

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

Table 11.2 Environmental and Social Management and Monitoring Plan for Project Bhesada - Operation Phase

S. No.	Environment/Social Parameters/Project Activities	Impacts/Issue	Mitigation Measures	Responsibility for ensuring implementation of the suggested mitigation	Means of Verification that mitigation has been met	Timelines/ frequency of Monitoring	Responsibility for implementation of monitoring	Supervision responsibility	Reporting Requirements
1.1	Land and soil environment								
1.1.1	Operations and maintenance	Soil contamination	<ul style="list-style-type: none"> Use of spill control kits to contain and clean small spills and leaks during O&M activities; and The guidelines and procedures shall be prepared and followed for immediate clean-up actions following any spillages. 	EPC Contractor - Suzlon	Site Inspection; Visual Assessment	Monthly	EHS - Suzlon	EHS - MEIL	Monthly Report
1.2	Water Resources								
1.2.1	Water conservation	Water availability	Optimising water usage in the SCADA building and substation area by application of water conservation measures such as sensor based taps, low flush urinals etc.;	Suzlon	Site Inspection; Training records;	Monthly	EHS - Suzlon	EHS - MEIL	Monthly Report
1.3	Ambient Noise								
1.3.1	Operation of WTGs	Ambient noise level	<ul style="list-style-type: none"> Ensure regular maintenance of WTGs; Periodic monitoring of noise near to the sources of generation to ensure compliance with design specification; Quarterly monitoring of ambient noise levels (during day and night time) at identified residential receptors for determination of actual impact due to 	EPC Contractor - Suzlon	Site Inspection;	Monthly	EHS - Suzlon	EHS - MEIL	Monthly Report

S. No.	Environment/Social Parameters/Project Activities	Impacts/Issue	Mitigation Measures	Responsibility for ensuring implementation of the suggested mitigation	Means of Verification that mitigation has been met	Timelines/frequency of Monitoring	Responsibility for implementation of monitoring	Supervision responsibility	Reporting Requirements
			<p>operation of WTGs;</p> <ul style="list-style-type: none"> Only night time predicted noise levels are showing exceedence from the applicable standards and therefore, monitoring of noise during night time at impacted receptors inside the structure to check attenuation caused by the wall/ roof material and its comparison with applicable standard; If the above two monitoring results confirm the impact and its level, then provide solid noise barriers near the receptors based on the impact magnitude 						
1.4	Shadow Flicker								
1.4.1	Operation of WTGs	Impact on health	<ul style="list-style-type: none"> MEIL should explore installation of an automatic switching unit with radiation or illumination sensor which record the specific meteorological conditions on the problematic WTG so that the turbine could potentially then be shut down, when the strength of the sun, wind speed and the angle and position of the sun combines to cause a flicker nuisance. Higher fencing and planting of trees at problem locations. 	EPC Contractor - Suzlon	Site Inspection;	Monthly	EHS - Suzlon	EHS - MEIL	Monthly Report

S. No.	Environment/Social Parameters/Project Activities	Impacts/Issue	Mitigation Measures	Responsibility for ensuring implementation of the suggested mitigation	Means of Verification that mitigation has been met	Timelines/ frequency of Monitoring	Responsibility for implementation of monitoring	Supervision responsibility	Reporting Requirements
1.5	Ecology and Biodiversity								
1.5.1	Ecological Monitoring with special emphasis on bird during the Operations Phase	Impact on Bird/bats movement and Interference	<ul style="list-style-type: none"> A short term bird monitoring to be conducted in migratory season (Oct-March) Detailed long term Bird and bat monitoring study to be conducted post operation of wind farm site to record the movement pattern of birds all through the year in terms of distance and time based on the outcome of Migratory season survey suggest high sensitivity; This monitoring would give probable flight path of birds and bats for day to day activity; Flash lamps on the WTGs will prevent bird collision at nights. Regular checking of the vacuums or holes in the towers to avoid nesting facility of any of the birds; and Bird and bat mortality count in the immediate vicinity is proposed to establish a strong link between the wind turbines and bird and bat mortality for two years starting from the commissioning of the wind 	EPC Contractor - Suzlon	Site Inspection; Training records; Visual Assessment by experts	Once during the project phase	EHS - Suzlon	EHS MEIL	Ecological Monitoring with special emphasis on bird and bats during the first year of the Operations Phase

S. No.	Environment/Social Parameters/Project Activities	Impacts/Issue	Mitigation Measures	Responsibility for ensuring implementation of the suggested mitigation	Means of Verification that mitigation has been met	Timelines/ frequency of Monitoring of	Responsibility for implementation of monitoring	Supervision responsibility	Reporting Requirements
			<p>farm;</p> <ul style="list-style-type: none"> • Requirement of baseline data generation with respect to migratory birds during the migratory season. • Based on the outcome, if the sensitivity is found high bird and bat monitoring is to take place of duration at least 3 months and maximum of 6 months covering migratory season and breeding season in order, to assess the actual impacts on the birds and bats in the area by wind farm. • In the very unlikely event that migratory or other birds are observed to fly through specific routes across the wind farm, during specific seasons and times during the year or day for- <ul style="list-style-type: none"> i. Accessing habitats during onwards or reverse migrations (e.g. stop-over locations during migrations) (where onward migration is migration from summering to wintering grounds and reverse migration is the reverse). This is a seasonal activity. ii. Travelling to and fro from foraging, breeding or roosting sites. This is a daily activity. <p>Then: 1. Sensitive WTG's should be</p>						

S. No.	Environment/Social Parameters/Project Activities	Impacts/Issue	Mitigation Measures	Responsibility for ensuring implementation of the suggested mitigation	Means of Verification that mitigation has been met	Timelines/ frequency of Monitoring	Responsibility for implementation of monitoring	Supervision responsibility	Reporting Requirements
			<p>identified.</p> <p>2. The towers of these WTGs should be painted as per the photo attached (all WTGs will be painted similarly)</p> <p>3. Flash-lamps should be attached to the top of the WTGs to manage risks to nocturnal flight of birds (all WTGs will have flash-lamps).</p> <p>Sensitive WTG's should then be monitored during seasons of fly through to detect any major spurts in mortality.</p> <p>If such major spurts of mortality are noticed during such seasons.</p> <p>i. Sensitive WTG activity should be curtailed during periods when such fly through is highest e.g, dawn and dusk</p> <p>ii. In the worst case but least likely scenario and only in the event of high mortality, if period of fly through occurs right through the day, WTG activity needs to be curtailed for longer periods, often involving several days. Such periods are likely only during onward and reverse migration of birds.</p> <p>In both the above cases effort is</p>						

S. No.	Environment/Social Parameters/Project Activities	Impacts/Issue	Mitigation Measures	Responsibility for ensuring implementation of the suggested mitigation	Means of Verification that mitigation has been met	Timelines/ frequency of Monitoring	Responsibility for implementation of monitoring	Supervision responsibility	Reporting Requirements
1.6	Community Health and Safety		needed to understand i) periods during the day or ii) periods involving several days when collision risk is high. These periods can be established through a combination of vantage point and carcass monitoring during the first year of the operations, assuming that level of mortality requires such monitoring in the first place.						
1.6.1	Community Health & Safety	Community grievance	<ul style="list-style-type: none"> Put in place a grievance mechanism to allow for the community members to report any concern or grievance related to project activities 	Suzlon	Records;	Monthly	EHS - Suzlon	EHS - MEIL	Monthly Report
1.6.2	Blade throw and natural disasters	Health And Safety	<ul style="list-style-type: none"> The disaster management cell of the district and the nearest fire-service station should be involved in preparedness for emergency situation; Company should get adequate third party insurance cover to meet the financial loss to any third party due to such emergencies. 						

12.1**INTRODUCTION**

This Environmental and Social Impact Assessment has been conducted to evaluate the impacts associated with the proposed wind farm project of 50.4MW capacity in Jaisalmer district of Rajasthan. The impact assessment has been conducted in compliance with administrative framework identified herein, including relevant national legislative requirement, international conventions and MEIL's corporate requirements.

12.2**SUMMARY OF DETAILED IMPACT ASSESSMENT**

Following a Scoping exercise, this ESIA was focused on interactions between project activities and various resources/receptors that could result in significant impacts. The table below presents the outcomes of the comprehensive assessment of identified impacts as a result of the various phases of the proposed project and summarize the impacts. Based on the impacts significance, the ESMP has been prepared.

Table 12.1 Summary of detailed Impacts

Impact Description	Impact nature	Significance of Impact	Residual Impact
Construction Phase			
Change in land use	Negative	Minor	Negligible to minor
Soil erosion	Negative	Negligible	-
Soil compaction	Negative	Negligible	-
Impact on land due to Improper waste disposal	Negative	Minor	Negligible
Soil contamination due to Leaks/spills	Negative	Minor	Negligible
Impact on Water availability	Negative	Moderate	Negligible to Minor
Impact on Water quality	Negative	Negligible	-
Impact on Air quality	Negative	Negligible	-
Increased Ambient Noise Levels	Negative	Negligible	-
Ecological impacts due to Vegetation Clearance	Negative	Minor	Negligible to minor
Impact due to construction of WTG foundation and installation	Negative	Minor	Negligible
Impact due to laying of approach roads	Negative	Minor	Negligible to minor
Impact due to Land Procurement	Negative	Moderate	Minor
Impacts on Economic Opportunities	Positive	Moderate	Minor
Labour Rights and Welfare	Negative	Moderate	Minor
Impacts on Indigenous Communities/ Vulnerable Groups	Negative	Negligible	-

Operations Phase			
Impact on land due to improper waste disposal	Negative	Negligible	-
Soil Contamination due to leaks/spills	Negative	Negligible	-
Impact on water availability	Negative	Negligible	-
Impact on Water quality	Negative	Negligible	-
Impact on Air quality	Negative	Negligible	-
Impact on Ambient noise levels	Negative	Negligible to minor	-
Impact of Shadow Flickering	Negative	Minor	Minor to Negligible
Impact due to Bird Collision and Electrocutation	Negative	Moderate	Minor
Accidents- Blade Throw and Natural Hazards	Negative	Negligible	-
Decommissioning Phase			
Impact on land and soil	Negative	Minor	Negligible to minor
Impact on air quality	Negative	Negligible	-
Impact on ambient noise levels	Negative	Negligible	-

The proposed project is a green energy project comprising of 24WTG to generate 50.4 MW power through wind energy. Impacts due to wind energy projects are short term, generally limited to construction phase and operation phase have negligible adverse environmental and social impacts.

The project and its key components such as access road, WTGs, Office building and transmission lines, are likely to have some adverse environmental impacts on baseline parameters such as land use, water quality etc. The social impacts from the project are assessed to be generally beneficial in terms of overall local area development.

