National Electric Power Regulatory Authority

Islamic Republic of Pakistan

2nd Floor, OPF Building, G-5/2, Islamabad
Ph: 9206500, 9207200, Fax: 9210215
E-mail: registrar@nepra.org.pk

Registrar

No. NEPRA/R/LAG-195/11470-72

December 26, 2011

Mr. Nauman Mirza
Chief Financial Officer
Master Wind Energy Limited
82-C-1, Gulberg-III
Lahore

Subject: **Generation Licence No. WPGL/15/2011**
Licence Application No. LAG-195
Master Wind Energy Limited

Reference: *Your letter No. GL01/MWEL/11, dated September 23, 2011*

Enclosed please find herewith Generation Licence No. WPGL/15/2011 granted by National Electric Power Regulatory Authority (NEPRA) to Master Wind Energy Limited for its 50.00 MW Generation Facility/Wind Farm located at Jhampir, near Nooriabad, District Thatta, Sindh pursuant to Section 15 of the Regulation of Generation, Transmission and Distribution of Electric Power Act (XL of 1997). Further, the determination of the Authority in the subject matter is also attached.

2. Please quote above mentioned Generation Licence No. for future correspondence.

Enclosure: **Generation Licence**
[No. WPGL/15/2011]

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
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(Syed Safeer Hussain)

Copy to:

1. Chief Executive Officer, Hyderabad Electric Supply Company (HESCO), WAPDA Water Wing Complex, Hussainabad, Hyderabad

2. Director General, Pakistan Environmental Protection Agency, House No. 311, Main Margalla Road, F-11/3, Islamabad.

National Electric Power Regulatory Authority
(NEPRA)
Islamabad – Pakistan

GENERATION LICENCE

No.
WPGL/15/2011

In exercise of the Powers conferred upon the National Electric Power Regulatory Authority (NEPRA) under Section 15 of the Regulation of Generation, Transmission and Distribution of Electric Power Act 1997, the Authority hereby grants a Generation Licence to:

MASTER WIND ENERGY LIMITED

Incorporated under the Companies Ordinance, 1984
Under Certificate of Incorporation
No. 00010938/2005, dated May 03, 2005

for its Generation Facility/Wind Farm Located at Jhampir, near Nooriabad District Thatta, Sindh

(Installed Capacity: 49.50 MW Gross ISO)

to engage in generation business subject to and in accordance with the Articles of this Licence.

Given under my hand this 26th day of December Two Thousand & Eleven and expires on day of 30th December Two Thousand & Thirty Three.

Registrar

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
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Article-1
Definitions

1.1 In this Licence

(a) "Act" means the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997 (XL of 1997);

(b) "Authority" means the National Electric Power Regulatory Authority constituted under section 3 of the Act;

(c) "CPPA" means Central Power Purchasing Agency of NTDC or any other entity created for the like purpose;

(d) "Licensee" means Master Wind Energy (Private) Limited;

(e) "NTDC" means National Transmission and Despatch Company;

(f) "Policy" means the Policy for Development of Renewable Energy for Power Generation, 2006 of Government of Pakistan as amended from time to time;

(g) "Power Purchaser" means CPPA of NTDC purchasing power on behalf of XW-DISCOs;

(h) "Rules" mean the National Electric Power Regulatory Authority Licensing (Generation) Rules, 2000;

(i) "Wind Farm" means a cluster of wind turbines in the same location used for production of electric power;

(j) "XW DISCO" means an Ex-WAPDA distribution company engaged in the distribution of electric power.

1.2 Words and expressions used but not defined herein bear the meaning given thereto in the Act or in the Rules.

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Article-2
Application of Rules

This Licence is issued subject to the provisions of the Rules, as amended from time to time.

Article-3
Generation Facilities

3.1 The location, size, technology, interconnection arrangements, technical limits, technical and functional specifications and other details specific to the Generation Facility/Wind Farm of the Licensee are set out in Schedule-I to this Licence.

3.2 The Net Capacity of the Generation Facility/Wind Farm of the Licensee is set out in Schedule-II hereto.

3.3 The Licensee shall provide the final arrangement, technical and financial specifications and other specific details pertaining to its Generation Facility/Wind Farm before its commissioning.

Article-4
Term of Licence

4.1 The Licence is granted for a term of twenty (20) years after the Commercial Operation Date (COD).

4.2 Unless suspended or revoked earlier, the Licensee may within ninety (90) days prior to the expiry of the term of the Licence, apply for renewal of the Licence under the Licensing (Application and Modification Procedures) Regulation, 1999 as amended or replaced from time to time.

