Cypsiurus balasensis</i>	Asian Palm Swift	Apodiformes	LC	--	--	--	Resident
20.	<i>Dicrurus macrocercus</i>	Black Drongo	Passeriformes	LC	IV	--	--	Resident



S.No.	Scientific Name	Common Name	Order	IUCN Status*	WPA Schedule	CITES status	CMS Appendix	Migratory Status
21.	<i>Egretta garzetta</i>	Little Egret	Pelecaniformes	LC	IV	--	--	Resident
22.	<i>Elanus caeruleus</i>	Black-winged Kite	Accipitriformes	LC	IV	II	--	Resident
23.	<i>Eremopterix griseus</i>	Ashy-crowned Sparrow Lark	Passeriformes	LC	IV	--	--	Resident
24.	<i>Eudynamys scolopaceus</i>	Asian Koel	Cuculiformes	LC	IV	--	--	Resident
25.	<i>Francolinus pndicerianus</i>	Grey Francolin	Galliformes	LC	IV	--	--	Resident
26.	<i>Galerida deva</i>	Sykes's Lark	Passeriformes	LC	IV	--	--	Resident
27.	<i>Halcyon smyrnensis</i>	White-throated Kingfisher	Coraciiformes	LC	IV	--	--	Resident
28.	<i>Lanius meridionalis</i>	Southern Grey Shrike	Passeriformes	LC	--	--	--	Resident
29.	<i>Lanius vittatus</i>	Bay-backed Shrike	Passeriformes	LC	--	--	--	Resident
30.	<i>Leptocoma zeylonica</i>	Purple-rumped Sunbird	Passeriformes	LC	IV	--	--	Resident
31.	<i>Lonchura malacca</i>	Black-headed Munia	Passeriformes	LC	IV	--	--	Resident
32.	<i>Merops orientalis</i>	Green Bee-eater	Coraciiformes	LC	--	--	--	Winter
33.	<i>Microcarbo niger</i>	Little Cormorant	Pelecaniformes	LC	IV	--	--	Resident
34.	<i>Milvus migrans</i>	Black Kite	Accipitriformes	LC	IV	II	II	Resident
35.	<i>Mirafra erythroptera</i>	Indian Bushlark	Passeriformes	LC	IV	--	--	Resident
36.	<i>Motacilla flava</i>	Yellow Wagtail	Passeriformes	LC	--	-	--	Winter
37.	<i>Motacilla madaraspatensis</i>	White-browed Wagtail	Passeriformes	LC	IV	--	--	Resident
38.	<i>Muscicapa dauurica</i>	Asian Brown Flycatcher	Passeriformes	LC	IV	--	--	Winter
39.	<i>Oriolus xanthornus</i>	Black-hooded Oriole	Passeriformes	LC	IV	--	--	Resident
40.	<i>Passer domesticus</i>	House Sparrow	Passeriformes	LC	--	--	--	Resident
41.	<i>Pericrocotus cinnamomeus</i>	Small Minivet	Passeriformes	LC	--	--	--	Resident
42.	<i>Ploceus philippinus</i>	Baya Weaver	Passeriformes	LC	IV	--	--	Resident
43.	<i>Psittacula krameri</i>	Rose-ringed Parakeet	Psittaciformes	LC	IV	--	--	Resident
44.	<i>Ptyonoprogne concolor</i>	Dusky Crag Martin	Passeriformes	LC	--	--	--	Resident

S.No.	Scientific Name	Common Name	Order	IUCN Status*	WPA Schedule	CITES status	CMS Appendix	Migratory Status
45.	<i>Pycnonotus cafer</i>	Red-vented Bulbul	Passeriformes	LC	IV	--	--	Resident
46.	<i>Saxicola caprata</i>	Pied Bush Chat	Passeriformes	LC	IV	--	--	Resident
47.	<i>Saxicoloides fulicatus</i>	Indian Robin	Passeriformes	LC	IV	--	--	Resident
48.	<i>Streptopelia chinensis</i>	Spotted Dove	Columbiformes	LC	IV	--	--	Resident
49.	<i>Streptopelia decaocto</i>	Eurasian Collared Dove	Columbiformes	LC	IV	--	--	Resident
50.	<i>Streptopelia senegalensis</i>	Laughing Dove	Columbiformes	LC	IV	--	--	Resident
51.	<i>Sturnia pagodarum</i>	Brahminy Starling	Passeriformes	LC	IV	--	--	Resident
52.	<i>Tephrodornis pondicerianus</i>	Common Woodshrike	Passeriformes	LC	--	--	--	Resident
53.	<i>Turdoides caudatus</i>	Common Babbler	Passeriformes	LC	IV	--	--	Resident
54.	<i>Turdoides malcolmi</i>	Large Grey Babbler	Passeriformes	LC	IV	--	--	Resident
55.	<i>Upupa epops</i>	Common Hoopoe	Bucerotiformes	LC	--	--	--	Resident
56.	<i>Vanellus indicus</i>	Red-wattled Lapwing	Charadriiformes	LC	IV	--	--	Resident

* Status assigned by the International Union for Conservation of Nature and Natural Resources, where - LC – Least Concern

*Sources: R. Grimmett, C. Inskipp & T. Inskipp, Birds of the Indian Subcontinent; Salim Ali, Book of Indian Birds; IUCN Red Data List, <https://www.cites.org/>, www.cms.int/en/species

4.2 VANTAGE POINT SURVEY

Vantage point survey was undertaken at **ten (10) locations** covering both projects during winter & monsoon seasons. The vantage point locations were identified during reconnaissance surveys. Each vantage point was scanned for a short period, with 10x50 DPSI power (Night vision) standard binocular, to spot bird-species. Raptors were identified as one of the target group species for the vantage point watches due to the presence of open fallow lands and agriculture land in the study-area, their preferred flight zone and their known vulnerability to wind-farms projects.