The key features of the project in terms of impact include the following:

- There are no sensitive receptors as villages, water bodies within 500 m of the wind farm;
- The entire wind farm mostly falls under barren and cultivable wasteland and the WTGs are on government land;
- The construction of proposed project may bring local changes in the landuse pattern of the site but there would be no drastic visual impact to the area as other wind energy projects are already operating in the study area;
- The Project will require ~4 m³/day of fresh water during operation phase–planned to be sourced from local RO water suppliers;
- The project will have negligible impact on air emissions and ambient noise levels due to the distant location of receptors ;
- The negligible quantity of sewage will be generated at site office, which will be disposed through septic tanks;
- The hazardous waste will be disposed of as per authorisation from RSPCB. The storage, handling, transportation and disposal will be strictly as per the requirement of authorisation by RSPCB and Hazardous Wastes (Management, Handling and Transboundary Movement) Rules, 2008. The waste will be stored into closed containers under covered area with

concrete flooring and sent for disposal to TSDF through authorized vendors;

- The proposed project will have no significant negative impacts on the nearby communities as there will be no physical displacement of people or impact on private land holdings.

The Environmental and Social Management Plan (ESMP) describes mitigation measures for impacts specific to project activities and also discuss implementation mechanism.

To conclude, the implementation of ESMP will help MEIL in complying with national/ state regulatory framework as well as to meet IFC/ ADB reference framework requirements.

Annex A

WTG photo

Status of WTGs



RSA 342



RSA 360



RSA 055



RSA 056

Status ... (Cont'd)



RSA 057



RSA 058



RSA 059



RSA 052

Status ... (Cont'd)



RSA 051



RSA 631



RSA 632

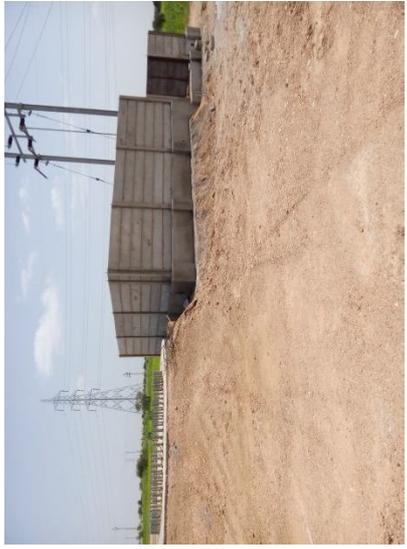


RSA 006

Status ... (Cont'd)



RSA 007



RSA 005



RSA 004



RSA 003

Status ... (Cont'd)



RSA 128



RSA 126



RSA 192

RSA 190

Status ... (Cont'd)



RSA 355



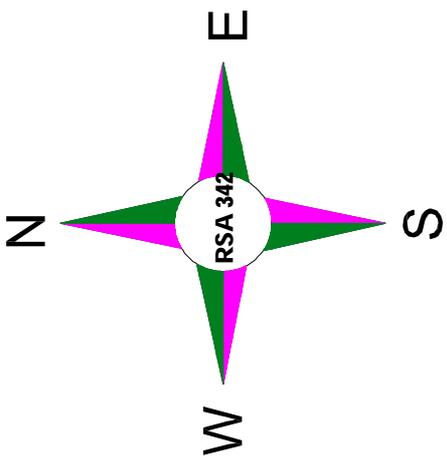
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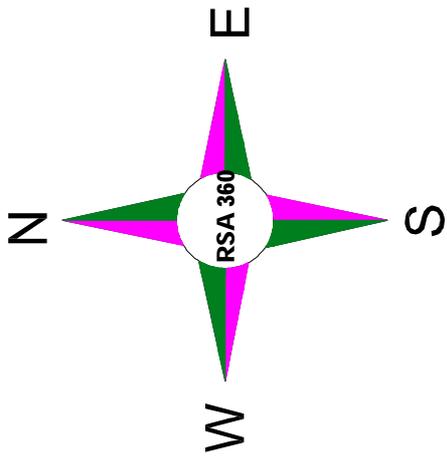
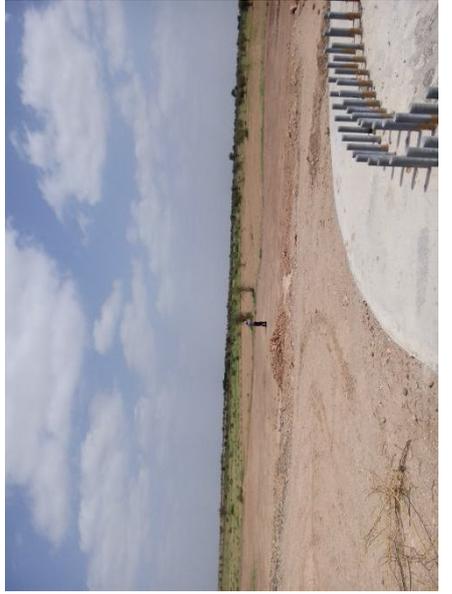


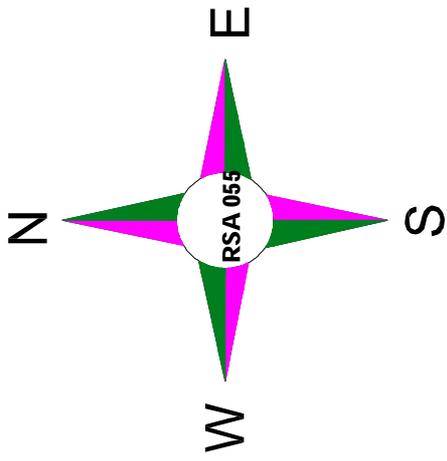
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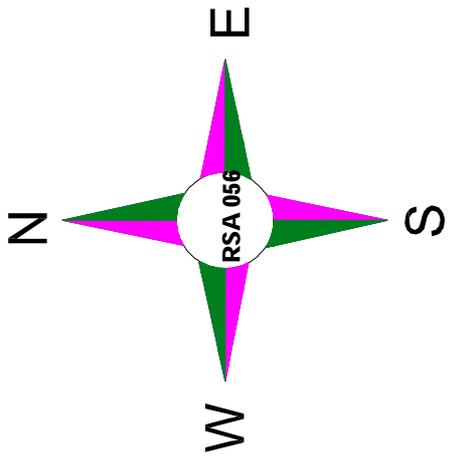


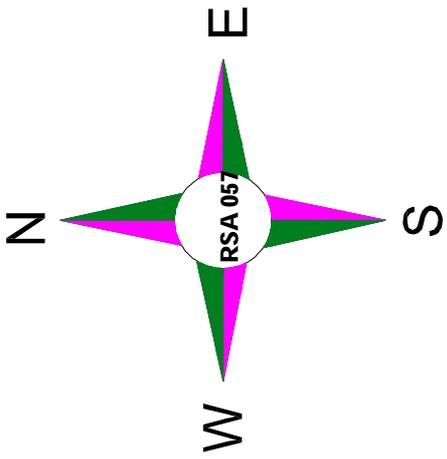
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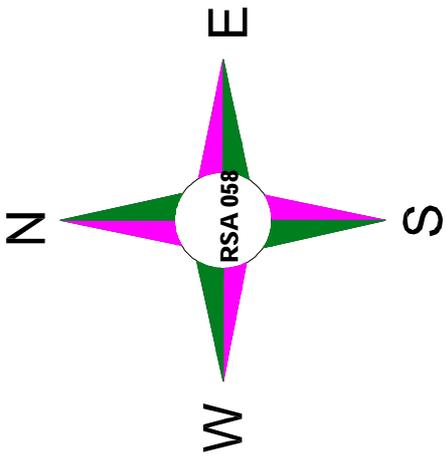


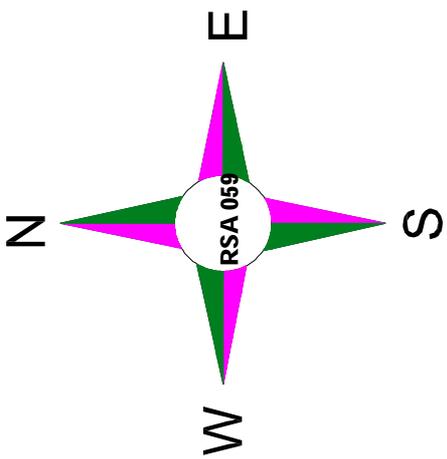


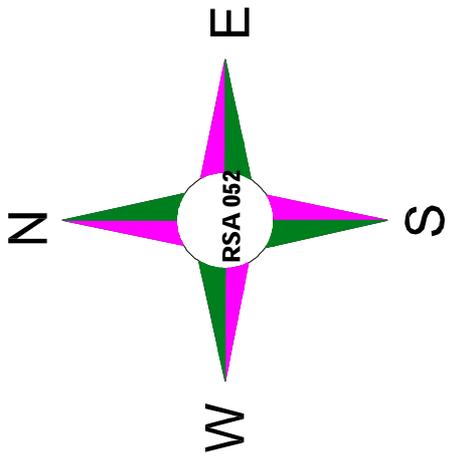


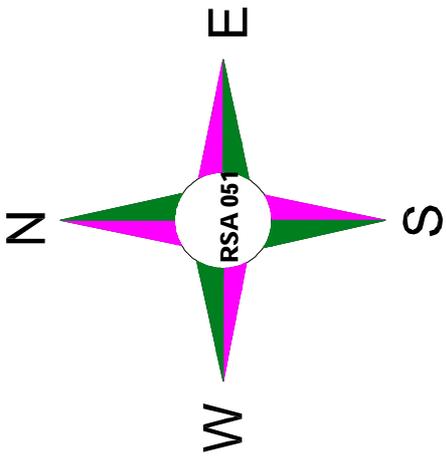


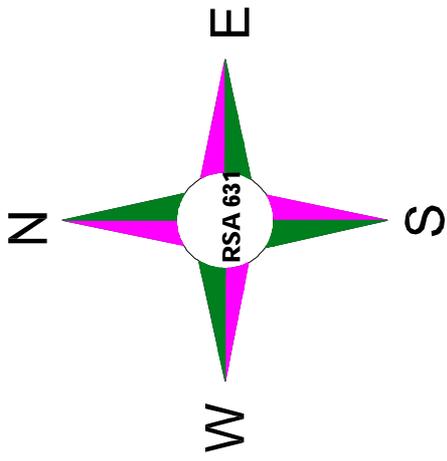
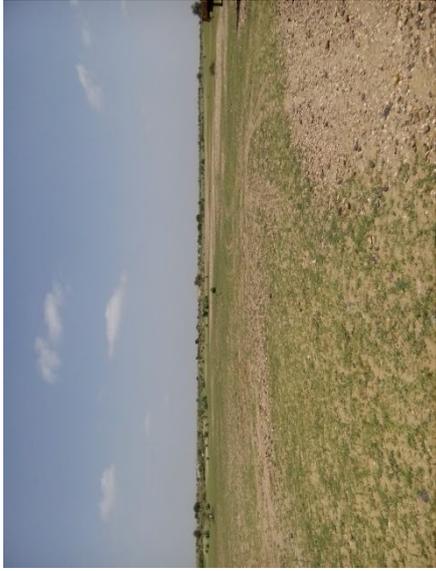


