

Environmental and Social Due Diligence Report

Project Number: 47083-004
April 2020

INDIA: Accelerating Infrastructure Investment Facility in India – Tranche 3 Spring ALT Energy Private Limited (Part 1 of 5)

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

This environmental and social due diligence report is a document of the borrower. The views expressed herein do not necessarily represent those of ADB's Board of Directors, Management, or staff, and may be preliminary in nature.

In preparing any country program or strategy, financing any project, or by making any designation of or reference to a particular territory or geographic area in this document, the Asian Development Bank does not intend to make any judgments as to the legal or other status of any territory or area.

Due Diligence Report on Environment and Social Safeguards

By

**India Infrastructure Finance Company Limited (IIFCL)
(A Govt. of India Enterprise)**

**Sub-Project: Construction, operation and maintenance of 197.5 MW Kageshree
Wind Power Project at Jamjodhpur Taluka, Jamnagar District, Gujarat (India)**







February 2020

SUB PROJECT: Construction, operation and maintenance of 197.5 MW Kageshree Wind Power project at Jamjodhpur Taluka, Jamnagar District, Gujarat (India)

Sprng ALT Energy Private Limited (SAEPL)

**Environmental and Social Safeguards Due Diligence Report
(ESDDR)**

Prepared by	Dr. Rashmi Kadian Assistant General Manager (Environmental Specialist) ESMU, IIFCL Mr. Krupasindhu Guru Assistant General Manager (Social Specialist) ESMU, IIFCL Mr. Ashok Suyal Consultant - Social Safeguards	  
Reviewed and Approved by	Dr. S. S. Garg General Manager & Head, ESMU IIFCL	

CONTENTS

PROJECT BACKGROUND.....	5
1. PURPOSE OF THE REPORT:	6
2. SUB-PROJECT:.....	6
3. SUB-PROJECT BACKGROUND:	6
4. SUB-PROJECT LOCATION:.....	6
5. SUB-PROJECT TECHNICAL DETAILS:	7
6. O&M CONTRACT:	7
7. IIFCL FUNDING:.....	8
8. STATUS OF PROJECT IMPLEMENTATION:.....	8
DUE DILIGENCE ON ENVIRONMENTAL SAFEGUARDS	9
9. ABOUT THE PROJECT	10
10. APPROACH TO THE ENVIRONMENTAL SAFEGUARDS DUE DILIGENCE REPORT:.....	10
11. COMPLIANCE OF SAEPL TO THE ESSF OF IIFCL:	11
12. APPLICABLE ENVIRONMENTAL POLICIES AND REGULATORY REQUIREMENT:.....	11
13. IMPLEMENTATION OF ENVIRONMENTAL MANAGEMENT PLANS:	12
14. INSTITUTIONAL FRAMEWORK & GRIEVANCE REDRESSAL	15
15. ENVIRONMENTAL SENSITIVITY:	16
16. PROJECT AGAINST THE PROHIBITED INVESTMENT ACTIVITIES LIST:.....	16
17. CATEGORIZATION OF SUB-PROJECT:.....	17
18. SITE VISIT OBSERVATIONS:.....	17
19. CONCLUSIONS AND RECOMMENDATIONS:.....	18
DUE DILIGENCE ON SOCIAL SAFEGUARDS	20
20. OBJECTIVE OF SOCIAL SAFEGUARDS DUE DILIGENCE REPORT:.....	21
21. SCOPE OF THE SUB-PROJECT:	21
22. PROJECT AGAINST THE PROHIBITED INVESTMENT ACTIVITIES LIST	21
23. APPROACH AND METHODOLOGY:	21
24. SOCIAL IMPACT OF THE PROJECT.....	22
25.1 LAND ACQUISITION IN THE PROJECT.....	22
25.2 IMPACT ON STRUCTURE	22
25.3 REHABILITATION AND RESETTLEMENT IMPACT IN THE SUB-PROJECT	22
25.4 IMPACT ON INDIGENOUS PEOPLE.....	22
25.5 IMPACT ON RELIGIOUS PROPERTIES:	23
25. PUBLIC CONSULTATION & STAKEHOLDERS MEETING:	23
26. GRIEVANCE MECHANISM AT THE PROJECT:.....	23
27. EMPLOYMENT GENERATION AND INCOME RESTORATION:.....	23
28. COMMUNITY DEVELOPMENT ACTIVITIES:	24
29. SITE VISIT OBSERVATION:.....	24
30. CONCLUSION:	24

LIST OF TABLES

Table 1: Project Description in Brief.....	7
Table 2: Commissioning Dates for WTGs at SAEPL.....	8
Table 3: Status of Regulatory Clearances Obtained related to Environmental Safeguards.....	11
Table 4: Status of Implementation of EMP at SAEPL during construction stage.....	13
Table 5: Status of Implementation of EMP during Operation Phase at SAEPL.....	14