Article-5
Licence fee

After the grant of the Generation Licence, the Licensee shall pay to the Authority the Licence fee, in the amount and manner and at the time set out in National Electric Power Regulatory Authority (Fees) Rules, 2002.

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Article-6
Tariff

The Licensee shall charge only such tariff which has been approved, determined, adjusted or specified by the Authority.

Article-7
Competitive Trading Arrangement

7.1 The Licensee shall participate in such manner as may be directed by the Authority from time to time for development of a Competitive Trading Arrangement. The Licensee shall in good faith work towards implementation and operation of the aforesaid Competitive Trading Arrangement in the manner and time period specified by the Authority. Provided that, any such participation shall be subject to any contract entered between the Licensee and another party with the approval of the Authority.

7.2 Any variation or modification in the above-mentioned contracts for allowing the parties thereto to participate wholly or partially in the Competitive Trading Arrangement shall be subject to mutual agreement of the parties thereto and such terms and conditions as may be approved by the Authority.

Article-8
Maintenance of Records

For the purpose of sub-rule (1) of Rule 19 of the Rules, copies of records and data shall be retained in standard and electronic form and all such records and data shall, subject to just claims of confidentiality, be accessible by authorized officers of the Authority.

Article-9
Compliance with Performance Standards

The Licensee shall comply with the relevant provisions of NEPRA rules on Performance Standards as may be prescribed by the Authority from time to time.

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Article-10
Compliance with Environmental Standards

The Licensee shall comply with the environmental standards as may be prescribed by the relevant competent authority from time to time.

Article-11
Power off take Point and Voltage

The Licensee shall deliver power at the outgoing bus of its 132 KV grid station. The up-gradation (step up) of generation voltage up to 132 KV will be the responsibility of the Licensee.

Article-12
Performance Data of Generation Facility/Wind Farm

The Licensee shall install monitoring mast with properly calibrated automatic computerized wind speed recording meters at the same height as that of the wind turbine generators and a compatible communication/SCADA system both at its Generation Facility/Wind Farm and control room of the Power Purchaser for transmission of wind speed and power output data to the control room of the Power Purchaser for record of data.

Article-13
Provision of Information

13.1 The obligation of the Licensee to provide information to the Authority shall be in accordance with Section 44 of the Act.

13.2 The Licensee shall in addition to 13.1 above, supply information to NTDC regarding Wind data specific to the Licensee's site and other related information on a regular basis and in a manner required by NTDC.

13.3 The Licensee shall be subject to such penalties as may be specified in the relevant rules made by the Authority for failure to furnish such information as may be required from time to time by the Authority and which is or ought to be or has been in the control or possession of the Licensee.

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Article-14
Emissions Trading /Carbon Credits

The Licensee shall process and obtain emissions/Carbon Credits expeditiously and credit the proceeds to the Power Purchaser as per prevailing Policy issued by the Government on the subject.

Article-15
Design & Manufacturing Standards

Wind Turbine Generation system shall be designed, manufactured and tested according to the latest IEC standards or other equivalent standards. All plant and equipment shall be un-used and brand new.

Article-16
Power Curve

The power curve for the individual Wind Turbine provided by the manufacturer and as mentioned in this Generation Licence shall form the basis in determining the cumulative Power Curve of Generation Facility/Wind Farm/Complex.

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SCHEDULE-I

The Location, Size, Type of Technology, Interconnection Arrangements, Technical Limits, Technical/Functional Specifications and other details specific to the Generation Facility/Wind Farm of the Licensee are described in this Schedule.