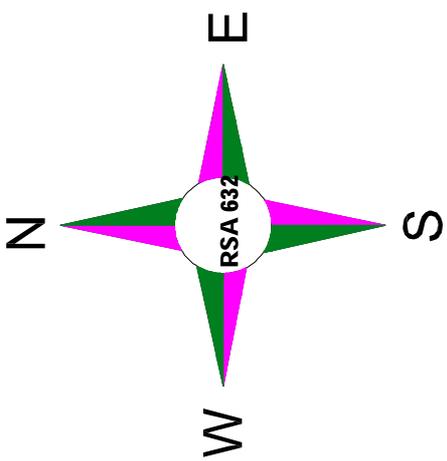


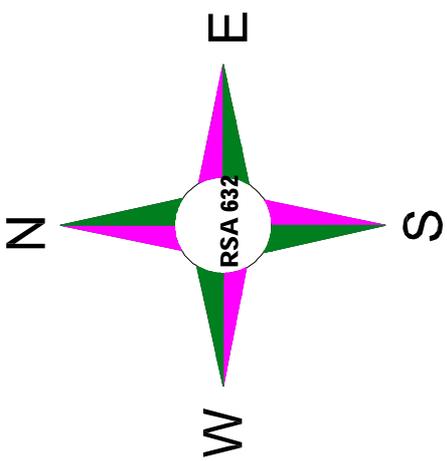


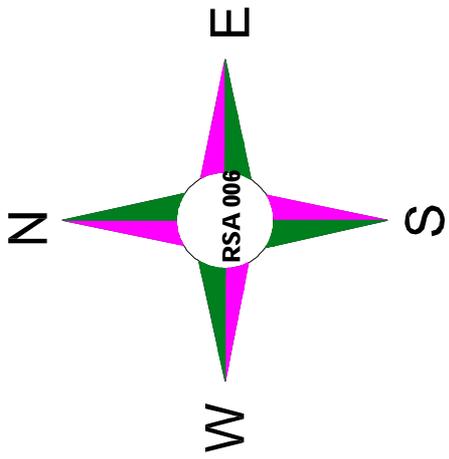


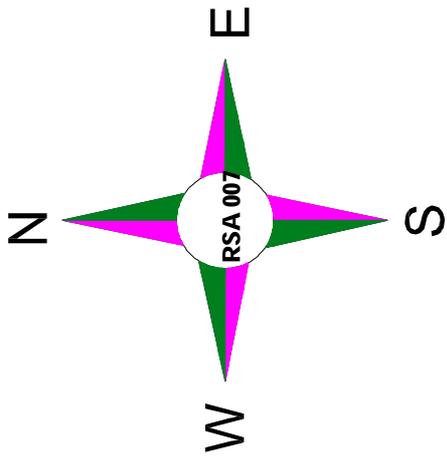
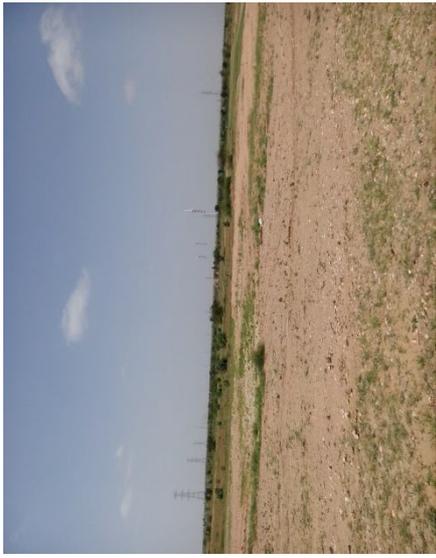


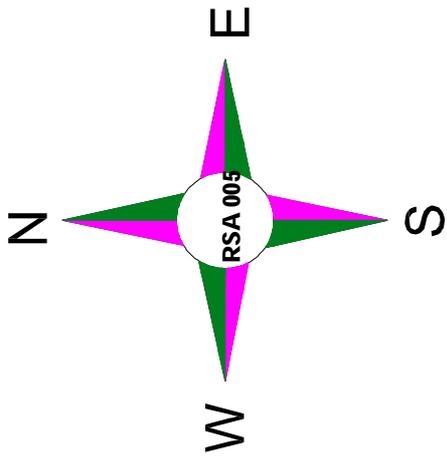


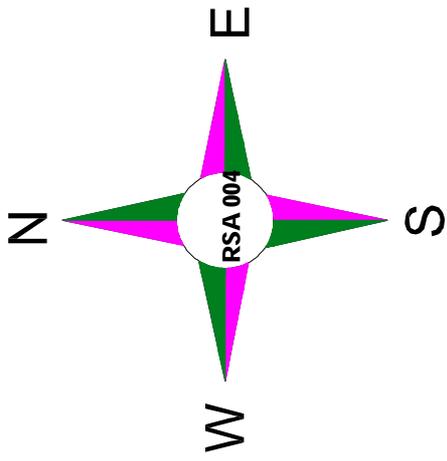
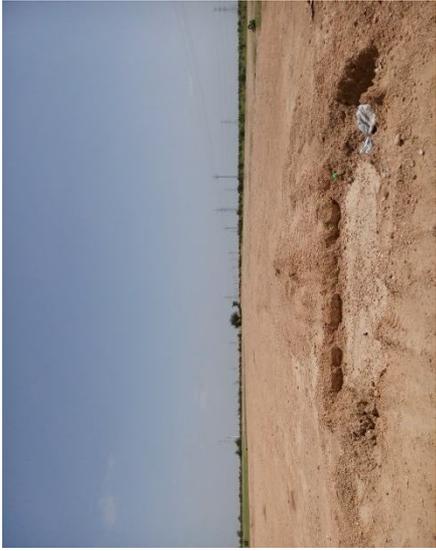


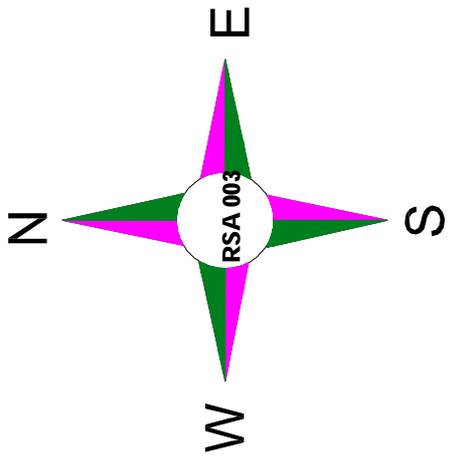


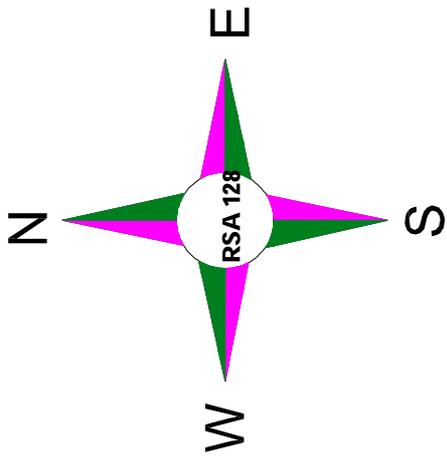


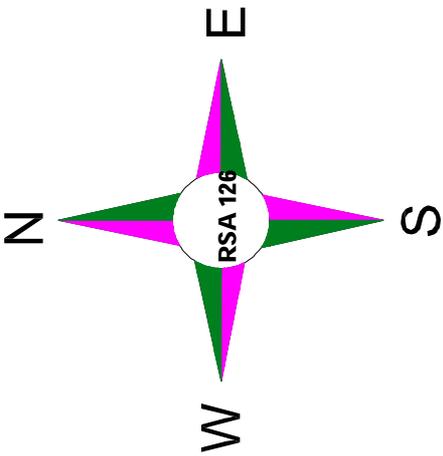


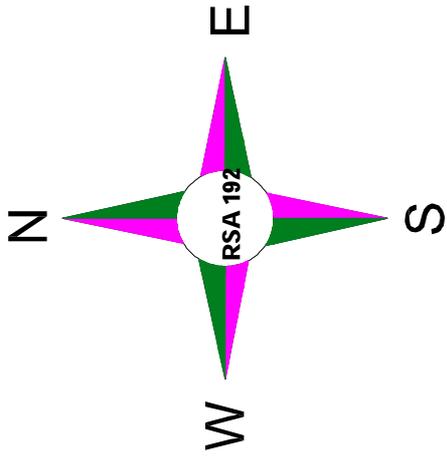


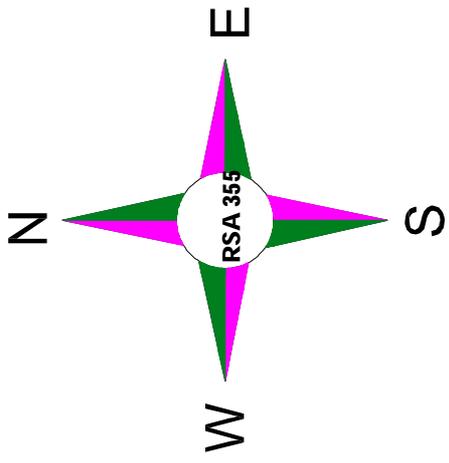


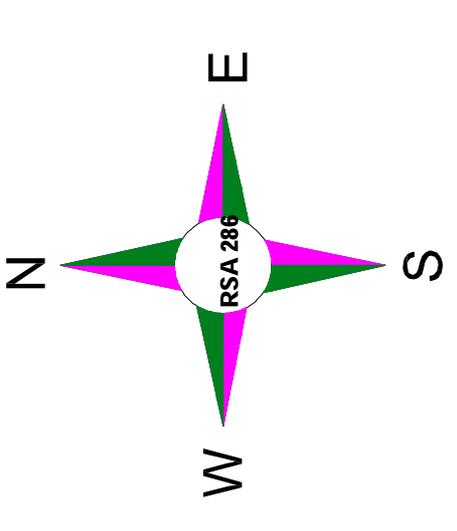


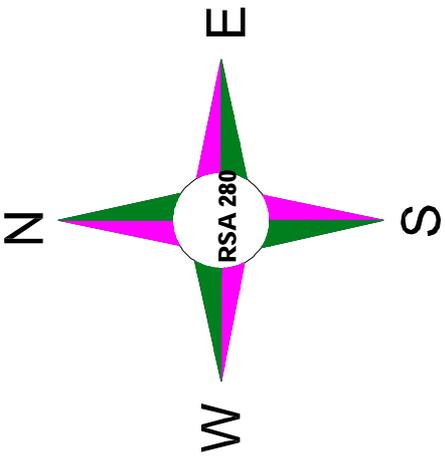


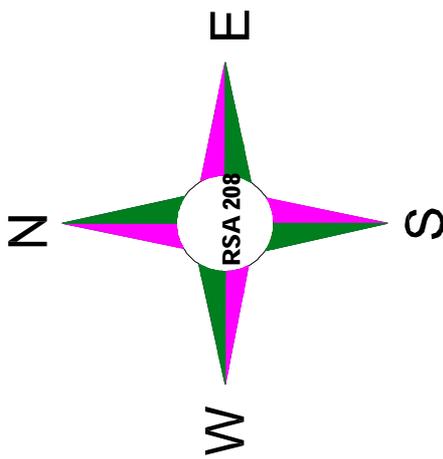












Annex B

Applicable Environmental Standards

1.1.1

Ambient Air Quality Standards

National Ambient Air Quality Standards (NAAQS)

National Ambient Air Quality Standards (NAAQ Standards), as prescribed by MoEF vide, Gazette Notification dated 16th November, 2009 are given below in **Table.1**.