ANNEXURES

Annexure I	ESIA Report
Annexure II	Gujarat Pollution Control Board Order regarding Categorization of Industries
Annexure III	CEIG Approval Sample
Annexure IV	Village NOC Sample
Annexure V	Sample copy of Monthly EHS report
Annexure VI	Environment Policy
Annexure VII	Occupational Health & Safety Policy
Annexure VIII	Onsite Emergency Plan

PHOTOPLATE**Photoplate I : Site Visit Photographs**

PROJECT BACKGROUND

1. PURPOSE OF THE REPORT:

1. This Environmental and Social Due Diligence Report (ESDDR) has been prepared by India Infrastructure Finance Company Limited (IIFCL) in consultation with the developer, Sprng ALT Energy Private Limited (SAEPL) to assess the adequacy of the project with the applicable National safeguards and ADB's SPS (2009) compliance. The report has been prepared as per the documents/information received from the developer and on the basis of site visit observations.

2. SUB-PROJECT:

2. The sub-project includes construction, operation and maintenance of 197.5 MW Kageshree Wind Power Project in Jamjodhpur Taluka, Jamnagar District in the State of Gujarat.

3. SUB-PROJECT BACKGROUND:

3. SAEPL has been incorporated by Sprng Energy for the implementation of 197.50 MW wind power project in Jamnagar District in the state of Gujarat. Sprng Energy is a renewable energy platform set up in India by Actis - a private equity fund manager that invests exclusively in the world's growth markets, with a total commitment of US \$ 450 MN of equity from Actis Energy Fund.
4. SAEPL Project is a part of bid invited by Gujarat Urja Vikas Nigam Limited (GUVNL) for 500 MW wind power, via competitive bidding route, in June 2017. The Project has been implemented by Envision Wind Power Technologies India Private Limited (Envision) with 79 wind turbine generators (2.5 MW each). The O&M activities are also being handled by Envision.
5. The Company has entered into long-term power purchase agreement (PPA) for 100% capacity of the Project with Gujarat Urja Vikas Nigam Limited (GUVNL) at a tariff of Rs. 2.43/kWh for a fixed period of 25 years and had also received evacuation approval from Gujarat Energy Transmission Corporation Limited (GETCO).

4. SUB-PROJECT LOCATION:

6. The proposed site comprises of 79 Wind Turbine Generators (WTGs) which are spread over nine villages including Satapur, Vadvala, Balva, Chur, Mahiki, Amrapar, Malvada, Patan and Parvada of Taluka Jam Jodhpur, District Jamnagar, Gujarat.

5. SUB-PROJECT TECHNICAL DETAILS:

7. Sub-project description for Kageshree site in brief is given in Table 1.

Table 1: Project Description in Brief

Project Site	Spread over 9 Villages: Satapur, Vadvala, Balva, Chur, Mahiki, Amrapar, Malvada, Patan and Parvada of Taluka Jam Jodhpur, District Jamnagar, Gujarat, India
Project Capacity	197.5 MW
Number of WTGs	79
Capacity of each turbine	2.5 MW each
Model of wind turbine	EN 131/ 2.5 MW
Rotor Diameter	131 m
Hub Height	120 m
Commercial Operational Date	3 rd December 2019
Sensitive area	The sub-project is not located in vicinity of any protected area or ecologically sensitive area
Type of land	~82 hectares (~1 hectare for each WTG location; out of which 73 hectares is revenue land and 6 hectares private land + land for Pooling Sub Station is around 5 acres (private land))
Land use Type	Barren Waste land
Forest Land Involved	No Forest land involved
Power Evacuation	<ul style="list-style-type: none"> Approximately 130 km of 33 kV internal transmission line for power evacuation from individual WTGs to the pooling substation located in Patan Village Approximately 14 km of 220 kV external transmission line for power evacuation from the 33/200 kV Pooling Substation to the Gujarat Energy Transmission Corporation Limited (GETCO) 220 kV Grid substation at Motipaneli, Rajkot District.
PPA	PPA was signed with Gujarat Urja Vikas Nigam Limited for entire capacity of 197.5 MW for 25 years from COD at a fixed tariff of ₹ 2.43 per kWh on 11 th January 2018
Total Cost of Project	₹ 1210 Crore

6. O&M CONTRACT:

7. The O&M agreement between SAEPL and Envision Wind Power Services India Private Limited for the wind project was signed on 22nd April 2019.

7. IIFCL FUNDING:

8. The total project cost of SAEPL is ₹ 1210 crores. The project cost is funded by equity of ₹ 301.5 crores and debt of ₹ 907.5 crores. The project is financed by IIFCL under Direct Lending Scheme. IIFCL has sanctioned an amount of ₹ 240 Crores and disbursed an amount of ₹ 210 crore till 31st January 2020.

8. STATUS OF PROJECT IMPLEMENTATION:

9. The sub-project is under operation. At the time of site visit during 30th – 31st January 2020, handing taking over by O&M contractor was going on at site. The sub-project WTGs were commissioned during the period as detailed in **Table 2**.