The focus of the vantage-point watches conducted during this avian study was the resident raptor species and waterfowl either sighted during the walkover surveys or having recorded ranges that coincide with the study-area. However, flight-behavior of non-target bird-species was also noted during the focused watch. The details of the vantage points selected during winter & monsoon seasons monitoring are given in **Table 4-6** as follows and location of vantage points are marked on study area map provided in **Figure 2-3**:

Table 4-6: Vantage Points locations selected for focused watch survey

S.N	Vantage point	Co-ordinates	Nearest WTG
Vajrakarur-I			
1.	VP-1	15° 2'28.42"N, 77°16'6.60"E	VK-109
2.	VP-2	15° 0'0.29"N, 77°19'12.10"E	VAR-050
3.	VP-3	14°58'3.75"N, 77°17'47.01"E	VK-039
4.	VP-4	14°59'33.31"N, 77°16'8.41"E	VAR-019
5.	VP-5	15° 1'3.46"N, 77°15'26.76"E	VK-203
Vajrakarur-II			
6.	VP-1	15° 2'21.84"N, 77°24'25.39"E	PPD 073
7.	VP-2	15° 3'23.86"N, 77°21'58.93"E	PPD 056
8.	VP-3	15° 4'51.50"N, 77°20'58.33"E	PPD 049
9.	VP-4	15° 1'34.44"N, 77°21'22.19"E	PPD 034
10.	VP-5	15° 2'9.10"N, 77°19'26.94"E	PPD 016

To gauge avifaunal activity, the survey was conducted during the daytime, covering early-morning to late evening. For every target-species sighting, the number of individuals sighted, approximate flight height and general flight-direction were recorded. One uninterrupted Two-hour focused watch was conducted at each vantage point location. The flight-height was recorded in terms of flight zone of the species with respect to WTG height i.e. below the rotor, within or above the rotor-swept zone. The flight zones consider for the study are detailed below and presented in **Figure 4-6**.

- **Flight Zone 1:** Below the rotor-space (approximately 0 m to 23 m above the ground, extending from ground-level to approximately edge of the blade of the wind-turbine)
- **Flight Zone 2:** Within the rotor-space (approximately 23 m to 120 m above the ground, extending from the approximate base-level to tip-level of the wind-turbine-blade)
- **Flight Zone 3:** Above the rotor-space (approximately above 120 m, beyond the approximate

height of the tip-level of the wind-turbine-rotor and blades)

Figure 4-6: Flight zones considered for the study



4.2.1 OBSERVATIONS

Target Bird-species Activity

During Winter Season Monitoring **Four (04) target-species** including three resident raptor species Viz., Rufous-tailed Lark (*Ammomanes phoenicurus*), Black-winged Kite (*Elanus caeruleus*), Black Kite (*Milvus migrans*) and one migratory raptor Asian Green Bee-eater (*Merops orientalis*) were sighted in flight during the vantage-point watches. All the Four (04) target species have a flying zone which traverses through Zone two i.e., between Rotor swept area. Similarly, during Monsoon Season monitoring, four (04) target-species which were resident raptor species Viz., Rose-ringed Parakeet (*Psittacula krameri*), Small Minivet (*Pericrocotus cinnamomeus*), Shikra (*Accipiter badius*) and Little Ringed Plover (*Charadrius dubius*) were sighted in flight during the vantage-point watches. All the four (04) target species were reported to be traversed through Zone two i.e., between Rotor swept area. The number of times a given species was sighted, together with the flight-zone, is provided in the following **Table 4-7**.

Table 4-7: Target Bird species recorded during vantage survey

S.N.	Common Name	Scientific Name	Type of Target Species	IUCN Status	WPA Schedule	CITES status	CMS Appendix	Total Sightings	**Flight Direction	Flight Zone*	Vantage point (VP)
Target Bird species recorded during Winter Season Study											
1.	Rufous-tailed Lark	<i>Ammomanes phoenicurus</i>	T	LC	IV	--	--	4	Southwest-Northeast	1, 2	VP-01 & VP-05 (Vajrakarur-I) and VP-03 and VP-04 (Vajrakarur-II)
2.	Black-winged Kite	<i>Elanus caeruleus</i>	T	LC	IV	II	--	3	Northwest-Southeast	1,2	VP-02, and VP-04 (Vajrakarur-I) and VP-02 (Vajrakarur-II)
3.	Black Kite	<i>Milvus migrans</i>	T	LC	IV	--	--	3	Southeast-Northwest	2,3	VP-01 & VP-04 (Vajrakarur-I) and VP-05 (Vajrakarur-II)
4.	Asian Green Bee-eater	<i>Merops orientalis</i>	T	LC	--	--	--	4	Northeast-Southwest	2,3	VP-01 & VP-03 (Vajrakarur-I) and VP-02 & VP-05 (Vajrakarur-II)

S.N.	Common Name	Scientific Name	Type of Target Species	IUCN Status	WPA Schedule	CITES status	CMS Appendix	Total Sightings	**Flight Direction	Flight Zone*	Vantage point (VP)
Target Bird species recorded during Monsoon Season Study											
1.	Rose-ringed Parakeet	<i>Psittacula krameri</i>	T	LC	IV	--	--	6	Southeast-Northwest	2, 3	VP-01, VP-03, V P-04 and VP-05 (Vajrakarur-I) and VP-02 and VP-05 (Vajrakarur-II)
2.	Small Minivet	<i>Pericrocotus cinnamomeus</i>	T	LC	--	--	--	4	Southwest-Northeast	1, 2	VP-02, VP-03 and VP-04 (Vajrakarur-I) and VP-02 (Vajrakarur-II)
3.	Shikra	<i>Accipiter badius</i>	T	LC	IV	--	--	3	Northwest-Southeast	1, 2	VP-03 (Vajrakarur-I) and VP-01 & VP-03 (Vajrakarur-II)
4.	Little Ringed Plover	<i>Charadrius dubius</i>	T	LC	IV	--	II	2	Southeast-northwest	2,3	VP-05 (Vajrakarur-I) and VP-02 (Vajrakarur-II)

* As described above

Non-target Bird-species Activity

A total of 11 non-target bird-species were recorded during the ten vantage-point watches in the Winter Season Study; whereas 08 non-target bird-species were recorded in the Monsoon Season monitoring in the Study area. However, only 08 non-target species in winter and 05 non-target species in monsoon seasons were reported to have a flying zone which traverses through Zone two i.e., between Rotor swept area therefore, they have the potential of collision with turbine blade as well electrocution with high tension transmission wires.