Table.1 National Ambient Air Quality Standards

Pollutant	Time Weighted Avg.	Concentration in Ambient Air	
		Industrial, Residential, Rural & Other Areas	Ecologically Sensitive Areas (notified by Central Government)
Sulphur dioxide (SO ₂)	Annual Average*	50	20
µg/m ³	24 Hours**	80	80
Oxides of Nitrogen (NO _x)	Annual Average*	40	30
µg/m ³	24 Hours**	80	80
Particulate Matter (PM 10)	Annual Average*	60	60
µg/m ³	24 Hours**	100	100
Particulate Matter (PM 2.5)	Annual Average*	40	40
µg/m ³	24 Hours**	60	60
Ozone (O ₃)	8 Hours**	100	100
µg/m ³	1 Hour**	180	180
Lead (Pb)	Annual Average*	0.50	0.50
µg/m ³	24 Hours**	1.0	1.0
Carbon monoxide (CO)	8 Hours**	02	02
mg/m ³	1 Hour**	04	04
Ammonia (NH ₃)	Annual*	100	100
µg/m ³	24 Hours**	400	400
Benzene (C ₆ H ₆)	Annual*	05	05
µg/m ³			
Benzo(α)Pyrene-particulate phase	Annual*	01	01
ng/m ³			
Arsenic (As)	Annual*	06	06
ng/m ³			
Nickel (Ni)	Annual*	20	20
ng/m ³			

Note: *Annual arithmetic mean of minimum 104 measurements in a year at a particular site taken twice a week 24 hourly at uniform interval.

** 24 hourly/8 hourly/1 hourly monitored values, as applicable shall be complied with 98% of the time in a year. 2% of the time, it may exceed but not on two consecutive days of monitoring.

As the project is in rural/residential set up, NAAQS for rural/residential area will be applicable for the project.

IFC/WB Air Emissions and Ambient Air Quality Standards

The IFC/WB General EHS guidelines on Air emissions and ambient air quality, specifies that emissions do not result in pollutant concentrations that reach or exceed relevant ambient quality guidelines and standards by applying national legislated standards, or in their absence World Health Organization (WHO) Ambient Air Quality guidelines as represented in

Table.2.

Table.2 WHO Ambient Air Quality Guidelines

Pollutant	Averaging Period	Guideline Value in µg/m ³
Sulphur Dioxide	24-hour	24-hour
	10 minute	10 minute
		125 (Interim target-1) 50 (Interim target-2)
Nitrogen Oxide	1 year	40 (guideline)
	1 hour	200 (guideline)
Particulate Matter 10	1 year	70 (Interim target-1)
		50 (Interim target-2)
		30 (Interim target-3)
		20 (guideline)
	24 hour	150 (Interim target-1)
		100 (Interim target-2)
		75 (Interim target-3)
Particulate Matter 2.5	1 year	50 (guideline)
		35 (Interim target-1)
		25 (Interim target-2)
		15 (Interim target-3)
	24 hour	10 (guideline)
		75 (Interim target-1)
		50 (Interim target-2)
Ozone	37.5 (Interim target-3)	
	25 (guideline)	
	8-hour daily	8-hour daily
	Maximum	Maximum

Source: IFC/WB General EHS Guidelines: Air emissions and ambient air quality, 30 April 2007

Interim target means Interim targets are provided in recognition of the need for a staged approach to achieving the recommended guidelines.

1.1.2 Water Quality Standards

As per the Bureau of Indian Standards, (IS 10500: 2012) drinking water shall comply with the requirements given in **Table.3**.

Table.3 Indian Drinking Water Standard (IS 10500: 2012)

S.N	Substance/ Characteristics	Requirement (Acceptable limit)	Permissible limit in absence of alternate source
1.	Colour, Hazen units, max	5	15
2.	Odour	Unobjectionable	-
3.	Taste	Agreeable	-
4.	Turbidity, NTU, max	5	5
5.	pH value	6.5 - 8.5	No Relaxation
6.	Total hardness (as CaCO ₃) mg/l, max	200	600
7.	Iron (as Fe) mg/l, max	0.3	No relaxation
8.	Chlorides (as Cl) mg/l, max	250	1000
9.	Free residual chlorine, mg/l, min	0.2	1
10.	Dissolved solids mg/l, max	500	2000
11.	Calcium (as Ca) mg/l, max	75	200
12.	Magnesium (as Mg) mg/l, max	30	100
13.	Copper (as Cu) mg/l, max	0.05	1.5
14.	Manganese (as Mn) mg/l, max	0.1	0.3
15.	Sulphate (as SO ₄) mg/l, max	200	400
16.	Nitrate (as NO ₃) mg/l, max	45	No relaxation
17.	Fluoride (as F) mg/l, max	1.0	1.5

S.N	Substance/ Characteristics	Requirement (Acceptable limit)	Permissible limit in absence of alternate source
18.	Phenolic compounds (as C ₆ H ₆ OH) mg/l, max	0.001	0.002
19.	Mercury (as Hg) mg/l, max	0.001	No relaxation
20.	Cadmium (as Cd) mg/l, max	0.003	No relaxation
21.	Selenium (as Se) mg/l, max	0.01	No relaxation
22.	Arsenic (as As) mg/l, max	0.01	0.05
23.	Cyanide (as CN) mg/l, max	0.05	No relaxation
24.	Lead (as Pb) mg/l, max	0.01	No relaxation
25.	Zinc (as Zn) mg/l, max	5	15
26.	Anionic detergents (as MBAS) mg/l, max	0.2	1.0
27.	Total Chromium (as Cr) mg/l, max	0.05	No relaxation
28.	Polynuclear aromatic hydrocarbons (as PAH) g/l, max	0.0001	No relaxation
29.	Mineral Oil mg/l, max	0.5	No relaxation
30.	Pesticides mg/l, max	Absent	0.001
	Radioactive materials:		
31.	a) Alpha emitters Bq/l, max	0.1	No relaxation
	b) Beta emitters pci/l, max	1.0	No relaxation
32.	Total Alkalinity (as CaCO ₃), mg/l, max	200	600
33.	Aluminium (as Al) mg/l, max	0.03	0.2
34.	Boron, mg/l, max	0.5	1.0
35.	Ammonia (as total ammonia-N). mg/l, max	0.5	No relaxation
36.	Barium (as Ba), mg/l, max	0.7	No relaxation
37.	Chloramines (as Cl ₂), mg/l, max	4.0	No relaxation
38.	Silver (as Ag), mg/l, max	0.1	No relaxation
39.	Sulphide (as H ₂ S), mg/l, max	0.05	No relaxation
40.	Molybdenum (as Mo), mg/l, max	0.07	No relaxation
41.	Nickel (as Ni), mg/l, max	0.02	No relaxation
42.	Polychlorinated biphenyls, mg/l, max	0.0005	No relaxation
	Trilomethanes:		
	a) Bromoform, mg/l, max	0.1	No relaxation
43.	b) Dibromochloromethane, mg/l, max	0.1	No relaxation
	c) Bromodichloromethane, mg/l, max	0.06	No relaxation
	d) Chloroform, mg/l, max	0.2	No relaxation
	Bacteriological Quality		
	All water intended for drinking:		
1.	a) E. coli or thermotolerant coliform bacteria	Shall not be detectable in any 100 ml sample	-
	Treated water entering the distribution system:		
2.	a) E. coli or thermotolerant coliform bacteria	Shall not be detectable in any 100 ml sample;	-
	b) Total coliform bacteria	Shall not be detectable in any 100 ml sample.	-
	Treated water in the distribution system:		
3.	a) E. coli or thermotolerant coliform bacteria	Shall not be detectable in any 100 ml sample;	-
	b) Total coliform bacteria	Shall not be detectable in any 100 ml sample.	-

Source: Central Pollution Control Board

General Standards for discharge

The general standards for discharge are as prescribed under the Environment Protection Rules, 1986 and amendments. The project intends to treat the domestic waste water in septic tanks and soak pits. The general standards for discharge of environmental pollutants are detailed in **Table.4**.

Table.4 **General Standards for Discharge of Environmental Pollutants**

S. N	Parameter	Standards		
		Inland surface water	Public sewers	Land for Irrigation
1.	Colour and odour	Refer to Note 1	-	Refer to Note 1
2	Suspended solids mg/l, max.	100	600	200
3	Particle size of suspended solids	Shall 850 micron IS sieve	-	-
4	PH value	5.5 to 9.0	5.5 to 9.0	5.5 to 9.0
5	Temperature	Shall not exceed 5 ⁰ C above the receiving water temperature	-	-
6	Oil and grease, mg/l max,	10	20	10
7	Total residual chlorine, mg/l max	1.0	-	-
8	Ammonical nitrogen (as N), mg/l max.	50	50	-
9	Total Kjeldahl nitrogen (as N); mg/l max	100	-	-
10	Free ammonia (as NH ₃), mg/l max	5.0	-	-
11	Biochemical oxygen demand (3 days at 27 ⁰ C), mg/l max	30	350	100
12	Chemical oxygen demand, mg/l max	250	-	-
13	Arsenic (as As) mg/l, max	0.2	0.2	0.2
14	Mercury (As Hg) mg/l max.	0.01	0.01	-
15	Lead (as Pb) mg/l, max	0.1	1.0	-
16	Cadmium (as Cd) mg/l, max	2.0	1.0	-
17	Hexavalent chromium (as Cr +6) mg/1 max	0.1	2.0	-
18	Total chromium (as Cr) mg/1 max	2.0	2.0	-
19	Copper (as Cu) mg/1, max	3.0	3.0	-
20	Zinc (as Zn)	5.0	15	-
21	Selenium (as Se)	0.05	0.05	-
22	Nickel (as Ni) mg/1,max	3.0	3.0	-
23	Cyanide (as CN) mg/1,max	0.2	2.0	0.2
24	Fluoride (as F) mg/1,max	2.0	15	-
25	Dissolved phosphates (as P) mg/1,max	5.0	-	-
26	Sulphide (as S) mg/1,max	2.0	-	-
27	Phenolic compounds (as C ₆ H ₅ OH) mg/1,max	1.0	5.0	-
28	Radioactive materials: (a) Alpha emitters micro curie mg/1,max (b) Beta emitters micro curie mg/1	10 ⁻⁷	10 ⁻⁷	10 ⁻⁸
29	Bio-assay test	10 ⁻⁶ 90% survival of fish after 96 hours in 100% effluent	10 ⁻⁶ 90% survival of fish after 96 hours in 100% effluent	10 ⁻⁷ 90% survival of fish after 96 hours in 100% effluent
30	Manganese	2 mg/1	2 mg/1	-
31	Iron (as Fe)	3mg/1	3mg/1	-
32	Vanadium (as V)	0.2 mg/1	0.2 mg/1	-
33	Nitrate Nitrogen	10 mg/1	-	-

Source: as per G.S.R 422 (E) dated 19.05.1993 and G.S.R 801 (E) dated 31.12.1993 issued under the provisions of E (P) Act 1986.