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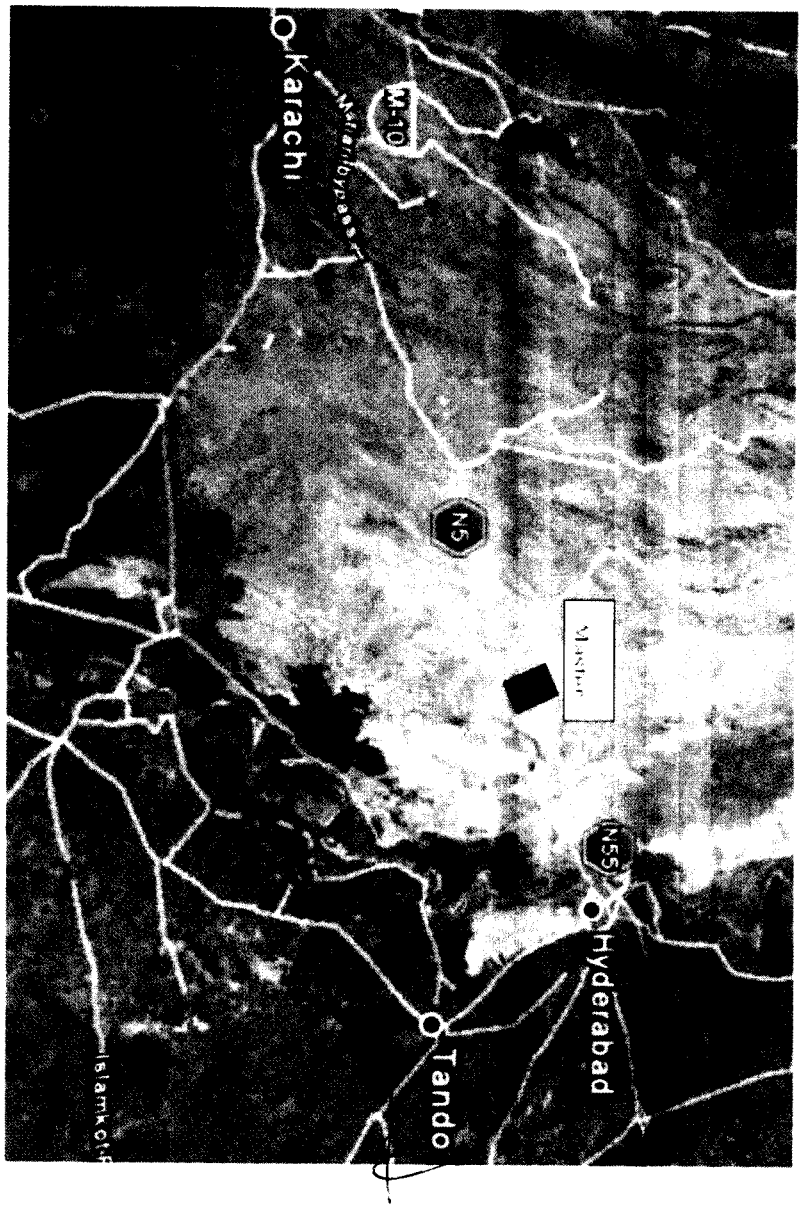
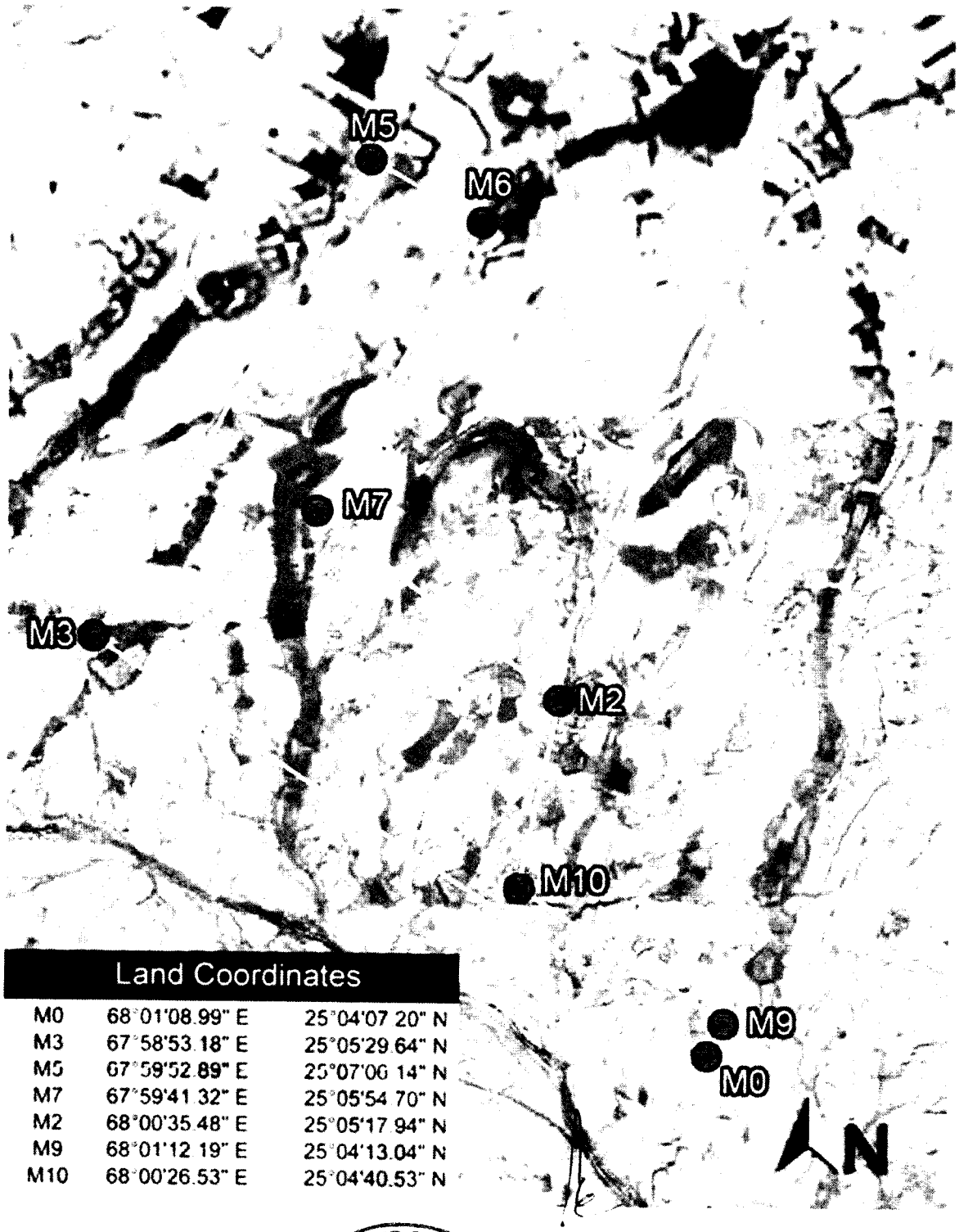
Wind Farm Location Map