The details regarding these bird-species are given in the following **Table 4-8:**

Table 4-8: Non-Target Bird species recorded during vantage survey

S. N.	Common Name	Scientific Name	IUCN Status	WPA Schedule	CITES status	CMS Appendix	Total Sightings	Flight Zone*	Vantage point (VP)
Non-Target Bird species recorded during Winter Season Study									
1.	Common Myna	<i>Acridotheres tristis</i>	LC	IV	--	--	8	1,2	VP-02, VP-03, VP-05 (Vajrakarur-I) and all the 05 VPs in Vajrakarur-II
2.	Indian Pond-heron	<i>Ardeola grayii</i>	LC	IV	--	--	4	1	VP-04 and VP-05
3.	Cattle Egret	<i>Bubulcus ibis</i>	LC	IV	--	--	10	1	All the 10 VPS of Vajrakarur-I & Vajrakarur-II
4.	Indian Roller	<i>Coracias benghalensis</i>	LC	IV	--	--	3	1,2	VP-01, VP-03 and VP 05
5.	Black Drongo	<i>Dicrurus macrocercus</i>	LC	IV	--	--	5	2,3	VP-01, VP-02 and VP-03 (Vajrakarur-I) and VP-03 & VP-05 (Vajrakarur-II)
6.	White-throated Kingfisher	<i>Halcyon smyrnensis</i>	LC	IV	--	--	7	1,2,3	VP-01, VP-03 and VP-04 (Vajrakarur-I) & VP-02, VP-03, VP-04 & VP-05 (Vajrakarur-II)
7.	Indian Bushlark	<i>Mirafra erythroptera</i>	LC	IV	--	--	2	2	VP-03 (Vajrakarur-I) & VP-01 (Vajrakarur-I)
8.	White-browed Wagtail	<i>Motacilla maderaspatensis</i>	LC	IV	--	--	5	1,2	VP-03 and VP-05 (Vajrakarur-I) & VP-01, VP-04 & VP-05 (Vajrakarur-II)
9.	Red-vented Bulbul	<i>Pycnonotus cafer</i>	LC	IV	--	--	3	1,2	VP-02 (Vajrakarur-I), VP-3 & VP-04 (Vajrakarur-II)
10	Dusky Crag Martin	<i>Ptyonoprogne concolor</i>	LC	--	--	--	4	1	VP-01 & VP-04 (Vajrakarur-I) & VP-02 & VP-03 (Vajrakarur-II)
11	Common Hoopoe	<i>Upupa epops</i>	LC	--	--	--	6	1,2	VP-01, VP-04, VP-045 (Vajrakarur-I) & VP-02, VP-04 & VP-05 (Vajrakarur-II)

S. N.	Common Name	Scientific Name	IUCN Status	WPA Schedule	CITES status	CMS Appendix	Total Sightings	Flight Zone*	Vantage point (VP)
Non-Target Bird species recorded during Monsoon Season Study									
1.	<i>Streptopelia decaocto</i>	Eurasian Collared Dove	LC	IV	--	--	8	1,2	VP-01, VP-02 VP 03 and VP-04 (Vajrakarur-I) and VP-02, VP-03, VP, 04 and VP-05 (Vajrakarur-II)
2.	<i>Stigmatopelia senegalensis</i>	Laughing Dove	LC	IV	--	--	11	1,2,3	At all VP's of Vajrakarur-I and Vajrakarur-II
3.	<i>Pycnonotus cafer</i>	Red-vented Bulbul	LC	IV	--	--	3	1	VP 02 & VP-05 (Vajrakarur-I) and VP-01 (Vajrakarur-II)
4.	<i>Saxicoloides fulicatus</i>	Indian Robin	LC	IV	--	--	2	1	VP-02 (Vajrakarur-I) and VP-01 ((Vajrakarur-II)
5.	<i>Dicrurus macrocercus</i>	Black Drongo	LC	IV	--	--	2	1	VP-02 (Vajrakarur-I) and VP-03 (Vajrakarur-II)
6.	<i>Corvus splendens</i>	House Crow	LC	V	--	--	5	2,3	VP-03, VP 04 and VP-05 (Vajrakarur-I) and VP-04 and VP-05 (Vajrakarur-II)
7.	<i>Acridotheres tristis</i>	Common Myna	LC	IV	--	--	14	1,2,3	At all VP's of Vajrakarur-I and (Vajrakarur-II)
8.	<i>Saxicola caprata</i>	Pied Bush Chat	LC	IV	--	--	3	1,2	VP 02, VP-03 and VP-04 (Vajrakarur-II)

* As described above

One migratory raptor Asian Green Bee-eater (*Merops orientalis*) were sighted during the focused watch survey however there were no consistency or pattern observed in flights, there directions and/or behavior of any of the targeted and non-target species. The No. of target & non-target species sighted during the Vantage Survey in Winter & Monsoon Seasons Study is depicted in Figure as follows:

Figure 4-7: No. of Target & Non-Target Species Sighted during the Winter & Monsoon Season Study

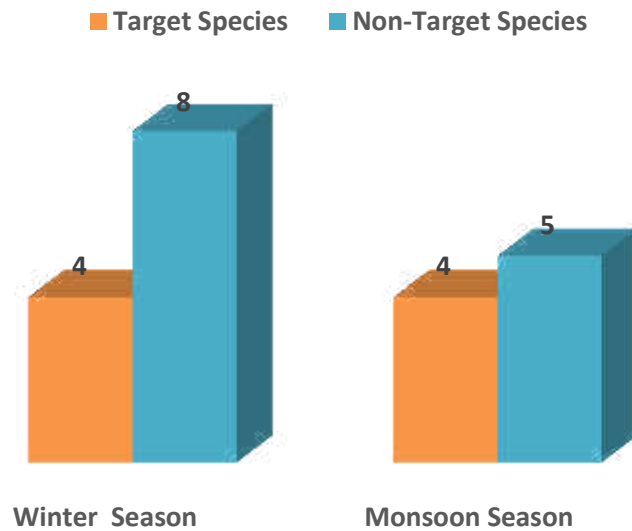
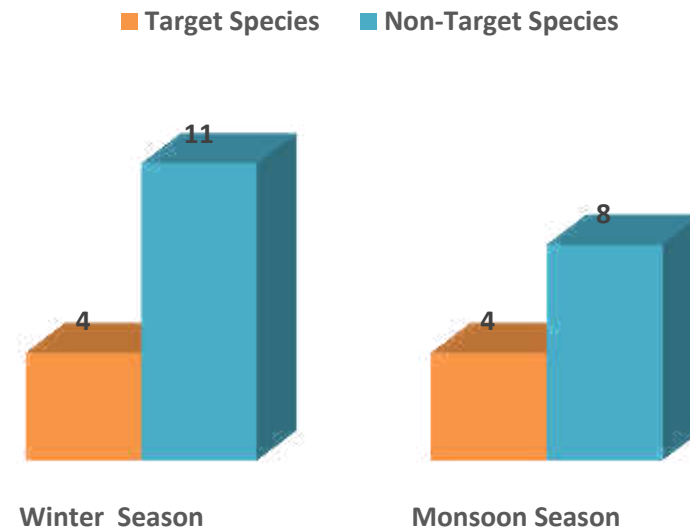


Figure 4-8: No. of Target & Non-Target Species Having flying zone in High Risk Zone (Zone-II)



4.3 CARCASS SURVEYS

No carcass of any livestock animals was sighted in the study area during the Winter & Monsoon Seasons survey. 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. **Sample Checklist for Bird and Bat Carcass Monitoring is given in Annexure-II.**

4.4 HABITAT SURVEYS

No major natural lakes/ponds or any other natural water body were recorded in the study area during the course of survey except a small artificial pond near WTG VAR 300, a drinking water supply project named as 'Satya Sai Reservoir', located at a distance of 2.8 km from WTG No. PPD 049 and a pond in Pottipadu village. The survey of these waterbodies in the project study area and its environs was carried out to evaluate the potential of these water bodies as a habitat of resident and migratory bird species reported in the study area.