Designated Best Use Classification of Surface Water

The designated best use classification as prescribed by CPCB for surface water is as given in **Table .5** below:

Table .5 Primary Water Quality Criteria for Designated-Best-Use-Classes

Designated-Best-Use	Class	Criteria
Drinking Water Source without conventional treatment but after disinfection	A	<ul style="list-style-type: none"> Total Coliforms Organism MPN/100ml shall be 50 or less pH between 6.5 and 8.5 Dissolved Oxygen 6mg/l or more Biochemical Oxygen Demand 5 days 20°C 2mg/l or less
Outdoor bathing (Organized)	B	<ul style="list-style-type: none"> Total Coliforms Organism MPN/100ml shall be 500 or less pH between 6.5 and 8.5 Dissolved Oxygen 5mg/l or more Biochemical Oxygen Demand 5 days 20°C 3mg/l or less
Drinking water source after conventional treatment and disinfection	C	<ul style="list-style-type: none"> Total Coliforms Organism MPN/100ml shall be 5000 or less pH between 6 to 9 Dissolved Oxygen 4mg/l or more Biochemical Oxygen Demand 5 days 20°C 3mg/l or less
Propagation of Wild life and Fisheries	D	<ul style="list-style-type: none"> pH between 6.5 to 8.5 Dissolved Oxygen 4mg/l or more Free Ammonia (as N) 1.2 mg/l or less
Irrigation, Industrial Cooling, Controlled Waste disposal	E	<ul style="list-style-type: none"> pH between 6.0 to 8.5 Electrical Conductivity at 25°C micro mhos/cm Max.2250 Sodium absorption Ratio Max. 26 Boron Max. 2mg/l
	Below-E	Not Meeting A, B, C, D & E Criteria

Source: Central Pollution Control Board

IFC/WB Guidelines for Treated Sanitary Sewage Discharge

Indicative values for treated sanitary sewage discharges are given in **Table.6**. These are applicable to meet national or local standards or in the absence of national standards for sanitary wastewater discharges and where either a septic system or land is used as part of treatment system.

Table.6 Indicative values for treated sanitary wastewater discharges

Pollutants	Units	Guideline Value
pH	pH	6-9
BOD	mg/l	30
COD	mg/l	125
Total Nitrogen	mg/l	10
Total Phosphorous	mg/l	2

Pollutants	Units	Guideline Value
Oil and grease	mg/l	10
Total suspended solids	mg/l	50
Total Coliform bacteria	MPN*/100ml	400

Source: General EHS Guidelines, World Bank Group, April 2007

*MPN = Most Probable Number

1.1.3 Noise Standards

Noise standards specified by the MoEF vide gazette notification dated 14th February, 2000 based on the A weighted equivalent noise level (L_{eq}) are as presented in **Table.7**.

Table.7 Ambient Noise Standards

Area Code	Category of Area	Limits in dB(A) Leq	
		Day time*	Night Time
A	Industrial Area	75	70
B	Commercial Area	65	55
C	Residential Area	55	45
D	Silence Zone**	50	40

Note:*Day time is from 6 am to 10 pm, Night time is 10.00 pm to 6.00 am;**Silence zone is an area comprising not less than 100 meters around premises of hospitals, educational institutions, courts, religious places or any other area which is declared as such by the competent authority. Use of vehicle horns, loud speakers and bursting of crackers are banned in these zones. Source: Noise Pollution (Regulation and control) Rules, 2000

As the project is in rural/residential set up, noise standards for residential area will be applicable for the project.

IFC/WB Noise Standards

As per the IFC/WB, General EHS Guidelines on noise management, noise impacts should not exceed the levels presented in **Table.9** or result in a maximum increase in background levels of 3 dB at the nearest receptor location off-site.

Table.8 Noise Level Guidelines

Receptor	One Hour LAeq (dBA)	
	Daytime 07:00 - 22:00	Night time 22:00 - 07:00
Residential; Institutional; Educational	55	45
Industrial; Commercial	70	70

Source: IFC/WB, General EHS Guidelines on noise management, 30 April, 2007

1.1.4 Hazardous Waste Management

The Hazardous Wastes (Management, Handling and Transboundary Movement) Rules, 2008 were promulgated under Environment (Protection) Act 1986, which was further amended in July 2009, September 2009, March 2010 and August 2010.

The major hazardous wastes to be released due to the proposed project are used or waste/used oil, oil containing rags and jutes. The categories of the wastes as applicable to construction and operation phases of the project and as covered under Schedule 1 of the Hazardous wastes Rules, 2008 are given in the **Table.9**.

Table.9 *List of Hazardous Wastes Generated in the Project: Schedule-1 of HWM Rules, 2008*

Category No.	Processes	Hazardous Wastes
5	Industrial operations using mineral/synthetic oil as lubricant in hydraulic systems or other applications	5.1 Used spent Oil 5.2 Wastes/ residues containing oil

Annex C

Basis - Project Data Overview

Project:

Mytrah-Bhesada

Description:

50.4 MW Mytrah Vayu Wind Farm, Bhesada

Licensed user:

ERM India Private Limited

Building 10, 4th Floor, Tower A, DLF Cyber City

IN-122002 Gurgaon

+91 124 4170300

Naval Chaudhary / naval.chaudhary@erm.com

Calculated:

9/29/2015 8:24 PM/3.0.578

BASIS - Project data overview

Calculation: Basis - Project Data Overview**Country:** India

Maps

Name Format Path

Basemap Bitmap map C:\Users\Naval.Chaudhary\Documents\WindPRO Data\Projects\Mytrah - Bhesada\Basemap.bmi

Site center: UTM (north)-WGS84 Zone: 42 East: 754,367 North: 2,951,980

WTGs

UTM (north)-WGS84 Zone: 42

Easting Northing Z Row data/Description

[m]

UTM (north)-WGS84 Zone: 42				WTG type							
Easting	Northing	Z	Row data/Description	Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Circle radius [m]	
RSA003	742,730	2,953,022	309.9 Suzlon S97 2100 97.0 !O! hub: 120.0 ..New	Yes	Suzlon	S97-2,100	2,100	97.0	120.0	500.0	
RSA004	743,476	2,952,480	303.8 Suzlon S97 2100 97.0 !O! hub: 120.0 ..New	Yes	Suzlon	S97-2,100	2,100	97.0	120.0	500.0	
RSA005	744,094	2,951,980	308.7 Suzlon S97 2100 97.0 !O! hub: 120.0 ..New	Yes	Suzlon	S97-2,100	2,100	97.0	120.0	500.0	
RSA006	744,376	2,951,142	312.1 Suzlon S97 2100 97.0 !O! hub: 120.0 ..New	Yes	Suzlon	S97-2,100	2,100	97.0	120.0	500.0	
RSA007	744,778	2,950,680	307.4 Suzlon S97 2100 97.0 !O! hub: 120.0 ..New	Yes	Suzlon	S97-2,100	2,100	97.0	120.0	500.0	
RSA050	745,350	2,951,587	314.5 Suzlon S97 2100 97.0 !O! hub: 120.0 ..New	Yes	Suzlon	S97-2,100	2,100	97.0	120.0	500.0	
RSA051	744,771	2,952,436	311.8 Suzlon S97 2100 97.0 !O! hub: 120.0 ..New	Yes	Suzlon	S97-2,100	2,100	97.0	120.0	500.0	
RSA052	744,464	2,952,798	307.0 Suzlon S97 2100 97.0 !O! hub: 120.0 ..New	Yes	Suzlon	S97-2,100	2,100	97.0	120.0	500.0	
RSA055	743,066	2,954,740	310.5 Suzlon S97 2100 97.0 !O! hub: 120.0 ..New	Yes	Suzlon	S97-2,100	2,100	97.0	120.0	500.0	
RSA056	743,896	2,955,685	307.7 Suzlon S97 2100 97.0 !O! hub: 120.0 ..New	Yes	Suzlon	S97-2,100	2,100	97.0	120.0	500.0	
RSA057	744,604	2,954,625	307.9 Suzlon S97 2100 97.0 !O! hub: 120.0 ..New	Yes	Suzlon	S97-2,100	2,100	97.0	120.0	500.0	
RSA058	744,941	2,954,255	310.7 Suzlon S97 2100 97.0 !O! hub: 120.0 ..New	Yes	Suzlon	S97-2,100	2,100	97.0	120.0	500.0	
RSA059	745,223	2,953,779	310.2 Suzlon S97 2100 97.0 !O! hub: 120.0 ..New	Yes	Suzlon	S97-2,100	2,100	97.0	120.0	500.0	
RSA126	747,819	2,955,503	308.5 Suzlon S97 2100 97.0 !O! hub: 120.0 ..New	Yes	Suzlon	S97-2,100	2,100	97.0	120.0	500.0	
RSA128	748,403	2,953,957	309.3 Suzlon S97 2100 97.0 !O! hub: 120.0 ..New	Yes	Suzlon	S97-2,100	2,100	97.0	120.0	500.0	
RSA190	748,876	2,958,541	297.9 Suzlon S97 2100 97.0 !O! hub: 120.0 ..New	Yes	Suzlon	S97-2,100	2,100	97.0	120.0	500.0	
RSA192	749,626	2,957,286	309.2 Suzlon S97 2100 97.0 !O! hub: 120.0 ..New	Yes	Suzlon	S97-2,100	2,100	97.0	120.0	500.0	
RSA208	756,254	2,947,532	312.2 Suzlon S97 2100 97.0 !O! hub: 120.0 ..New	Yes	Suzlon	S97-2,100	2,100	97.0	120.0	500.0	
RSA280	760,077	2,945,455	288.0 Suzlon S97 2100 97.0 !O! hub: 120.0 ..New	Yes	Suzlon	S97-2,100	2,100	97.0	120.0	500.0	
RSA286	762,502	2,944,683	277.1 Suzlon S97 2100 97.0 !O! hub: 120.0 ..New	Yes	Suzlon	S97-2,100	2,100	97.0	120.0	500.0	
RSA342	760,223	2,950,048	295.7 Suzlon S97 2100 97.0 !O! hub: 120.0 ..New	Yes	Suzlon	S97-2,100	2,100	97.0	120.0	500.0	
RSA355	763,180	2,947,108	283.3 Suzlon S97 2100 97.0 !O! hub: 120.0 ..New	Yes	Suzlon	S97-2,100	2,100	97.0	120.0	500.0	
RSA360	761,209	2,950,430	294.8 Suzlon S97 2100 97.0 !O! hub: 120.0 ..New	Yes	Suzlon	S97-2,100	2,100	97.0	120.0	500.0	
RSA631	745,132	2,952,125	313.2 Suzlon S97 2100 97.0 !O! hub: 120.0 ..New	Yes	Suzlon	S97-2,100	2,100	97.0	120.0	500.0	
RSA632	743,099	2,952,706	304.0 Suzlon S97 2100 97.0 !O! hub: 120.0 ..New	Yes	Suzlon	S97-2,100	2,100	97.0	120.0	500.0	

Shadow receptor

UTM (north)-WGS84 Zone: 42

Easting Northing Z Object name Orientation Length Height Height Angle

a.g.l.