Table 2: Commissioning Dates for WTGs at SAEPL

No of WTGS	Capacity (MW)	Date of Commissioning
2	5	16-May-19
3	7.5	20-May-19
4	10	24-May-19
7	17.5	28-May-19
11	27.5	12-Jun-19
8	20	21-Jun-19
6	15	24-Jun-19
4	10	03-Jul-19
2	5	06-Jul-19
5	12.5	17-Jul-19
3	7.5	22-Jul-19
1	2.5	30-Jul-19
8	20	29-Aug-19
1	2.5	21-Sep-19
5	12.5	03-Oct-19
3	7.5	04-Oct-19
1	2.5	06-Nov-19
2	5	08-Nov-19
1	2.5	22-Nov-19
1	2.5	25-Nov-19
1	2.5	03-Dec-19
Total WTGs=79	197.5 MW	

DUE DILIGENCE ON ENVIRONMENTAL SAFEGUARDS

9. ABOUT THE PROJECT

10. Sprng ALT Energy Private Limited (SAEPL) has set up a 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat. SAEPL is the project company owned by Sprng Energy Limited. The sub project has 79 WTGs having 2.5 MW capacity each. The wind power generated from this sub project is being evacuated from the 33/200 kV Pooling Substation (PSS) to the Gujarat Energy Transmission Corporation Limited (GETCO) 220 kV Grid substation at Motipaneli, Rajkot district. The total length of external transmission line is ~14 km. The external transmission line and the grid substation are maintained by GETCO.
11. The 79 WTGs are spread over nine villages – Satapur, Vadvala, Balva, Chur, Mahiki, Amrapar, Malvada, Patan and Parvada of Taluka Jam Jodhpur, District Jamnagar, Gujarat, India.
12. The construction of 197.5 MW wind power project was commenced in June 2018 and all the WTGs were commissioned by December 2019. All access roads and internal transmission lines required for the sub project have been constructed and completed. The sub project has been fully commissioned and generating wind power at its full installed capacity.
13. The subproject has 79 wind turbines of 2.5 MW generation capacity each at 79 locations. 73 WTGs are located on government revenue land and 6 WTGs are located on private land. The land requirement for each WTG is 1 acre each. The cumulative land requirement of the sub project is approximately 82 hectares. For WTGs, 73 hectares is government land and around 6 hectares is private land. The pooling substation near the village Patan is located on approximately 5 acres of private land.

10. APPROACH TO THE ENVIRONMENTAL SAFEGUARDS DUE DILIGENCE REPORT:

7. The Environmental Due Diligence Report reviews the available documents/information and includes site visit observations. It also assesses the compliance of the sub-project with the respect to environmental safeguards, implementation of environmental management measures and institutional arrangement for implementing environmental measures. A detailed discussion on the environmental and social safeguards related issues was also carried out with the team of the sub-project at site.
8. The following documents were referred in order to prepare Environmental Safeguards Due-Diligence Report:
 - Project Information Memorandum (PIM)
 - Project Approvals/Permits
 - ESIA
 - EMP implementation status
 - Project HSE documents
 - Labour License and insurance
 - Contract Documents
 - Grievance redressal mechanism

- On-site Emergency Plan

11. COMPLIANCE OF SAEPL TO THE ESSF OF IIFCL:

9. The Environmental and Social Safeguard Framework (ESSF) provides the enabling mechanism to IIFCL to deliver its policy objectives and applies to projects funded by IIFCL throughout the project cycle. The ESSF defines procedures, roles, and responsibilities, at various project milestones for managing the adverse environmental impacts.
10. The environmental due diligence for SAEPL has been done as per requirements of direct lending scheme. The environmental management plans (EMPs) were implemented during the construction phase and are being implemented during the operational phase of sub-project. Upon due diligence it can be concluded that SAEPL is compliant to the requirements of IIFCL's ESSF and has adequate EMP implementation on site.

12. APPLICABLE ENVIRONMENTAL POLICIES AND REGULATORY REQUIREMENT:

11. Wind power projects are not listed in Schedule I of the EIA Notification, 2006 that lists projects or activities requiring prior environmental clearance and hence these are exempt from obtaining Environmental Clearance. As per the categorization of industries by the Central Pollution Control Board and its Office Memorandum to all State Pollution Control Boards, wind power generation comes under white category of industry. An Environmental & Social Impact Assessment (ESIA) report for 197.5 MW wind power project was prepared for the sub project as part of Corporate Governance Framework of Sprng Energy and to comply with the ESMS requirements of the Group. The ESIA report was prepared before commencement of construction of project and assessment of anticipated impacts was done. A copy of ESIA Report is attached as **Annexure I**. The EMPs were implemented during the construction stage and EMPs are available for the operation phase of the project. Records of the EMPs are being maintained at site.
12. The statutory clearances related to environmental aspects obtained from regulatory authorities as part of the SAEPL were assessed and current status of availability of such clearances are given in **Table 3** below:

Table 3: Status of Regulatory Clearances Obtained related to Environmental Safeguards

Clearances	Statutory Authority	Current Status of Clearance
Environmental Clearance	Ministry of Environment, Forests & Climate Change (MoEF&CC), New Delhi	Not applicable, as Wind Power project development is not listed in Schedule I of the MoEF&CC's EIA Notification 2006, that lists projects or activities requiring prior environmental clearance and hence this is exempted from obtaining the same.