Figure 4-9: Habitat Survey in the study area



4.5 TRAINING AND AWARENESS PROGRAMME

As part of the Study a training and awareness programme was conducted on 20th July 2017 in the Office of Mytrah for the Technical and Field Staff of Mytrah, OEM Contractors and Security Guards. The purpose of the training programme was to create awareness among the staff about the importance of bird and bat study in Wind Power Projects as well as to train them to record and maintain the carcass of any livestock, bird, bat and wild animals. The training programme was followed by a site visit in the nearby WTGs to explain the onsite personnel about the approach & methodology to be adopted for carcass survey & monitoring. The training and awareness programme was conducted in accordance to the requirement of the Lender.



Training and Awareness Programme on Carcass Monitoring

5 POTENTIAL IMPACTS & MITIGATION MEASURES

The potential impacts of wind projects include injuries and fatalities of birds and bats as a result of collision with moving rotors, meteorological towers, wind mast and transmission lines; electrocution from transmission lines. The risk of collision with rotors exists only when a bird is in flight within the rotor-swept-area, or may be affected by turbulence caused by rotors. Wind turbines also have the potential to influence breeding, wintering and migrating birds and bats. However, of all the primary concern of the impact assessment process of wind power project is its potential impact on populations of threatened and endemic birds and bats species of the area.

5.1 POTENTIAL IMPACT OF WIND POWER PROJECT ON BIRD AND BAT

Both projects are in operational stage therefore the potential impact of wind turbines on birds and bats could be deaths from collisions with wind turbines and due to changes in air pressure caused by the spinning turbines, as well as from habitat disruption. The potential impacts of wind projects during operational phase may include the following:

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.

Barotrauma: Barotrauma is a significant cause of bat mortality due to wind project. It occurs when bats chase the turbine blade (their echolocation detects a moving object). As the bat gets close to the blade, it is pulled into a low-pressure area immediately behind the blade. This low pressure area causes the bat's lungs to expand into its body cavity, exploding the blood capillaries in the bat's lungs.

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.

Other impacts include impact on behavior of bird and bat species due to noise pollution and disturbance, or destruction of foraging habitats, roosting areas, and commuting corridors.

5.2 POTENTIAL IMPACT ON BIRD AND BAT DUE TO PROJECT

Bird species associated with the study-area include members of groups considered especially vulnerable to collision-risk from wind turbines, namely resident raptors and migratory raptors and waterfowl. Some of the species concerned are designated as globally threatened or near threatened by the IUCN and have conservation status as per other criteria.

The primary survey reveals that a total of 56 bird species including 52 resident & 04 migratory bird species have been recorded in the study area during the Winter & Monsoon Seasons monitoring. In addition to the 52 resident bird species & 04 migratory bird species recorded during the primary field survey during winter & monsoon season bird & bat survey, about 108 resident bird species & 76 migratory bird species (Please refer **Annexure-I**) are also reported to be present in the study area and its influence zone of 02 km in accordance to the publically available secondary sources.

Though, no bat species were sighted during the bird & bat monitoring study carried out in winter & monsoon seasons, 01 bat species (Indian Fulvous Fruit Bat-*Rousettus leschenaultia*) is also reported to be present in the study area & its vicinity by the local inhabitants. Twenty-Five (25) species of bats of possible occurrence are also reported from the project area and its influence zone in accordance to the secondary data (Please Refer **Annexure-I**).

Out of 56 bird species, 4 species of birds were Winter Migrants and 52 species were local resident birds. Of these 56 species, 04 bird species are of conservation importance as per criteria of CITES APPENDIX: II and; CMS APPENDIX: II. These species are Shikra (*Accipiter badius*), Little Ringed Plover (*Charadrius dubius*), Black-winged Kite (*Elanus caeruleus*) and Black Kite (*Milvus migrans*).

The vantage point study carried out during winter seasons indicated that 4 targeted species and 8 non-targeted species have a flying zone which traverses through Zone two i.e., between Rotor swept area therefore, they have the potential of collision with turbine blade as well electrocution with high tension transmission wires. Similarly, the vantage point study during monsoon season study reveals that 04 targeted and 05 non-targeted species have a flying zone in Zone-2 (Please refer **Figure 4.8**).

Due to presence a small artificial pond near WTG VAR 300, a drinking water supply project named as 'Satya Sai Reservoir', located at a distance of 2.8 km from WTG No. PPD 049 and a pond in Pottipadu village, it is anticipated that these bird species may be diverted towards the project site area. Therefore, it is inferred that this area may fall on the route of migratory water birds.

The project site was also screened through the Integrated Biodiversity Assessment Tool (IBAT), which provides critical information on biodiversity priority sites and address any potential biodiversity impacts. The results of IBAT screening confirm that, the study area does not form part of any critical habitat, IUCN protected area, Important Bird Area and Ramsar Wetland Site⁶.

⁶ A Ramsar Site is a wetland site designated of international importance under the Ramsar Convention. The Convention on Wetlands, known as the Ramsar Convention, is an intergovernmental environmental treaty established in 1971 by

5.3 MITIGATION MEASURES SUGGESTED

The study area does not form part of any critical habitat, IUCN protected area, Important Bird Area and Ramsar Wetland Site. In addition, no “Critically Endangered” or “Endangered” species were recorded during the primary survey. The anticipated impact identified due to the projects consist injury and/or 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 both 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. Following measures are suggested to possibly minimize the hazardous impacts in the study area:

- i. Appropriate working practices to be implemented to minimize any major disturbance to the bird and bat species in the habitat of the study area and its nearby surrounding.
- ii. Care should be taken to avoid planting fruit bearing trees (Such as guava, mango, banana, fig) and flowering plants, which attract bat and bird in the project area;
- iii. Some bird reflectors can be fitted at relevant places to divert low-medium and medium-high flying bird species during day time.
- iv. 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;
- v. Periodic surveillance of the project site should be taken 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;
- vi. Marking overhead cables and transmission poles using defectors and avoiding use of areas of high bird concentrations, especially for species vulnerable to collision.
- vii. Priority should be given to poles preferred by raptors or other birds that have high electrocution risk.
- viii. Poles supporting additional electrical equipment (e.g., transformers and switches) in avian use areas are more likely to cause electrocution. Retrofitting these structures can reduce avian electrocution risk and improve power reliability.
- ix. Providing adequate briefing for site personnel and conducting an on-site ecological study in a regular interval.