[m]

[°]

[m]

[m]

[m]

[°]

A	760,400	2,949,841	297.0		-35.0	1.0	1.0	1.0	90.0
B	760,123	2,949,694	297.9		20.3	1.0	1.0	1.0	90.0
C	760,645	2,949,887	297.7		-50.9	1.0	1.0	1.0	90.0
D	761,265	2,950,643	292.7		205.6	1.0	1.0	1.0	90.0
E	760,984	2,950,472	296.0		107.4	1.0	1.0	1.0	90.0
F	760,967	2,950,543	294.2		127.5	1.0	1.0	1.0	90.0
G	760,956	2,950,616	294.0		133.9	1.0	1.0	1.0	90.0
H	742,806	2,954,861	308.8		122.1	1.0	1.0	1.0	90.0
I	745,173	2,952,595	311.8		253.9	1.0	1.0	1.0	90.0
J	745,343	2,952,423	315.0		221.4	1.0	1.0	1.0	90.0
K	748,599	2,954,000	306.7		268.5	1.0	1.0	1.0	90.0
L	747,671	2,955,581	306.1		120.3	1.0	1.0	1.0	90.0
M	747,699	2,955,285	307.1		32.1	1.0	1.0	1.0	90.0
N	748,683	2,958,759	294.2		144.4	1.0	1.0	1.0	90.0
O	744,151	2,951,481	311.1		149.0	1.0	1.0	1.0	90.0
P	744,945	2,951,019	309.2		211.6	1.0	1.0	1.0	90.0

Project:

Mytrah-Bhesada

Description:

50.4 MW Mytrah Vayu Wind Farm, Bhesada

Licensed user:

ERM India Private Limited

Building 10, 4th Floor, Tower A, DLF Cyber City

IN-122002 Gurgaon

+91 124 4170300

Naval Chaudhary / naval.chaudhary@erm.com

Calculated:

9/29/2015 8:24 PM/3.0.578

BASIS - Project data overview

Calculation: Basis - Projct Data Overview

Elevation grid

UTM (north)-WGS84 Zone: 42

	Easting	Northing	Z [m]	Object name	File
A	754,047	2,951,980	0.0	Elevation Grid Data Object: Mytrah-Bhesada_EMDGrid_1.wpg	C:\Users\Naval.Chaudhary\Documents\WindPRO Data\Projects\Mytrah - Bhesada\Mytrah-Bhesada_EMDGrid_1.wpg

Annex D

Shadow main results

SHADOW - Main Result

Assumptions for shadow calculations

Maximum distance for influence
 Calculate only when more than 20 % of sun is covered by the blade
 Please look in WTG table

Minimum sun height over horizon for influence 3 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) [JODHPUR]
 Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
 8.71 9.25 8.52 9.17 10.09 8.60 6.53 6.37 8.38 9.44 9.14 8.61

Operational time
 N NNE ENE E ESE SSE S SSW WSW W WNW NNW Sum
 411 738 824 545 314 237 468 1,623 1,692 597 316 260 8,025
 Idle start wind speed: Cut in wind speed from power curve

A ZVI (Zones of Visual Influence) calculation is performed before flicker calculation so non visible WTG do not contribute to calculated flicker values. A WTG will be visible if it is visible from any part of the receiver window. The ZVI calculation is based on the following assumptions:
 Height contours used: Elevation Grid Data Object: Mytrah-Bhesada_EMDGrid_1.wpg (2)
 Obstacles used in calculation
 Eye height: 1.5 m
 Grid resolution: 20.0 m

All coordinates are in
 UTM (north)-WGS84 Zone: 42

WTGs

	Easting	Northing	Z	Row data/Description	WTG type			Shadow data				
					Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	Calculation distance	RPM
			[m]				[kW]	[m]	[m]	[m]	[RPM]	
RSA003	742,730	2,953,022	309.9	Suzlon S97 2100 97.0 !O! hub:...	Yes	Suzlon	S97-2,100	2,100	97.0	120.0	1,000	0.0
RSA004	743,476	2,952,480	303.8	Suzlon S97 2100 97.0 !O! hub:...	Yes	Suzlon	S97-2,100	2,100	97.0	120.0	1,000	0.0
RSA005	744,094	2,951,980	308.7	Suzlon S97 2100 97.0 !O! hub:...	Yes	Suzlon	S97-2,100	2,100	97.0	120.0	1,000	0.0
RSA006	744,376	2,951,142	312.1	Suzlon S97 2100 97.0 !O! hub:...	Yes	Suzlon	S97-2,100	2,100	97.0	120.0	1,000	0.0
RSA007	744,778	2,950,680	307.4	Suzlon S97 2100 97.0 !O! hub:...	Yes	Suzlon	S97-2,100	2,100	97.0	120.0	1,000	0.0
RSA050	745,350	2,951,587	314.5	Suzlon S97 2100 97.0 !O! hub:...	Yes	Suzlon	S97-2,100	2,100	97.0	120.0	1,000	0.0
RSA051	744,771	2,952,436	311.8	Suzlon S97 2100 97.0 !O! hub:...	Yes	Suzlon	S97-2,100	2,100	97.0	120.0	1,000	0.0
RSA052	744,464	2,952,798	307.0	Suzlon S97 2100 97.0 !O! hub:...	Yes	Suzlon	S97-2,100	2,100	97.0	120.0	1,000	0.0
RSA055	743,066	2,954,740	310.5	Suzlon S97 2100 97.0 !O! hub:...	Yes	Suzlon	S97-2,100	2,100	97.0	120.0	1,000	0.0
RSA056	743,896	2,955,685	307.7	Suzlon S97 2100 97.0 !O! hub:...	Yes	Suzlon	S97-2,100	2,100	97.0	120.0	1,000	0.0
RSA057	744,604	2,954,625	307.9	Suzlon S97 2100 97.0 !O! hub:...	Yes	Suzlon	S97-2,100	2,100	97.0	120.0	1,000	0.0
RSA058	744,941	2,954,255	310.7	Suzlon S97 2100 97.0 !O! hub:...	Yes	Suzlon	S97-2,100	2,100	97.0	120.0	1,000	0.0
RSA059	745,223	2,953,779	310.2	Suzlon S97 2100 97.0 !O! hub:...	Yes	Suzlon	S97-2,100	2,100	97.0	120.0	1,000	0.0
RSA126	747,819	2,955,503	308.5	Suzlon S97 2100 97.0 !O! hub:...	Yes	Suzlon	S97-2,100	2,100	97.0	120.0	1,000	0.0
RSA128	748,403	2,953,957	309.3	Suzlon S97 2100 97.0 !O! hub:...	Yes	Suzlon	S97-2,100	2,100	97.0	120.0	1,000	0.0
RSA190	748,876	2,958,541	297.9	Suzlon S97 2100 97.0 !O! hub:...	Yes	Suzlon	S97-2,100	2,100	97.0	120.0	1,000	0.0
RSA192	749,626	2,957,286	309.2	Suzlon S97 2100 97.0 !O! hub:...	Yes	Suzlon	S97-2,100	2,100	97.0	120.0	1,000	0.0
RSA208	756,254	2,947,532	312.2	Suzlon S97 2100 97.0 !O! hub:...	Yes	Suzlon	S97-2,100	2,100	97.0	120.0	1,000	0.0
RSA280	760,077	2,945,455	288.0	Suzlon S97 2100 97.0 !O! hub:...	Yes	Suzlon	S97-2,100	2,100	97.0	120.0	1,000	0.0
RSA286	762,502	2,944,683	277.1	Suzlon S97 2100 97.0 !O! hub:...	Yes	Suzlon	S97-2,100	2,100	97.0	120.0	1,000	0.0
RSA342	760,223	2,950,048	295.7	Suzlon S97 2100 97.0 !O! hub:...	Yes	Suzlon	S97-2,100	2,100	97.0	120.0	1,000	0.0
RSA355	763,180	2,947,108	283.3	Suzlon S97 2100 97.0 !O! hub:...	Yes	Suzlon	S97-2,100	2,100	97.0	120.0	1,000	0.0
RSA360	761,209	2,950,430	294.8	Suzlon S97 2100 97.0 !O! hub:...	Yes	Suzlon	S97-2,100	2,100	97.0	120.0	1,000	0.0
RSA631	745,132	2,952,125	313.2	Suzlon S97 2100 97.0 !O! hub:...	Yes	Suzlon	S97-2,100	2,100	97.0	120.0	1,000	0.0
RSA632	743,099	2,952,706	304.0	Suzlon S97 2100 97.0 !O! hub:...	Yes	Suzlon	S97-2,100	2,100	97.0	120.0	1,000	0.0

Shadow receptor-Input

No.	Easting	Northing	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
			[m]	[m]	[m]	[m]	[°]	[°]	
A	760,400	2,949,841	297.0	1.0	1.0	1.0	-215.0	90.0	Fixed direction
B	760,123	2,949,694	297.9	1.0	1.0	1.0	-159.7	90.0	Fixed direction

To be continued on next page...

SHADOW - Main Result

...continued from previous page

No.	Easting	Northing	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
			[m]	[m]	[m]	[m]	[°]	[°]	
C	760,645	2,949,887	297.7	1.0	1.0	1.0	-230.9	90.0	Fixed direction
D	761,265	2,950,643	292.7	1.0	1.0	1.0	25.6	90.0	Fixed direction
E	760,984	2,950,472	296.0	1.0	1.0	1.0	-72.6	90.0	Fixed direction
F	760,967	2,950,543	294.2	1.0	1.0	1.0	-52.5	90.0	Fixed direction
G	760,956	2,950,616	294.0	1.0	1.0	1.0	-46.1	90.0	Fixed direction
H	742,806	2,954,861	308.8	1.0	1.0	1.0	-57.9	90.0	Fixed direction
I	745,173	2,952,595	311.8	1.0	1.0	1.0	73.9	90.0	Fixed direction
J	745,343	2,952,423	315.0	1.0	1.0	1.0	41.4	90.0	Fixed direction
K	748,599	2,954,000	306.7	1.0	1.0	1.0	88.5	90.0	Fixed direction
L	747,671	2,955,581	306.1	1.0	1.0	1.0	-59.7	90.0	Fixed direction
M	747,699	2,955,285	307.1	1.0	1.0	1.0	-147.9	90.0	Fixed direction
N	748,683	2,958,759	294.2	1.0	1.0	1.0	-35.6	90.0	Fixed direction
O	744,151	2,951,481	311.1	1.0	1.0	1.0	-31.0	90.0	Fixed direction
P	744,945	2,951,019	309.2	1.0	1.0	1.0	31.6	90.0	Fixed direction