Wind Farm Lay Out



Land Coordinates		
M0	68°01'08.99" E	25°04'07.20" N
M3	67°58'53.18" E	25°05'29.64" N
M5	67°59'52.89" E	25°07'06.14" N
M7	67°59'41.32" E	25°05'54.70" N
M2	68°00'35.48" E	25°05'17.94" N
M9	68°01'12.19" E	25°04'13.04" N
M10	68°00'26.53" E	25°04'40.53" N

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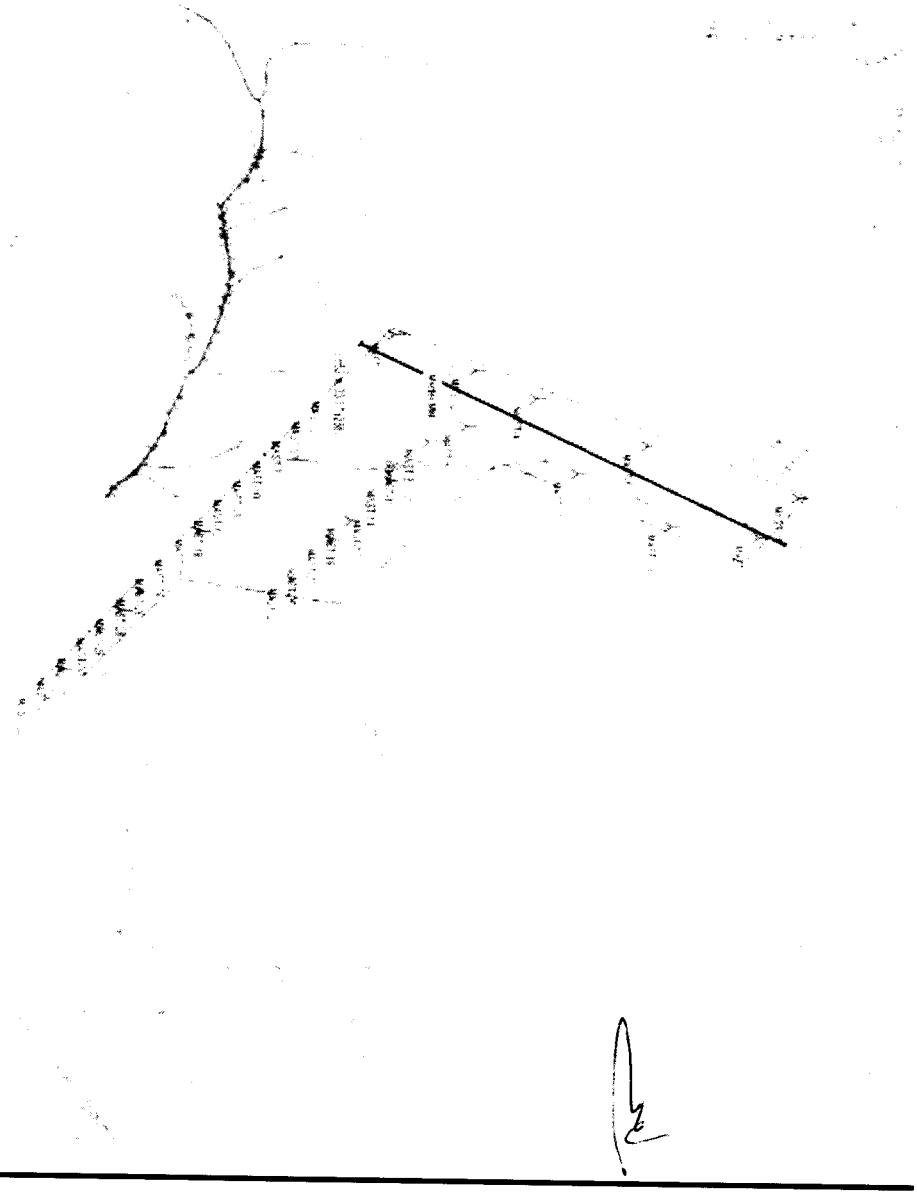
Wind Farm Micro-Sitting