UNESCO, and coming into force in 1975. There are 26 Ramsar sites in India of which, the Kolleru Lake is the only Ramsar site in Andhra Pradesh, located between Krishna and Godavari deltas. Kolleru Lake one of the largest freshwater lakes in India, spans into two districts - Krishna and West Godavari.

6 CLOSURE

The current study has assessed the overall impacts on bat and birds associated to the project study area due to 63 MW Vajrakarur-I and 105 MW Vajrakarur-II wind power project in Vajrakarur Mandal of Anantapur district, Andhra Pradesh. The project is in operational phase and the major impact envisaged due to project activity is fatalities and injuries of birds and bats as a result of collision with moving rotors, meteorological towers, wind mast and transmission lines; electrocution from transmission lines. However, the overall assessment of the site, its bio-geographical setting, climate and scanning of water bodies within the study area indicates no detrimental impact on bird and bat species of the area is analyzed.

Poor rainfall and lack of suitable habitat and natural major water body within the 02 km periphery of the project study, limits the project area for being used as resting or staging point by migratory birds. Further, no species with higher conservation status falling under Critically Endangered and Endangered categories have been reported/recorded in the project study area during the survey. This is most likely due to non-availability of any larger water body and suitable terrestrial habitats within the study area and its adjoining surroundings.

Indian Fulvous Fruit Bat (*Rousettus leschenaultia*) travels everyday a long distance in search of food and returns back to day-time roost. The foraging area of Fruit bats and Indian Flying Fox is large therefore; it is likely that the study area may come under its foraging area. Both are high fliers and can fly above turbine heights but; there are chances that they may fly through flight zone 2, which can attribute to collision risks. However, the memory and vision of Fruit bat is very good as they can sense the obstructions in their route with the help of excellent night vision and memory also, they are vocal and communicate with other members with vocal sounds and body postures and positioning. Considering these points, it is assumed that, they may likely change their route and select a safer path for the foraging area, in case of any hindrance. In comparison to fruit bats insectivorous bat species fly at lower to medium heights. They also can sense obstructions in their routes with the help of very well developed ultra- bio-sonar therefore; possibility of collision with wind turbine blades will be rare.

Finally, the operation activities with respect to wind mill project under study will not be detrimental to the survival of these species, if proper and eco-friendly care with Beat Available Technology (BAT) are adopted during the operational phase. It can minimize threats, if any, to the bird and bat populations. Attempts to be made not to bring in major changes in study area habitats which may attract, 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 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.

7 REFERENCES

- i. ADB Safeguard Policy Statement
- ii. Anonymous, 2006. The Wildlife (Protection) Act, 1972 (As amended upto 2006) Natraj Publishers, Dehra Dun, In Technical Association with WWF, Traffic India: 138 pp.
- iii. Bates, Paul J. J. and Harrison, David L. 1997. Bats of the Indian Subcontinent. Harrison Zoological Museum Publication: Sevenoaks, Kent. 258pp.
- iv. BirdLife International (2012) IUCN Red List of Threatened Species. Version 2013.2 IUCN.
- v. Collection, Preservation and Identification of Animals: Eds: Alfred, J.R.B. and Ramakrishna (2004) :Publ : Director, Zool. Surv. India, Kolkata.
- vi. Environmental Impact Assessment Ghosh A. K. (1990) IN Taxonomy in Environment and Biology Ed. Director, Publ: Zoological Survey of India, Kolkata.
- vii. Grimmett R., C. Inskipp & T. Inskipp, Birds of the Indian Subcontinent
- viii. <http://avibase.bsc-eoc.org/>
- ix. http://bnhsenviis.nic.in/Database/IndianWaterbirds_836.aspx
- x. <http://envfor.nic.in/division/wildlife>
- xi. http://wiienvis.nic.in/Database/ScheduleSpeciesDatabase_7969.aspx
- xii. <http://www.iucnredlist.org>
- xiii. <http://www.snh.gov.uk/docs/B721137.pdf>
- xiv. <https://en.wikipedia.org/>
- xv. <https://www.cites.org/>
- xvi. www.cms.int/en/species
- xvii. <https://www.ibat-alliance.org/>
- xviii. <https://www.ibat-alliance.org/ibat-conservation/ibat/>
- xix. IFC Performance Standards, 2012
- xx. Indian Mammals: M. S. Pradhan and S. S. Talmale (2012) : Publ: Nature Books India, Kolkata.
- xxi. Narwade, S.S., P.A. Shaikh, M.V. Prabhu and A.R.Rahmani (2013): Review of existing global guidelines, policies, and methodologies for the study of impact of windmills on birds and bats: requirements in India: BUCEROS 18 (1&2): 1 48.
- xxii. Review of existing global guidelines, policies and methodologies for the study of impact of windmills on bird and bats: requirements in India. Narwade, S. S., P. A. Shaikh, Prabhu, M. V. and Rehamani, A. R. (2013): BUCEROS: 18 (1&2): 1-48.
- xxiii. Rishad Naoroji, Birds of Prey of the Indian Sub-continent
- xxiv. SNH 2010. SNH Avoidance Rate Information and Guidance Note. Use of Avoidance Rates in the SNH Wind Farm Collision Risk Model.
- xxv. The Book of Indian Mammals: S. H. Prater (1980): Publ: BNHS, Mumbai.
- xxvi. The Book on Indian Birds: Salim Ali (2002, 13th Ed.): Pub: BNHS, Mumbai.
- xxvii. Vivek Menon, A Field Guide to Indian Mammals
- xxviii. Working Plan for the forest of Anantapur (2010-11), Forest Deptt. Govt. of Andhra Pradesh
- xxix. World Bank Guideline