Forest Clearance	MoEF&CC and State Forest Department	Not applicable, as the sub-project does not involve any forest land.
Wildlife Clearance	MoEF&CC	The Project area does not lie within an Ecologically Sensitive Area and is not located within 10 km of any National Park/Wildlife Sanctuary. The location of Project does not contravene any international biodiversity or ecosystem conservation conventions. Therefore, it does not require wildlife clearance or permission.
Consents from Pollution Control Board	Gujarat Pollution Control Board (GPCB)	Wind projects of all capacities are exempt from obtaining consents from Pollution Control Board. The GPCB Office order in this regard is attached as Annexure II .
Connection Agreement	Gujarat Energy Transmission Corporation Limited (GETCO)	Connection agreement has been signed between SAEPL and GETCO for grid connection to 220 kV Motipaneli substation on 1 st June 2018.
CEIG Approval	Chief Electrical Inspector, Government of Gujarat	CEIG approvals for all installations have been taken by the Developer. Under the Regulation 43/32 & 43 of the Central Electricity Authority (Measures relating to Safety and Electric Supply) Regulation, 2010 permission has been granted to energize all the installations along with the associated equipment. Sample copy of CEIG approval is attached as Annexure III .
NOC from Village Panchayat	Village Panchayat	Developer has taken NOC from village Panchayat for setting up the wind farm. Sample copy of Panchayat NOC for Patan village is enclosed as Annexure IV .
Labour License	Assistant Labour Commissioner Office, District Jamnagar, Gujarat	SAEPL and its contractors have taken labour license under section 7 of the Contract Labour (Regulation and abolition) Act, 1970.

13. IMPLEMENTATION OF ENVIRONMENTAL MANAGEMENT PLANS:

13. In the ESIA, the area falling within 500 m from the proposed project has been considered as area of influence for evaluation of impact assessment of the project on noise and shadow flicker on the receptors in area falling with 0.5 km from the Wind Turbines. The ESMP suggested on assessment of impacts covers the transmission lines also along with WTGs.
14. The overall management and coordination of the project is managed through CEO, SPRNG Energy who is supported by Head of Operation and the Head ESG looking after Health, Safety and Environment. The Head – ESG overviews, monitors and controls the activities of Project Manager and the Safety Officers at the site. The contractors were controlled by the Project Manger during

construction phase. In site visit it was found that the staff understood their commitment towards safeguards. O&M contractor also has designated staff for taking care of EHS aspects. The organogram for the sub project is given in ESIA report.

15. The ESMP suggested in the ESIA has been implemented at site during the construction phase. Key conditions for safety, environment and social aspects formed part of the contract agreement. The contractors were closely monitored for implementation of the EMPs and records maintained at site. Head ESG reports to the CEO every month regarding EHS aspects implementation and monitoring. The brief of EMPs implemented during construction phase are given in **Table 4**.

Table 4: Status of Implementation of EMP at SAEPL during construction stage

Impact	Mitigation Measure Status
Land use & Soil Resources	<ul style="list-style-type: none"> The land in use has been disturbed minimally. The areas for temporary facilities have been restored. All construction material was kept within the footprint of area acquired for the sub project. Contractors of SAEPL made daily observations on storage and handling of soil and construction material.
Waste generation, storage and disposal	<ul style="list-style-type: none"> Proper designated storage sites were marked at site and waste was stored at designated sites Workers were asked to use dustbins and toilets at the site
Water Resource and Quality	<ul style="list-style-type: none"> Consumption of water was recorded Workers were instructed about optimal use of water Storm water arrangements were made at site and monitored on weekly basis Water used during construction was sourced through tankers by contractors
Ecology	<ul style="list-style-type: none"> No tree cutting was involved in the sub project for the WTG and transmission lines as the area is devoid of vegetation Only pruning of trees was done at very few locations EPC contractor informed workers to refrain from any activity such as tree cutting/poaching etc. As per recommendation of the ESIA study - Bird & Bat studies were conducted for all four seasons through reputed external experts to assess the impacts on bird & bat because of the project activities during the construction stage. No significant impacts on birds and bats were found in the study. Two WTG locations were shifted away from a water body near village Satapar. Internal transmission line was rerouted to avoid Chur Mata Mandir, where trees density is high and birds (Peafowls) population is found. This rerouting avoided the impacts on avian fauna altogether. Barricading of all the excavated pits was done to prevent animal falls
Atmospheric emissions	<ul style="list-style-type: none"> Dust was controlled by water sprinkling.