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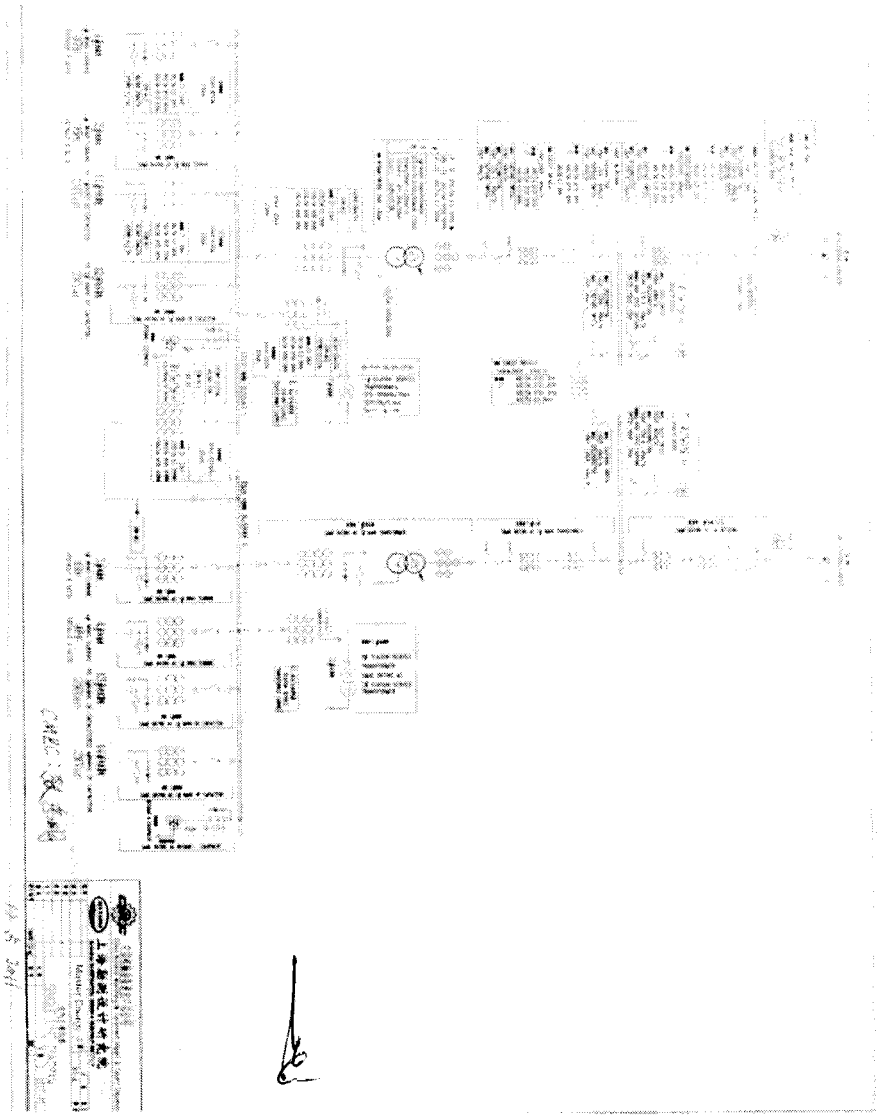
Single Line Diagram (Electrical System of the Wind Farm)