8 ANNEXURE I: BIRDS AND BAT SPECIES ASSOCIATED WITH THE STUDY AREA AS PER THE SECONDARY SOURCES

8.1 RESIDENT AVIFAUNA ASSOCIATED WITH THE STUDY AREA

S.No.	Zoological Name	Common name	Order	IUCN Red List Category*	WPA Schedule	CITES Status	CMS Appendix
1.	<i>Alauda gulgula</i>	Oriental Sky Lark	Passeriformes	LC	IV	--	--
2.	<i>Alcedo atthis</i>	Common Kingfisher	Coraciiformes	LC	IV	--	--
3.	<i>Amaurornis akool</i>	Brown Crake	Gruiformes	LC	IV	--	--
4.	<i>Amaurornis phoenicurus</i>	White-breasted Waterhen	Gruiformes	LC	IV	--	--
5.	<i>Anas poecilorhyncha</i>	Indian Spot-Billed Duck	Anseriformes	LC	IV	--	--
6.	<i>Anastomus oscitans</i>	Asian Openbill	Ciconiiformes	LC	IV	--	--
7.	<i>Aquila fasciata</i>	Bonelli's Eagle	Accipitriformes	LC	IV	--	--
8.	<i>Aquila rapax</i>	Tawny Eagle	Accipitriformes	LC	IV	II	II
9.	<i>Ardea purpurea</i>	Purple Heron	Pelecaniformes	LC	IV	--	II
10.	<i>Ardeotis nigriceps</i>	Great Indian Bustard	Otidiformes	CR	I	--	--
11.	<i>Artamus fuscus</i>	Ashy Woodswallow	Passeriformes	LC	--	--	--
12.	<i>Athene brama</i>	Spotted Owlet	Strigiformes	LC	IV	II	--
13.	<i>Bubo bubo</i>	Eurasian Eagle Owl	Strigiformes	LC	IV	--	--
14.	<i>Burhinus oedicephalus</i>	Indian Thick-knee	Charadriiformes	LC	IV	--	--
15.	<i>Butastur teesa</i>	White-eyed Buzzard	Accipitriformes	LC	IV	II	--
16.	<i>Butorides striata</i>	Striated Heron	Pelecaniformes	LC	IV	--	--
17.	<i>Cacomantis passerinus</i>	Grey-bellied Cuckoo	Cuculiformes	LC	IV	--	--
18.	<i>Caprimulgus affinis</i>	Savanna Nightjar	Cuculiformes	LC	IV	--	--
19.	<i>Caprimulgus asiaticus</i>	Indian Nightjar	Caprimulgiformes	LC	IV	--	--
20.	<i>Centropus parroti</i>	Southern Coucal /Indian Crow	Cuculiformes	LC	IV	--	--
21.	<i>Ceryle rudis</i>	Pied Kingfisher	Coraciiformes	LC	IV	--	--
22.	<i>Chloropsis aurifrons</i>	Golden-fronted Leafbird	Passeriformes	LC	--	--	--
23.	<i>Chloropsis jerdoni</i>	Jerdon's Leafbird	Passeriformes	LC	--	--	--

S.No.	Zoological Name	Common name	Order	IUCN Red List Category*	WPA Schedule	CITES Status	CMS Appendix
24.	<i>Chrysomma sinense</i>	Yellow-eyed Babbler	Passeriformes	LC	IV	--	--
25.	<i>Ciconia episcopus</i>	Woolly-necked Stork	Ciconiiformes	VU	IV	--	II
26.	<i>Circaetus gallicus</i>	Short-toed Snake Eagle	Accipitriformes	LC	IV	I	II
27.	<i>Cisticola juncidis</i>	Zitting Cisticola	Passeriformes	LC	--	--	--
28.	<i>Coracina macei</i>	Large Cuckoo shrike	Passeriformes	LC	IV	--	--
29.	<i>Coturnix chinensis</i>	King Quail	Galliformes	LC	IV	--	--
30.	<i>Cursorius coromandelicus</i>	Indian Courser	Charadriiformes	LC	--	--	--
31.	<i>Dendrocitta vagabunda</i>	Rufous Treepie	Passeriformes	LC	IV	--	--
32.	<i>Dendrocopos mahrattensis</i>	Yellow-crowned Woodpecker	Piciformes	LC	IV	--	--
33.	<i>Dendrocopos nanus</i>	brown-capped pygmy woodpecker Pygmy	Piciformes	LC	IV	--	--
34.	<i>Dicaeum agile</i>	Thick-billed Flowerpecker	Passeriformes	LC	IV	--	--
35.	<i>Dicaeum erythrorhynchos</i>	Pale-billed Flowerpecker	Passeriformes	LC	IV	--	--
36.	<i>Dicrurus caerulescens</i>	White-bellied Drongo	Passeriformes	LC	IV	--	--
37.	<i>Dinopium benghalense</i>	Lesser Goldenback	Piciformes	LC	IV	--	--
38.	<i>Ducula aenea</i>	Green Imperial Pigeon	Columbiformes	LC	IV	--	--
39.	<i>Dumetia hypertythra</i>	Tawny-bellied Babbler	Passeriformes	LC	IV	--	--
40.	<i>Egretta intermedia</i>	Intermediate Egret	Pelecaniformes	LC	IV	--	--
41.	<i>Esacus recurvirostris</i>	Great Thick-knee /Great Stone	Charadriiformes	NT	IV	--	--
42.	<i>Euodice malabarica</i>	Indian Silverbill /White	Passeriformes	LC	IV	--	--
43.	<i>Falco chicquera</i>	Red-necked Falcon	Falconiformes	NT	I	III	--
44.	<i>Falco jugger</i>	Laggar Falcon	Falconiformes	NT	I	I	--
45.	<i>Francolinus pictus</i>	Painted Francolin	Galliformes	LC	IV	--	--
46.	<i>Fulica atra</i>	Eurasian Coot	Gruiformes	LC	IV	--	--
47.	<i>Gallinula chloropus</i>	Common Moorhen	Gruiformes	LC	IV	--	--
48.	<i>Galloperdix lunulata</i>	Painted Spurfowl	Galliformes	LC	IV	--	--