Calculation Results

Shadow receptor

Shadow, expected values

No.	Shadow hours per year [h/year]
A	0:00
B	0:00
C	10:51
D	1:14
E	38:21
F	37:03
G	40:14
H	33:35
I	31:00
J	12:50
K	57:33
L	59:19
M	0:00
N	23:13
O	0:00
P	10:17

Total amount of flickering on the shadow receptors caused by each WTG

No.	Name	Worst case [h/year]	Expected [h/year]
RSA003	Suzlon S97 2100 97.0 !O! hub: 120.0 m (TOT: 168.5 m) (1)	0:00	0:00
RSA004	Suzlon S97 2100 97.0 !O! hub: 120.0 m (TOT: 168.5 m) (2)	0:00	0:00
RSA005	Suzlon S97 2100 97.0 !O! hub: 120.0 m (TOT: 168.5 m) (3)	0:00	0:00
RSA006	Suzlon S97 2100 97.0 !O! hub: 120.0 m (TOT: 168.5 m) (4)	37:15	10:17
RSA007	Suzlon S97 2100 97.0 !O! hub: 120.0 m (TOT: 168.5 m) (5)	0:00	0:00
RSA050	Suzlon S97 2100 97.0 !O! hub: 120.0 m (TOT: 168.5 m) (6)	0:00	0:00
RSA051	Suzlon S97 2100 97.0 !O! hub: 120.0 m (TOT: 168.5 m) (7)	72:05	33:12
RSA052	Suzlon S97 2100 97.0 !O! hub: 120.0 m (TOT: 168.5 m) (8)	44:29	11:30
RSA055	Suzlon S97 2100 97.0 !O! hub: 120.0 m (TOT: 168.5 m) (9)	95:42	33:35
RSA056	Suzlon S97 2100 97.0 !O! hub: 120.0 m (TOT: 168.5 m) (10)	0:00	0:00
RSA057	Suzlon S97 2100 97.0 !O! hub: 120.0 m (TOT: 168.5 m) (11)	0:00	0:00
RSA058	Suzlon S97 2100 97.0 !O! hub: 120.0 m (TOT: 168.5 m) (12)	0:00	0:00
RSA059	Suzlon S97 2100 97.0 !O! hub: 120.0 m (TOT: 168.5 m) (13)	0:00	0:00
RSA126	Suzlon S97 2100 97.0 !O! hub: 120.0 m (TOT: 168.5 m) (23)	178:48	59:19
RSA128	Suzlon S97 2100 97.0 !O! hub: 120.0 m (TOT: 168.5 m) (22)	143:12	57:33
RSA190	Suzlon S97 2100 97.0 !O! hub: 120.0 m (TOT: 168.5 m) (20)	65:33	23:13
RSA192	Suzlon S97 2100 97.0 !O! hub: 120.0 m (TOT: 168.5 m) (21)	0:00	0:00
RSA208	Suzlon S97 2100 97.0 !O! hub: 120.0 m (TOT: 168.5 m) (14)	0:00	0:00
RSA280	Suzlon S97 2100 97.0 !O! hub: 120.0 m (TOT: 168.5 m) (17)	0:00	0:00
RSA286	Suzlon S97 2100 97.0 !O! hub: 120.0 m (TOT: 168.5 m) (18)	0:00	0:00
RSA342	Suzlon S97 2100 97.0 !O! hub: 120.0 m (TOT: 168.5 m) (15)	42:20	10:51

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Project:

Mytrah-Bhesada

Description:

50.4 MW Mytrah Vayu Wind Farm, Bhesada

Licensed user:

ERM India Private Limited

Building 10, 4th Floor, Tower A, DLF Cyber City

IN-122002 Gurgaon

+91 124 4170300

Naval Chaudhary / naval.chaudhary@erm.com

Calculated:

9/29/2015 8:53 PM/3.0.578

SHADOW - Main Result

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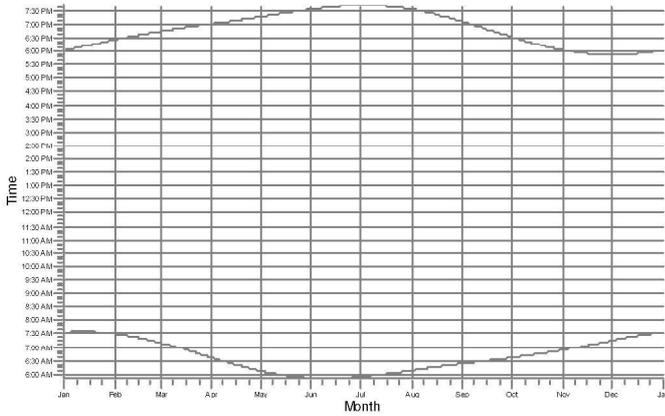
No.	Name	Worst case [h/year]	Expected [h/year]
RSA355	Suzlon S97 2100 97.0 !O! hub: 120.0 m (TOT: 168.5 m) (19)	0:00	0:00
RSA360	Suzlon S97 2100 97.0 !O! hub: 120.0 m (TOT: 168.5 m) (16)	286:54	97:33
RSA631	Suzlon S97 2100 97.0 !O! hub: 120.0 m (TOT: 168.5 m) (24)	0:00	0:00
RSA632	Suzlon S97 2100 97.0 !O! hub: 120.0 m (TOT: 168.5 m) (25)	0:00	0:00

Annex E

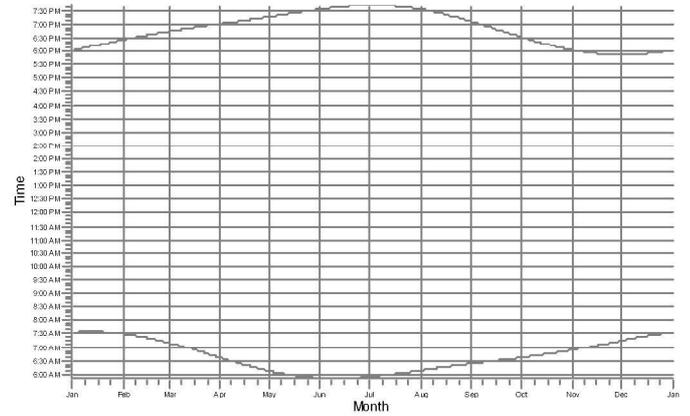
Shadow calendar graphical

SHADOW - Calendar, graphical

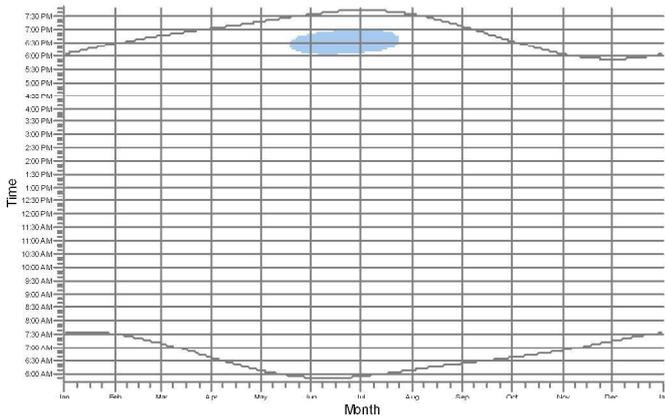
A: Shadow Receptor: 1.0 × 1.0 Azimuth: 145.0° Slope: 90.0° (1)



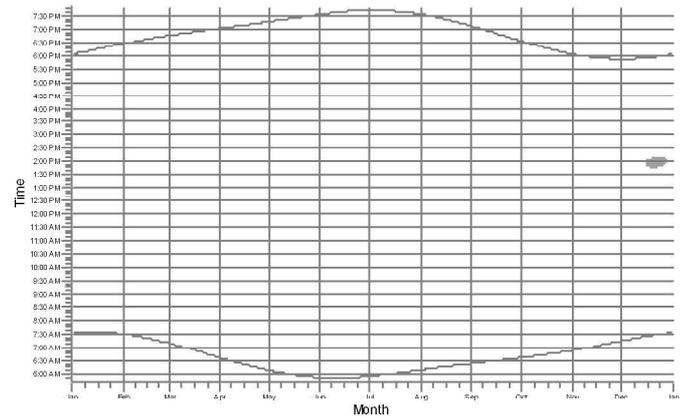
B: Shadow Receptor: 1.0 × 1.0 Azimuth: -159.7° Slope: 90.0° (2)



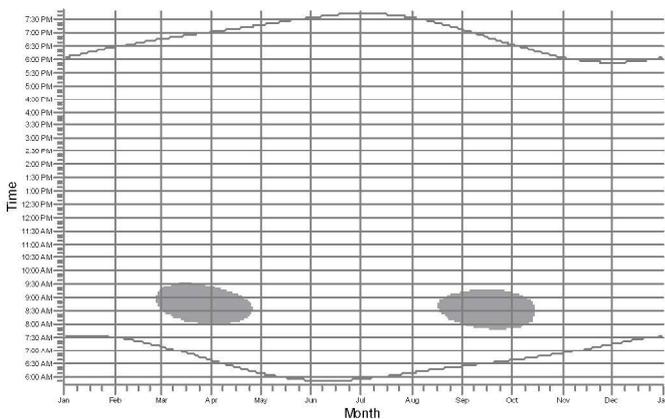
C: Shadow Receptor: 1.0 × 1.0 Azimuth: 129.1° Slope: 90.0° (3)



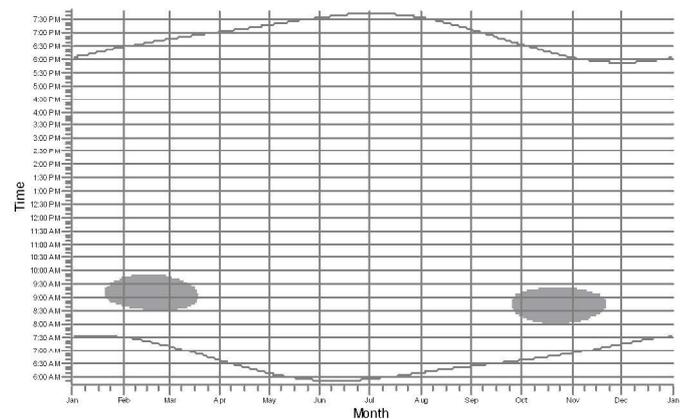
D: Shadow Receptor: 1.0 × 1.0 Azimuth: 25.6° Slope: 90.0° (4)



E: Shadow Receptor: 1.0 × 1.0 Azimuth: -72.6° Slope: 90.0° (5)



F: Shadow Receptor: 1.0 × 1.0 Azimuth: -52.5° Slope: 90.0° (6)



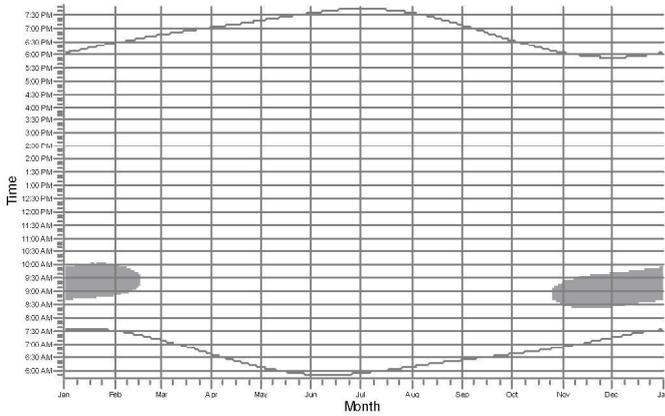
WTGs

RSA342: Suzlon S97 2100 97.0 !OI hub: 120.0 m (TOT: 168.5 m) (15)