	<ul style="list-style-type: none"> Fugitive emissions were controlled by checking and maintaining equipment and vehicles Vehicle speed was restricted in specific areas
Noise Disturbance	<ul style="list-style-type: none"> Measures were taken to control noise disturbance in the area regular maintenance of equipment & vehicles Site workers were provided with personal protective devices while working in areas with high noise levels
Health & Safety	<ul style="list-style-type: none"> Proper trainings were imparted to workers regarding health & safety Wearing personal protective equipment was mandatory Safety Officer was responsible to maintain health & Safety at the site Health & safety was given utmost priority by SAEPL. A labour camp was set up by the contractor, which was not found to be as per standards of Sprng Energy, as a corrective measure, the contractor was asked to house workers in proper accommodations in nearby villages with proper facilities related to sanitation and hygiene.

16. The EMP is being implemented at SAEPL site during the operation phase and is found to be adequate. The records are maintained by O&M Contractor and monthly O&M EHS statistics reports are maintained as records. EHS Officer of O&M team reports the records to Head ESG, Sprng Energy. The status of EMP implementation during operation phase of SAEPL based on information shared by SAEPL and site visit is presented in Table 5.

Table 5: Status of Implementation of EMP during Operation Phase at SAEPL

EMP	Status
Waste Disposal	<ul style="list-style-type: none"> Transformer oil will be replaced and retained by the supplier of transformers as per requirement. Tie up has been done by O&M Contractor for disposal of used oil, used grease, residue containing oil, empty barrel, etc. has been done with authorised recyclers with valid consents from Gujarat Pollution Control Board. Site office has toilets for staff with soak pit/septic tanks Waste generation records are maintained as part of Monthly EHS report. Sample copy of Monthly EHS report is attached as Annexure V.
Water Resource	<ul style="list-style-type: none"> Consumption of water to be recorded
Ecology	<ul style="list-style-type: none"> The tips of the wind turbines blade and upper segments of tower are colored in orange so that the blades are visible to birds to isolate from the sky and mitigate risk of bird collisions. The pole height used for 33 kV line was increased to 13 meters instead of industry standard of 11 meters required as per Electricity Act Rule, 1956. The increment of additional 2 meters helped in reducing the possibility of collision of peafowls from transmission

	<p>lines resulting in protecting them from electrocution.</p> <ul style="list-style-type: none"> • Use of tower line for 33 kV Double and multi circuit lines to ensure greater conductor height (17 meters) and to avoid multiple single pole lines in same area. These interventions are effective in ensuring the reduced risks of collision and electrocution of peafowls because of transmission lines. • Insulated conductors along with insulated jumpers are provided in total eight locations falling under the most sensitive area under village Chur from peafowl perspective. Insulated sleeves are also provided on two feeders in Chur and Balva to protect peafowls from electrocution. • The bird guards are installed at the entire length of 83 Km of 33 kV transmission line to reduce the possibility of sitting of peafowls on 33 kV line resulting in reduced risks of fatalities from electrocution. The bird guards are also provided on DP yard and top of the transformers at all USS. • A uniform clearance is maintained between the jumpers and the pole structure to avoid short circuit if any bird sits there.
Safety & Health	<ul style="list-style-type: none"> • Proper training of the workers regarding health and safety procedures to be done regularly. Records of trainings form part of the Monthly EHS report. • Workers are trained for use of personal protection equipment and its importance. • Any unsafe condition identified is reported as part of the Monthly EHS report • First aid kits are available at all locations at the project • Fire extinguishers are maintained at substation, WTGs, control room etc.

17. Sprng Energy has a well-established ESMS. The procedures of the ESMS are being followed at all Sprng Energy Projects. EHS Audit is conducted six monthly at the projects. Sprng energy has an Environment Policy and Occupational Health & Safety Policy which are applicable to all its projects including SAEPL. The policies are attached as **Annexure VI & VII**.

18. SAEPL has its Onsite Emergency Plan. The Onsite Emergency Plan is displayed at various locations in the project area and is understood well by the employees (**Annexure VIII**). Emergency contact numbers are displayed at Control room, Office area, sub-station area, etc. Card having all emergency contact numbers is given to all workers and staff at SAEPL.

14. INSTITUTIONAL FRAMEWORK & GRIEVANCE REDRESSAL

19. SAEPL has ESG staff at Corporate level. The O&M Contractor also has EHS Manager at site with QHSE Specialist reporting to him. The EHS team oversees overall implementation of the health & safety by contractors, sub-contractors, conduct audits, inspection of all the project activities and record keeping.

20. Sprng Energy has a Grievance Redressal Mechanism as part of the Group's ESMS. A Grievance Redressal Committee is already in operation at project site. The GRC comprises of Project Head and site in charge followed by site Engineer/EHS officer and Site Supervisor. Grievance register is maintained at project site. The complaints are segregated into different categories and resolved. Workers, staff and community members all can lodge complaints in the grievance register.

15. ENVIRONMENTAL SENSITIVITY:

21. The environmental sensitivity of SAEPL has been assessed by reviewing various documents, supplemented by field visit and consultation with the developer. The sub-project was commissioned in the year 2019 and is in operation phase.