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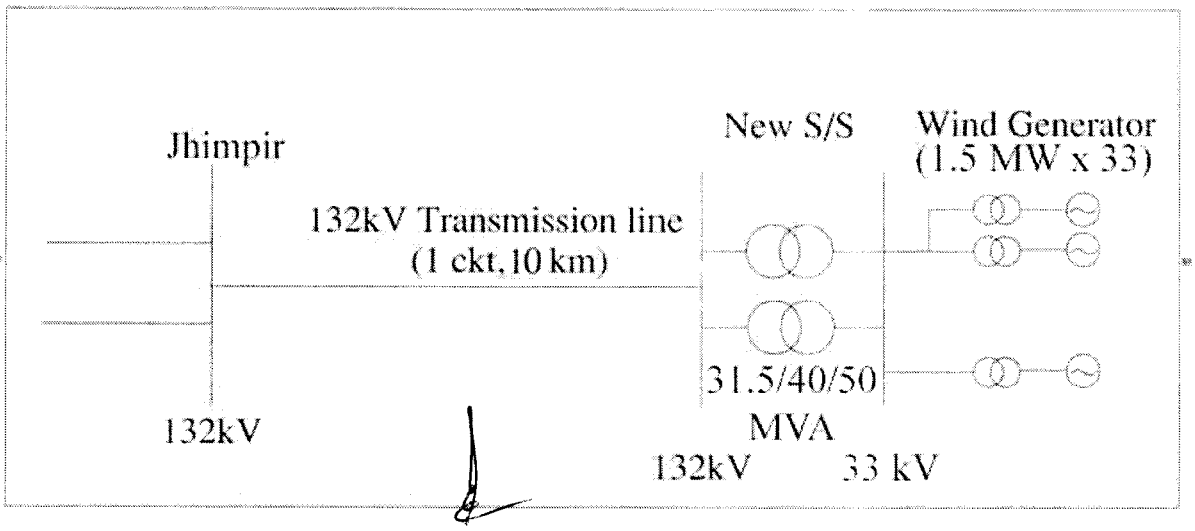
INTERCONNECTION ARRANGEMENT FOR DISPERSAL OF POWER FROM THE GENERATION FACILITY/WIND FARM

The power generated from Generation Facility/Wind Farm (WF) of Master Wind Energy Limited (MWEL) shall be dispersed to the Load Center/Ring of HESCO at 132 KV Voltage level.

The dispersal arrangement will be consisting of 132 KV S/C Transmission Line (measuring about 10 Kilometer), connecting the Wind Farm to Jhampir Grid Station.

If there is any change in the final dispersal arrangement, the same will be communicated to NEPRA in due course of time.



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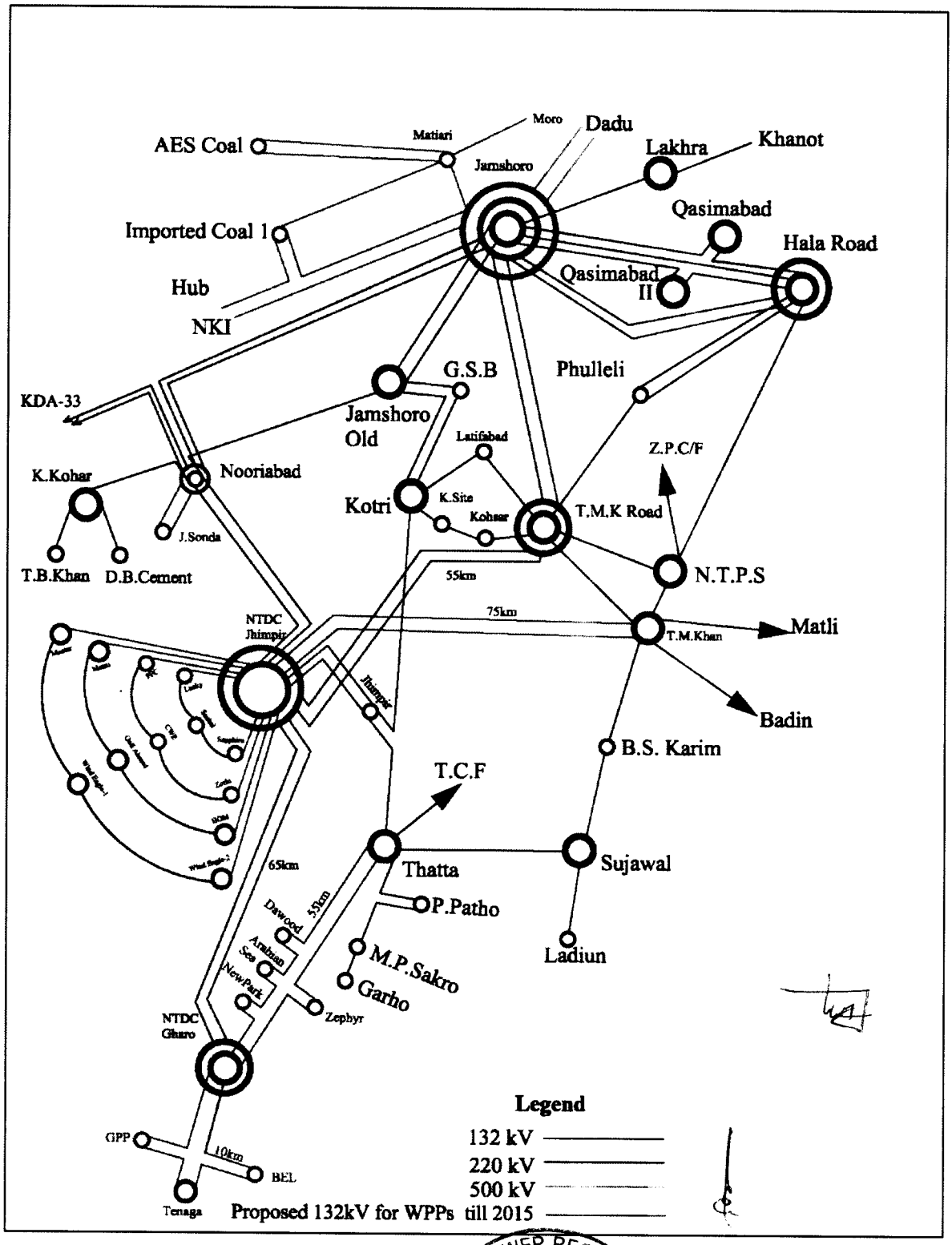
Schematic Diagram
For Interconnection/Transmission Arrangement for Dispersal of Power from MWEL