S.No.	Zoological Name	Common name	Order	IUCN Red List Category*	WPA Schedule	CITES Status	CMS Appendix
49.	<i>Galloperdix spadicea</i>	Red Spurfowl	Galliformes	LC	IV	--	--
50.	<i>Gallus sonneratii</i>	Grey Junglefowl	Galliformes	LC	II	II	--
51.	<i>Glareola lactea</i>	Small Pratincole	Charadriiformes	LC	--	--	--
52.	<i>Glaucidium radiatum</i>	Jungle Owlet	Strigiformes	LC	IV	II	--
53.	<i>Gymnoris xanthocollis</i>	Chestnut-shouldered Petronia	Passeriformes	LC	--	--	--
54.	<i>Gyps bengalensis</i>	White-rumped Vulture	Accipitriformes	CR	I	II	II
55.	<i>Gyps indicus</i>	Indian Vulture	Accipitriformes	CR	I	II	II
56.	<i>Haliastur indus</i>	Brahminy Kite	Accipitriformes	LC	IV	II	--
57.	<i>Hemiprocne coronata</i>	Crested Treeswift	Apodiformes	LC	--	--	--
58.	<i>Hierococcyx varius</i>	Common Hawk-Cuckoo	Cuculiformes	LC	IV	--	--
59.	<i>Hirundo fluviicola</i>	Streak-throated Swallow	Passeriformes	LC	--	--	--
60.	<i>Hirundo smithii</i>	Wire-tailed Swallow	Passeriformes	LC	IV	--	--
61.	<i>Hydrophasianus chirurgus</i>	Pheasant-tailed Jacana	Charadriiformes	LC	IV	--	--
62.	<i>Ketupa zeylonensis</i>	Brown Fish Owl	Strigiformes	LC	IV	--	--
63.	<i>Megalaima haemacephala</i>	Coppersmith Barbet	Piciformes	LC	IV	--	--
64.	<i>Megalaima zeylanica</i>	Brown-headed Barbet	Piciformes	LC	IV	--	--
65.	<i>Metopidius indicus</i>	Bronze-winged Jacana	Charadriiformes	LC	IV	--	--
66.	<i>Mycteria leucocephala</i>	Painted Stork	Ciconiiformes	NT	IV	--	--
67.	<i>Neophron percnopterus</i>	Egyptian Vulture	Accipitriformes	EN	IV	II	II
68.	<i>Nettapus coromandelianus</i>	Cotton Pygmy-goose	Anseriformes	LC	IV	--	--
69.	<i>Nycticorax nycticorax</i>	Black-crowned Night Heron	Pelecaniformes	LC	IV	--	--
70.	<i>Ocyrceros birostris</i>	Indian Grey Hornbill	Bucerotiformes	LC	--	--	--
71.	<i>Orthotomus sutorius</i>	Common Tailorbird	Passeriformes	LC	--	--	--
72.	<i>Otus bakkamoena</i>	Indian Scops Owl	Strigiformes	LC	IV	I	--
73.	<i>Pavo cristatus</i>	Indian Peafowl	Galliformes	LC	I	--	--
74.	<i>Perdicula argoondah</i>	Rock Bush Quail	Galliformes	LC	IV	--	--
75.	<i>Perdicula asiatica</i>	Jungle Bush Quail	Galliformes	LC	IV	--	--

S.No.	Zoological Name	Common name	Order	IUCN Red List Category*	WPA Schedule	CITES Status	CMS Appendix
76.	<i>Platalea leucorodia</i>	Eurasian Spoonbill	Pelecaniformes	LC	I	II	II
77.	<i>Porphyrio porphyrio</i>	Purple Swampphen	Gruiformes	LC	IV	--	--
78.	<i>Prinia hodgsonii</i>	Grey-breasted Prinia	Passeriformes	LC	--	--	--
79.	<i>Prinia inornata</i>	Plain Prinia	Passeriformes	LC	--	--	--
80.	<i>Prinia socialis</i>	Ashy Prinia	Passeriformes	LC	--	--	--
81.	<i>Prinia sylvatica</i>	Jungle Prinia	Passeriformes	LC	--	--	--
82.	<i>Pseudibis papillosa</i>	Red-naped Ibis	Pelecaniformes	LC	IV	--	--
83.	<i>Psittacula cyanocephala</i>	Plum-headed Parakeet	Psittaciformes	LC	IV	I	--
84.	<i>Psittacula eupatria</i>	Alexandrine Parakeet	Psittaciformes	NT	IV	II	--
85.	<i>Pterocles exustus</i>	Chestnut-bellied Sandgrouse	Pteroclidiformes	LC	IV	--	--
86.	<i>Pterocles indicus</i>	Painted Sandgrouse	Pteroclidiformes	LC	IV	--	--
87.	<i>Pycnonotus luteolus</i>	White-browed Bulbul	Passeriformes	LC	IV	--	--
88.	<i>Pycnonotus xantholaemus</i>	Yellow-throated bulbul	Passeriformes	V	IV	--	--
89.	<i>Rhinoptilus bitorquatus</i>	Jerdon's Courser	Charadriiformes	CR	I	--	--
90.	<i>Rhipidura aureola</i>	White-browed Fantail	Passeriformes	LC	--	--	--
91.	<i>Rhipidura albicollis</i>	White-spotted Fantail	Passeriformes	LC	--	--	--
92.	<i>Rhopodytes viridirostris</i>	Blue-faced Malkoha	Cuculiformes	LC	IV	--	--
93.	<i>Rostratula benghalensis</i>	Greater Painted-Snipe	Charadriiformes	LC	IV	--	--
94.	<i>Sterna aurantia</i>	River Tern	Charadriiformes	NT	--	--	--
95.	<i>Streptopelia orientalis</i>	Oriental Turtle-Dove	Columbiformes	LC	IV	--	--
96.	<i>Streptopelia tranquebarica</i>	Red Collared Dove	Columbiformes	LC	IV	--	--
97.	<i>Strix ocellata</i>	Mottled Wood Owl	Strigiformes	LC	IV	--	--
98.	<i>Taccocua leschenaultii</i>	Sirkeer Malkoha	Cuculiformes	LC	IV	--	--
99.	<i>Tachybaptus ruficollis</i>	Little Grebe	Podicipediformes	LC	IV	--	--
100.	<i>Tachymarptis melba</i>	Alpine Swift	Apodiformes	LC	--	--	--
101.	<i>Threskiornis melanocephalus</i>	Black-headed Ibis	Pelecaniformes	NT	IV	--	--
102.	<i>Treron phoenicopterus</i>	Yellow-footed Green Pigeon	Columbiformes	LC	IV	--	--



S.No.	Zoological Name	Common name	Order	IUCN Red List Category*	WPA Schedule	CITES Status	CMS Appendix
103.	<i>Turdoides affinis</i>	Yellow-billed Babbler	Passeriformes	LC	IV	--	--
104.	<i>Turdoides striata</i>	Jungle Babbler	Passeriformes	LC	IV	--	--
105.	<i>Tyto alba</i>	Barn Owl	Strigiformes	LC	IV	II	--
106.	<i>Vanellus malarbaricus</i>	Yellow-wattled Lapwing	Charadriiformes	LC	IV	--	--
107.	<i>Zoothera citrina</i>	Orange-headed Thrush	Passeriformes	LC	--	--	--
108.	<i>Zosterops palpebrosus</i>	Oriental White-eye	Passeriformes	LC	IV	--	--

*Status assigned by the International Union for Conservation of Nature and Natural Resources, where - LC – Least Concern

*Sources: R. Grimmett, C. Inskipp & T. Inskipp, *Birds of the Indian Subcontinent*; Salim Ali, *Book of Indian Birds*; IUCN Red Data List, <https://www.cites.org/>, www.cms.int/en/species