22. The environmental sensitivity assessment is given below:

- The land procured for the sub-project is revenue and private land, which is waste barren land.
- The project area and its surroundings do not fall under any major flyway or migratory routes.
- The sub-project sites are not located in or near any protected area like wildlife sanctuary / national park or in close proximity of any eco-sensitive area.
- The Shadow Flicker and Noise Modelling assessments conducted reveal that there shall not be impacts on increase in noise levels and aesthetics during operation phase of the project
- No forest area is getting affected due to the sub-project.
- No trees were cut due to the project either for WTGs or transmission lines as the area is devoid of vegetation.
- As informed by the concessionaire and reported in the ESIA, no important cultural or heritage sites are getting affected due to the sub-project.
- The impacts of the sub-project are temporary in nature and managed by specific EMPs.

16. PROJECT AGAINST THE PROHIBITED INVESTMENT ACTIVITIES LIST:

23. The sub-project does not involve any prohibited activity as per the Prohibited Investment Activities List (PIAL) of ADB.

17. CATEGORIZATION OF SUB-PROJECT:

24. The sub-project can be classified as category B based upon ADB's EA requirements as per their Safeguard Policy Statement (2009). This classification is based on the review of the available documents and site visit with respect to the environmental sensitivity due to project activities.

18. SITE VISIT OBSERVATIONS:

25. A site visit was undertaken by IIFCL's Environmental Specialist and Social Safeguards Consultant on 30th – 31st January 2020. The site visit was undertaken to review the implementation of the project's environmental and social safeguards. During the site visit, following staff were mainly consulted regarding environmental safeguards related measures implemented at the project site:

- Mr Amit Gupta, Head – ESG
- Mr Rajkumar G, Head O&M, Envision
- Mr Dilip Patel, Manager, Sprng
- Mr Raj Kumar M, EHS Manager, Envision

26. Based on the discussions with above mentioned officials and visit, the site observations are given below:

- The area is devoid of vegetation and trees.
- First aid boxes and fire fighting systems are maintained at WTGs and sub-station.
- EHS Manager is present at the site from O&M contractor. The engineers present at the site understood their commitments.
- Adequate EMPs are implemented at site. Adequate measures have been taken to avoid bird collision and electrocution at the sub project. Bird guards, insulation of transmission line etc could be seen during site visit.
- All sewage water being generated at the sub-project premises is disposed in septic tanks/soak pits.
- On discussions with the site staff, it was informed that safety induction training is mandatory for everyone at site.
- Site induction training is provided to all visitors.
- Site staff informed that the entire site is a Personal Protective Equipment (PPE) zone. PPE like safety helmets, goggles, safety harnesses, safety shoes, hand gloves, ear plugs etc are provided to all staff and visitors.
- Vehicle movement discipline is maintained at site.
- Good housekeeping and good waste disposal facilities are maintained at site.

- Fire extinguishers, sand buckets and first aid kits are available at all WTGs and sub-station.
- Workers are made aware of the first aid procedures. All employees during O&M stage have obtained formal first aid training.
- Approximately 40 number of staff will be available during the O&M phase of the sub project, which includes both technical and non-technical staff.
- Tool box talk is done for labour as well as staff.
- Safety signages could be seen at designated locations.
- Mock drills on fire safety are conducted regularly.
- Records of safety trainings, mock drills and various inspections/audits are maintained at site office.
- No oil spillage was observed at the site. Developer has informed that hazardous waste will be stored at designated areas on impervious surface.
- Training and accident/incident records are maintained at site.
- Onsite emergency plan is displayed at the site.
- It was informed during site visit that tie up with hospital at nearest town Jam Jodhpur exists in case of any emergency.
- Stand by vehicle is always available at all locations wherever any activity/repair/maintenance work is taking place.
- Currently there are no labour camps at the site.
- Emergency contact numbers have been displayed at appropriate locations.
- The sub-project has a proper grievance handling mechanism and records are maintained at site.
- Developer has informed that stakeholder consultation is being conducted regularly at sites and records and photographic evidence of the same is kept for records.
- During site visit IIFCL staff and Consultant conducted an informal stakeholder consultation with the Principal, teachers and NGO member regarding the project, while visiting the CSR activity of the Developer.

27. The site visit photographs are given in **Photoplate - I**.

19. CONCLUSIONS AND RECOMMENDATIONS:

28. It is concluded from the above analysis that the sub-project SAEPL, 197.5 MW wind power project in the District Jamnagar of Gujarat State is unlikely to pose any adverse irreversible environmental

risks given the nature of the activities and absence of any legally protected areas, forest land and cultural heritage sites located within and/or in close proximity to the sub-project. However, the sub-project activities have reversible environmental impacts which have been managed.