Generation Facility/ Wind Farm*

(A). General Information

(i).	Name of Applicant/Company	Master Wind Energy Limited
(ii).	Registered/Business Office	82-C/1 GULBARG-III LAHORE-PAKISTAN
(iii).	Plant Location	Jamphir District Thatta, Sindh.
(iv).	Type of Generation Facility	Wind Power

(B). Wind Farm Capacity & Configuration

(i).	Wind Turbine type, Make & Model	GE 1.5 xle 1.5 MW
(ii).	Installed Capacity of Wind Farm (MW)	49.5 MW
(iii).	Number of Wind Turbine Units/Size of each Unit (KW)	33 x 1.5 MW

(C). Wind Turbine Details

(a).	**Rotor**	
(i).	Number of blades	3
(ii).	Rotor speed	9-18 rpm
(iii).	Rotor diameter	82.5 m
(iv).	Swept area	5346 m^2
(v).	Power regulation	Active Single Blade Adjustment

* As provided by Master Wind Energy Limited

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(vi).	Rated power from	13 m/s
(vii).	Cut-in wind speed	3.5 m/s
(viii).	Cut-out wind speed	20 m/s
(ix).	Survival wind speed	52.5 m/s at 10 minutes average (at 80 m hub height)
(x).	Pitch regulation	Individual electromotive pitch
(b).	**Blades**	
(i).	Blade length	40.3 m
(ii).	Material	Glass reinforced plastic
(iii).	Weight	6200 Per Blade
(c).	**Gearbox**	
(i).	Type	3 stage 1 planetary 2 spur gear stages
(ii).	Gear ratio	1 :107
(iii).	Weight	-
(iv).	Oil quantity	300 liter
(v)	Main shaft bearing	Self-aligning roller bearing
(d).	**Generator**	
(i).	Power	1,500 kW (adjustable)
(ii).	Voltage	660 V
(iii).	Type	Double-fed asynchronous generator, air-cooled
(iv).	Speed	1000 - 2000 rpm
(v).	Enclosure class	IP 54
(vi).	Coupling	Multiple steel disc, electrically insulated
(vii).	Efficiency	Efficiency c. 95 % at full load, (electrical system overall)
(viii).	Weight	-
(ix).	Power factor	0.95 lead to 0.95 lagg.