Forest Working Plan Anantapur district, 2010-11

8.2 MIGRATORY BIRD SPECIES ASSOCIATED WITH THE STUDY AREA

S.N.	Scientific Name	Common Name	Order	Migratory Status	IUCN Status	WPA Schedule	CITES status	CMS Appendix
1.	<i>Acrocephalus dumetorum</i>	Blyth's Reed-Warbler	Passeriformes	Winter	LC	-	--	--
2.	<i>Actitis hypoleucos</i>	Common Sandpiper	Charadriiformes	Winter	LC	IV	--	II
3.	<i>Anas acuta</i>	Northern Pintail	Anseriformes	Winter	LC	IV	--	II
4.	<i>Anas clypeata</i>	Northern Shoveler	Anseriformes	Winter	LC	IV	--	II
5.	<i>Anas crecca</i>	Common Teal	Anseriformes	Winter	LC	IV	--	II
6.	<i>Anas querquedula</i>	Garganey	Anseriformes	Winter	LC	IV	--	II
7.	<i>Anas strepera</i>	Gadwall	Anseriformes	Winter	LC	IV	--	II
8.	<i>Anhinga melanogaster</i>	Darter	Suliformes	Winter	NT	IV	--	--
9.	<i>Anser indicus</i>	Bar-headed Goose	Anseriformes	Winter	LC	IV	--	--
10.	<i>Anthus godlewskii</i>	Blyth's Pipit	Passeriformes	Winter	LC	IV	--	--
11.	<i>Anthus trivialis</i>	Tree Pipit	Passeriformes	Winter	LC	IV	--	--
12.	<i>Asio flammeus</i>	Short-eared Owl	Strigiformes	Winter	LC	IV	--	--
13.	<i>Aythya ferina</i>	Common Pochard	Anseriformes	Winter	LC	IV	--	II
14.	<i>Aythya fuligula</i>	Tufted Duck	Anseriformes	Winter	LC	IV	--	II
15.	<i>Calidris minuta</i>	Little Stint	Charadriiformes	Winter	LC	IV	--	II
16.	<i>Calidris temminckii</i>	Temminck's Stint	Charadriiformes	Winter	LC	IV	--	II
18.	<i>Chlidonias hybrida</i>	Whiskered Tern	Charadriiformes	Winter	LC	-	--	--
19.	<i>Ciconia ciconia</i>	White Stork	Ciconiiformes	Winter	LC	IV	--	II
20.	<i>Circus aeruginosus</i>	Eurasian Marsh Harrier	Accipitriformes	Winter	LC	IV	II	II
21.	<i>Circus macrourus</i>	Pallid Harrier	Accipitriformes	Winter	NT	IV	II	II
22.	<i>Circus pygargus</i>	Montagu's Harrier	Accipitriformes	Winter	LC	IV	II	II
23.	<i>Clamator jacobinus</i>	Jacobin Cuckoo	Cuculiformes	Summer	LC	IV	--	--
24.	<i>Conturnix conturnix</i>	Common Quail	Galliformes	Winter	LC	IV	--	I
25.	<i>Conturnix coromandelica</i>	Rain Quail	Galliformes	Winter	LC	IV	--	--
26.	<i>Coracina melanoptera</i>	Black-headed Cuckooshrike	Passeriformes	Passage	LC	IV	--	--
27.	<i>Cyornis tickelliae</i>	Tickell's Blue Flycatcher	Passeriformes	Winter	LC	IV	--	--
28.	<i>Dicrurus leucophaeus</i>	Ashy Drongo	Passeriformes	Winter	LC	IV	--	--



S.N.	Scientific Name	Common Name	Order	Migratory Status	IUCN Status	WPA Schedule	CITES status	CMS Appendix
29.	<i>Falco peregrinus</i>	Peregrine Falcon	Falconiformes	Winter	LC	IV	II	II
30.	<i>Falco tinnunculus</i>	Common Kestrel	Falconiformes	Winter	LC	IV	II	II
31.	<i>Ficedula supercilialis</i>	Ultramarine Flycatcher	Passeriformes	Winter	LC	IV	--	--
32.	<i>Gallinago gallinago</i>	Common Snipe	Charadriiformes	Winter	LC	IV	--	--
33.	<i>Gallinago stenura</i>	Pin-tailed Snipe	Charadriiformes	Winter	LC	IV	--	--
34.	<i>Hieraaetus pennatus</i>	Booted Eagle	Accipitriformes	Winter	LC	IV	II	II
35.	<i>Himantopus himantopus</i>	Black-winged Stilt	Charadriiformes	Winter	LC	IV	--	II
36.	<i>Hirundo rustica</i>	Barn Swallow	Passeriformes	Winter	LC	-	--	--
37.	<i>Iduna caligata</i>	Booted Warbler	Passeriformes	Winter	LC		--	--
38.	<i>Iduna rama</i>	Sykes's Warbler	Passeriformes	Winter	LC	-	--	--
39.	<i>Jynx torquilla</i>	Eurasian Wryneck	Piciformes	Winter	LC	IV	--	--
40.	<i>Lanius cristatus</i>	Brown Shrike	Passeriformes	Winter	LC	-	--	--
41.	<i>Lanius schach</i>	Long-tailed Shrike	Passeriformes	Winter	LC	-	--	--
42.	<i>Limosa limosa</i>	Black-tailed Godwit	Charadriiformes	Winter	NT	IV	--	II
43.	<i>Luscinia svecica</i>	Bluethroat	Passeriformes	Winter	LC	IV	--	--
44.	<i>Merops philippinus</i>	Blue-tailed Bee-eater	Coraciiformes	Passage	LC	-	--	--
45.	<i>Monticola solitarius</i>	Blue Rock Thrush	Passeriformes	Winter	LC	IV	--	--
46.	<i>Motacilla alba</i>	White Wagtail	Passeriformes	Winter	LC	-	--	--
47.	<i>Motacilla cinerea</i>	Grey Wagtail	Passeriformes	Winter	LC	-	--	--
50.	<i>Numenius arquata</i>	Eurasian Curlew	Charadriiformes	Winter	NT	IV	--	--
51.	<i>Oriolus kundoo</i>	Indian Golden Oriole	Passeriformes	Winter	LC	IV	--	--
52.	<i>Pandion haliaetus</i>	Osprey	Accipitriformes	Winter	LC	I	II	II
53.	<i>Phalacrocorax carbo</i>	Great Cormorant	Suliformes	Winter	LC	IV	--	--
54.	<i>Phalacrocorax fuscicollis</i>	Indian Cormorant	Suliformes	Winter	LC	IV	--	--
55.	<i>Philomachus pugnax</i>	Ruff	Charadriiformes	Winter	LC	-	--	II
56.	<i>Phoenicopterus roseus</i>	Greater Flamingo	Phoenicopteriformes	Winter	LC	IV	--	II
57.	<i>Phoenicurus ochruros</i>	Black Redstart	Passeriformes	Winter	LC	IV	--	--