29. Based upon the available documents and site visit, it is concluded that the concessionaire has undertaken adequate environmental safeguard measures. The conclusions for the sub-project are given below:

- The sub-project has been planned as per the National and State Government requirement and not in anticipation to ADB operation.
- The sub-project has achieved complete commercial operation during the year 2019.
- The project site is not located in or close to an ecologically sensitive area.
- The project does not involve diversion of forest land.
- The sub-project has the required national and local level permits and approvals.
- The institutional arrangement available for the implementation of environment, health & safety at SAEPL is found to be adequate.
- The main impacts of the sub project were on land environment, water resources and waste management. However, most of the associated impacts were limited to the extent of construction phase and were temporary in nature. The EMPs are undertaken to minimize any significant negative impact during project implementation. The status of implementation of EMPs are maintained at the sub project and reported at various levels.
- During site visit and discussion with the project developer, the implementation of EMP was found to be adequate.
- This nature of the project site coupled with the clean nature of wind power generation ensures that the Project will not cause any significant adverse environmental impacts during construction and operation. The same is evident from the site visit.
- The sub-project also has a positive GHG emission reduction due to non-emission of pollutants during operation.
- After approval from the Bank the ESDDR will be uploaded on website for public disclosure.

30. Based on the site visit and due diligence findings, it can be deduced that the sub-project has no significant environmental safeguard issues. The sub-project, therefore, does not appear to involve any kind of reputational risk to ADB funding on environmental safeguards.

DUE DILIGENCE ON SOCIAL SAFEGUARDS

20. OBJECTIVE OF SOCIAL SAFEGUARDS DUE DILIGENCE REPORT:

31. The Social Safeguards Due Diligence Report (SSDDR) has been carried out by India Infrastructure Finance Company Limited (IIFCL) in consultation with the Concessionaire, Sprng ALT Energy Private Limited (SAEPL) to assess the Social safeguards adequacy of the project with the applicable National Policies. The report has been prepared as per the Documents/information received from the concessionaire and on the basis of site visit organized during 30th – 31st January 2020. The information given in the SSDDR is agreed and confirmed by the Concessionaire.

21. SCOPE OF THE SUB-PROJECT:

32. The sub-project SAEPL includes operation and maintenance of 197.5 MW wind power projects in Gujarat, India. The WTGs were commissioned by December 2019.

22. PROJECT AGAINST THE PROHIBITED INVESTMENT ACTIVITIES LIST

33. The sub project SAEPL does not involve any prohibited activity as per the Prohibited Investment Activities List (PIAL) of ADB.

23. APPROACH AND METHODOLOGY:

34. The Social safeguard due diligence study for SAEPL has been carried out after reviewing the documents made available by the Concessionaire. On site visit to the project location by Environmental and Social Safeguards Specialist, discussion with the project developer SAEPL and various permits and approvals relating to the project to understand the salient features of the project and social concerns. The following documents/Reports/Licenses/permits and notifications were referred in order to prepare the Social Safeguard Due Diligence Report:

- Project Information Memorandum (PIM)
- ESIA
- Project Statutory Approvals/Permits
- Labour License and insurance
- Grievance redressal mechanism
- NOC from Village Panchayats

35. The social safeguards due-diligence study was carried out for the sub-project on the basis of site visit observations and understanding project scope based on information and documents provided by Concessionaire. The site visit was undertaken by IIFCL's Environmental Safeguard Specialists and Social Safeguards Consultant on 30th – 31st January 2020. During the visit a detailed discussion on the social safeguards was also carried out with the project team.

24. SOCIAL IMPACT OF THE PROJECT

25.1 Land Acquisition in the Project

36. SAEPL Project: The total land acquired for the project is approx. 82 Hectares, out of which 73 Hectares is revenue land and remaining is private land.
37. The Project site is spread over nine villages including Satapur, Vadvala, Balva, Chur, Mahiki, Amrapar, Malvada, Patan and Parvada. Of the 79 WTG's 73 are on Revenue land and 6 on private land spread over 7 hills. The topography of the site is undulating and ranging from 300 m to 600 m above mean sea level. The land-use around the wind farm site is both revenue land and private agricultural land. There is no reserve forest near the vicinity of the project site.
38. The private lands have been purchased directly from the landowners on willing seller- willing buyer basis, with direct negotiation from the farmers and the rate of land was based on negotiations with individual landowners. All the WTGs of the project are located on dry hilly area and away from community settlement. The project does not involve any resettlement and rehabilitation (R & R).
39. As per discussions with the project developer it was observed that, no complaints were received regarding the procurement/purchase of land parcel for the project SAEPL.
40. The land acquisition/allocation process was initiated in the year 2017-2018, prior to IIFCL involvement and not in anticipation of ADB financing.

25.2 Impact on Structure

41. During the site visit, it was observed that no structure is getting affected due to the project. The project does not involve any resettlement activities as land of the project is devoid of any commercial or residential structures.

25.3 Rehabilitation and Resettlement impact in the sub-project

42. During the site visit, it was observed that there was no rehabilitation and resettlement impact in the project.

25.4 Impact on Indigenous people

43. As informed by the project developer no indigenous people are affected. There is no presence of Indigenous people in the project area.

25.5 Impact on Religious Properties:

44. No religious properties are affected in the project.

25. PUBLIC CONSULTATION & STAKEHOLDERS MEETING:

45. The project got commissioned recently (i.e. December 2019). During the site visit it was told that public consultation and stakeholder's meetings were conducted during the project planning and construction stage of project. Prior to project set up and during the construction of project the subproject developer has invited stakeholders in the project region to explain about the proposed project activity and benefits associated with the project. Project authority has discussed with the Gram Panchayats for setting up of the SAEPL.