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(e).	**Yaw System**	
(i).	Yaw bearing	Gear motor
(ii).	Brake	10 Disk brake with hydraulic brake calipers
(iii).	Yaw drive	Asynchronous motor
(iv).	Speed	0.75°/s
(f).	**Control System**	
(i).	Type	Remote field controller/PLC GE Power converter system
(ii).	Grid connection	Via IGBT converter
(iii).	Scope of monitoring	Remote monitoring of more than 300 different parameters, e.g. temperature sensors, hydraulic sensors, pitch parameters, vibration, speed, generator torque, wind speed and direction, etc.
(iv).	Recording	Production data, event list, long and short-term trends
(g).	**Brake**	
(i).	Design	Three independent systems, fail safe (individual pitch)
(ii).	Operational brake	Electromechanical
(iii).	Secondary brake	Actively actuated Disc brake
(h).	**Tower**	
(i).	Type	cylindrical tubular steel tower
(ii).	Hub heights	Tubular tower 82.5 m

(D). Other Details

(i).	Project Commissioning date (Anticipated)	December 31, 2013

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(ii).	Expected Life of the Project from Commercial Operation date (COD)	20 Years

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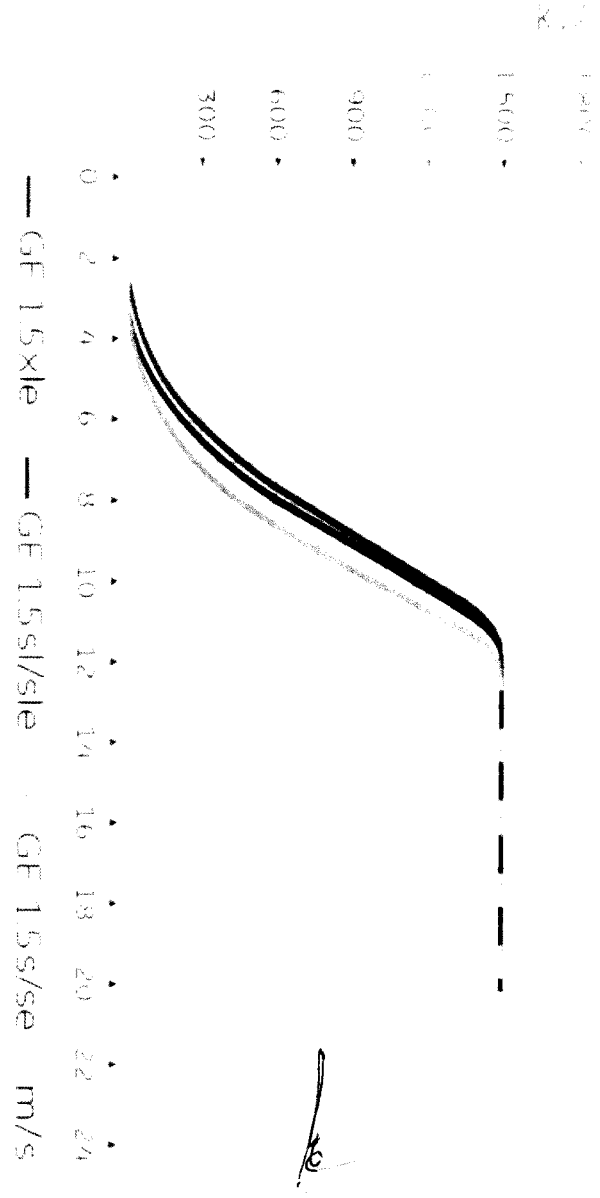
Power Curve
GE- 1.5XLe 1.5 MW



SCHEDULE-II

The Total Installed/Gross ISO Capacity (MW), Total Annual Full Load Hours, Average Wind Turbine Generator (WTG) Availability, Total Gross Generation of the Generation Facility/Wind Farm (in GWh), Array & Miscellaneous Losses (GWh), Availability Losses (GWh), Balance of Plant Losses (GWh) and Annual Energy Generation (GWh) of the Generation Facility /Wind Farm of Licensee is given in this Schedule.

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SCHEDULE-II*

1.	Total Installed Gross ISO Capacity of the Generation Facility/Wind Farm (MW/GWh)	49.5 MW
2.	Total Annual Full Load Hrs	2872 Hrs
3.	Average Wind Turbine Generator (WTG) Availability	95.90%
4.	Total Gross Generation of the Generation Facility/Wind Farm (in GWh)	171.7238711 GWh
5.	Array & Miscellaneous Losses GWh	18.88962582
6.	Availability Losses GWh	6.27
7.	Balance of Plant Losses GWh	4.397041
8.	Annual Energy Generation (20 year equivalent Net AEP) GWh	142.171
9.	Net Capacity Factor	Approx 32.79%

Note

All the above figures are indicative as provided by the Licensee. The Net energy available to NTDC for dispatch will be determined through procedures contained in the Energy Purchase Agreement.

*As provided by Master Wind Energy Limited

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