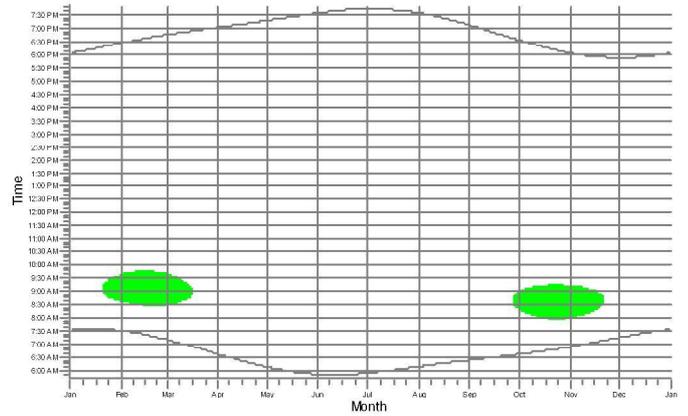
 RSA360: Suzlon S97 2100 97.0 !OI hub: 120.0 m (TOT: 168.5 m) (16)

SHADOW - Calendar, graphical

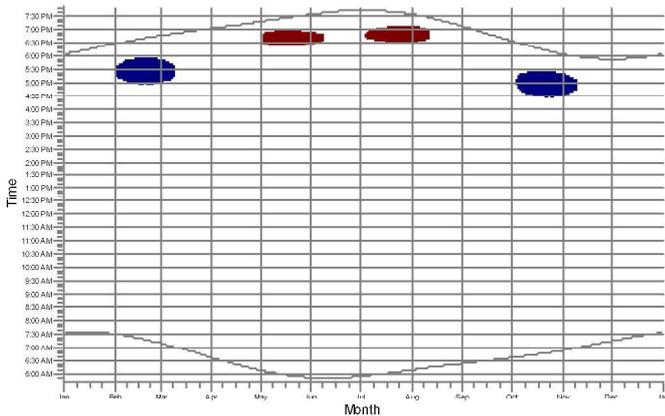
G: Shadow Receptor: 1.0 × 1.0 Azimuth: -46.1° Slope: 90.0° (7)



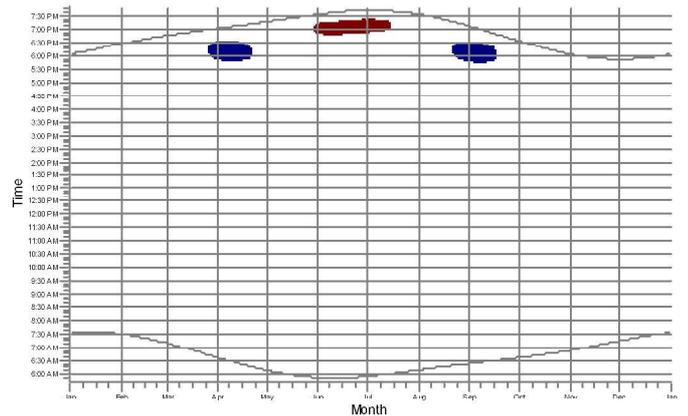
H: Shadow Receptor: 1.0 × 1.0 Azimuth: -57.9° Slope: 90.0° (8)



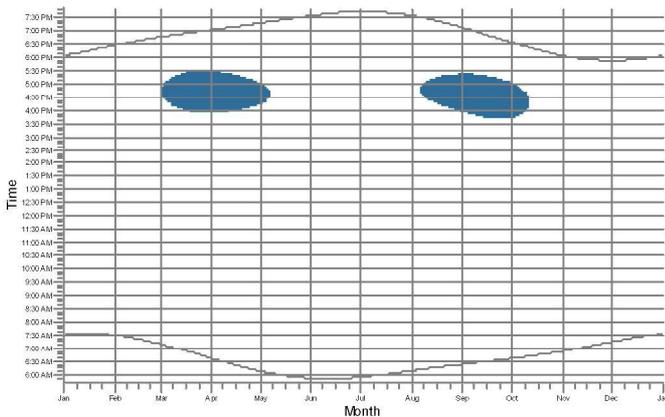
I: Shadow Receptor: 1.0 × 1.0 Azimuth: 73.9° Slope: 90.0° (9)



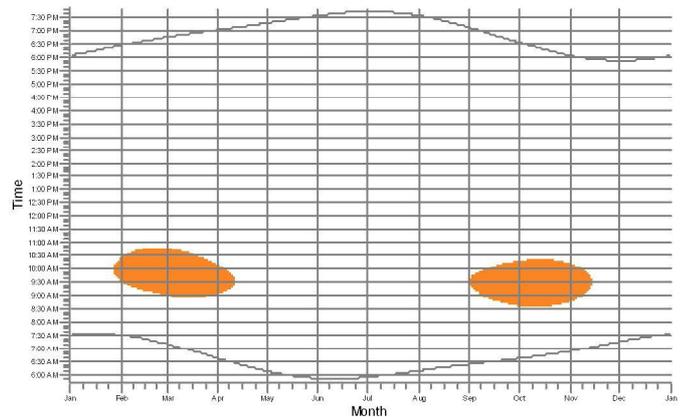
J: Shadow Receptor: 1.0 × 1.0 Azimuth: 41.4° Slope: 90.0° (10)



K: Shadow Receptor: 1.0 × 1.0 Azimuth: 88.5° Slope: 90.0° (11)



L: Shadow Receptor: 1.0 × 1.0 Azimuth: -59.7° Slope: 90.0° (12)

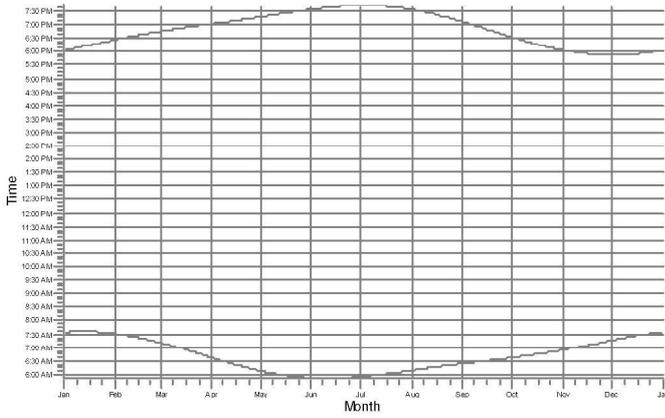


WTGs

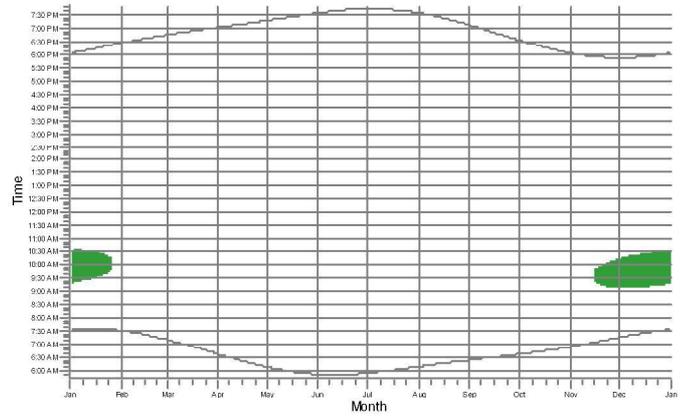
- RSA051: Suzlon S97 2100 97.0 IOI hub: 120.0 m (TOT: 168.5 m) (7)
- RSA052: Suzlon S97 2100 97.0 IOI hub: 120.0 m (TOT: 168.5 m) (8)
- RSA055: Suzlon S97 2100 97.0 IOI hub: 120.0 m (TOT: 168.5 m) (9)
- RSA360: Suzlon S97 2100 97.0 IOI hub: 120.0 m (TOT: 168.5 m) (16)
- RSA128: Suzlon S97 2100 97.0 IOI hub: 120.0 m (TOT: 168.5 m) (22)
- RSA126: Suzlon S97 2100 97.0 IOI hub: 120.0 m (TOT: 168.5 m) (23)

SHADOW - Calendar, graphical

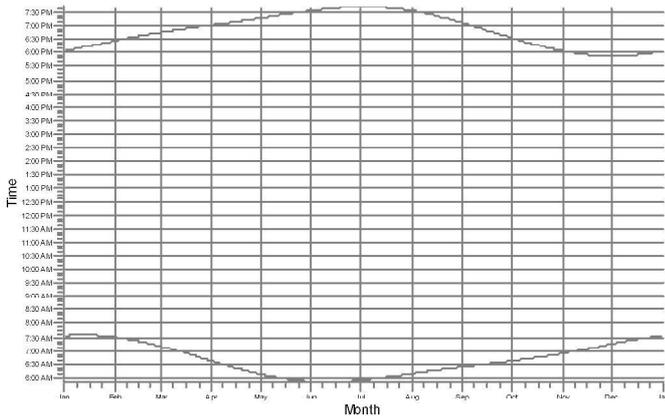
M: Shadow Receptor: 1.0 × 1.0 Azimuth: -147.9° Slope: 90.0° (13)



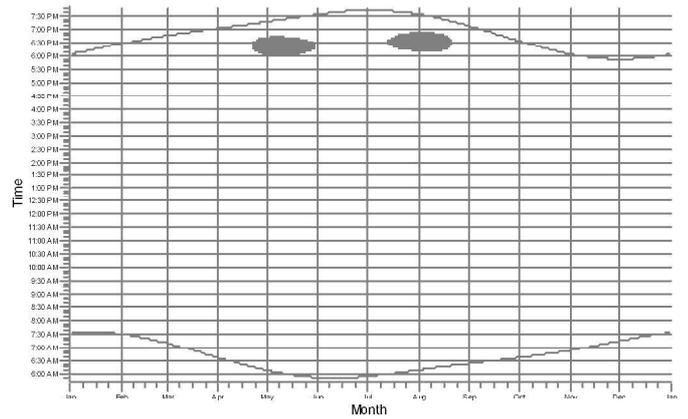
N: Shadow Receptor: 1.0 × 1.0 Azimuth: -35.6° Slope: 90.0° (14)



O: Shadow Receptor: 1.0 × 1.0 Azimuth: -31.0° Slope: 90.0° (15)



P: Shadow Receptor: 1.0 × 1.0 Azimuth: 31.6° Slope: 90.0° (16)



WTGs

- RSA006: Suzlon S97 2100 97.0 !OI hub: 120.0 m (TOT: 168.5 m) (4)
- RSA190: Suzlon S97 2100 97.0 !OI hub: 120.0 m (TOT: 168.5 m) (20)

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