26. GRIEVANCE MECHANISM AT THE PROJECT:

46. During the site visit it was informed, that Grievance Redressal Committee (GRC) was formed at the project site to ensure that the affected person's grievances, on both environmental and social concerns, are adequately addressed. The Grievance Redressal Mechanism (GRM) for the project provides an effective approach for complaints and resolution of issues raised by the affected community (if any). This mechanism was established prior to construction and will remain active throughout the life cycle of the project.
47. A Grievance Redressal Committee is already in operation at project site. The subproject developer is maintaining a complaint register at site. The GRC comprises of Project Head and site in charge followed by site Engineer/EHS officer and Site Supervisor. The grievances if/when received are recorded in detail mentioning the date, time, location, names of villager, details of grievance and the action taken to address the grievance.
48. As informed by the concessionaire during the site visit, the concerned local communities have already been informed about the project (via formal/informal discussion with panchayat heads, local community representatives) and no such grievance/complain are received. There were no grievances related to leased land and compensation reported at the project site.

27. EMPLOYMENT GENERATION AND INCOME RESTORATION:

49. The concessionaire has generated employment opportunities for the local people during the construction stage of the sub-project. Employment opportunities have been provided to project affected people and local villagers during project construction stage. Most of the construction labours at site were employed on contractual basis through sub-contractors.

50. It has been confirmed by the concessionaire that during construction stage, local personal were regularly been engaged on need basis on contractual basis. As informed during the site visit, approximately 40 local people are contracted on site including security guards, Semi Technical skills, and other sundry jobs.

28. COMMUNITY DEVELOPMENT ACTIVITIES:

51. During the site visit it was informed by the concessionaire that they have carried out various community development activities on public demand, which has been briefed below:

- Mobile Healthcare Services are regularly organized as community outreach and CSR activities.
- Active participation community for availing the basic healthcare services provided by SAEPL
- At least 80% of 857 households in 4 project villages are covered with basic medical services under project.
- At least one awareness campaign on sanitation is organized in all the villages every month.
- A mechanism is developed to sensitize the community towards safe disposal of plastic waste.
- RO Plant and water storage facility in schools provided as part of CSR initiatives.

29. SITE VISIT OBSERVATION:

52. A site visit was undertaken by IIFCL's Environmental Specialist and Social Safeguard Consultant on 30th – 31st January 2020 for field verification of social safeguards related aspects of the project. It was observed that:

- The project has been commissioned and “handing over and taking over” (HOTO) between construction & O&M teams happening smoothly;
- During the interactions with one of the village schools it was observed that children were eager and enthusiastic to showcase their computer skills. School Principle & teachers supported the students ably in helping the demonstrate their acquired computer skills. Villagers are happy about the project and the positive impact it's making on the future generation.
- As informed during the visit, no grievances have been received till date from the local people.

30. CONCLUSION:

53. Based upon the available documents and information provided by the subproject developer, it is concluded that the concessionaire has undertaken adequate social safeguard measures during the construction stage of the project. The conclusions for the sub-project is given below:

- The sub-project has been prepared by the Gujarat Urja Vikas Nigam Ltd (GUVNL) a Gujarat Government undertaking and as per the national and state government requirement and not in anticipation to IIFCL or ADB funding.
- Land of the project is composed of revenue land and private land acquired through willing seller – willing buyer basis.
- The project does not have any impact on the settlement area and no cultural and community property was affected due to the project.
- There were no grievances related to leased land and compensation reported at the project site.
- As informed by the subproject developer, during the site visit, no cases of litigation are pending.
- The project does not impact any Schedule Tribe families.
- Employment opportunities have been provided to the local people for various activities
- Concessionaire has undertaken up gradation/maintenance of village road based on the demands raised by the Village Panchayats.
- The Sub-project, therefore, does not appear to involve reputational risk to Asian Development Bank funding on social safeguards and is thus recommended for funding.



South Asia

Choose certainty.
Add value.

ESIA

FINAL ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT

197.5 MW KAGESHREE WIND POWER PROJECT, GUJARAT

Location:

Jamjodhpur Taluka, Jamnagar District,
Gujarat (India)

Client:

SPRNG ALT Energy Pvt. Ltd.



Date:

23-05-2018

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat
Client: SPRNG ALT Energy Pvt. Ltd.

TABLE OF CONTENTS

1. INTRODUCTION.....	6
1.1 OBJECTIVES AND SCOPE OF WORK	7
1.1.1 OBJECTIVES	7
1.1.2 SCOPE OF WORK.....	7
1.2 TUV SUDs APPROACH & BRIEF METHODOLOGY FOR THE STUDY	8
1.3 OVERVIEW OF THE PROJECT.....	11
1.3.1 AGENCIES CONTACTED.....	14
1.4 CATEGORIZATION OF THE PROJECT	14
1.5 LIMITATIONS OF THE STUDY	15
1.6 STRUCTURE OF THE REPORT / CHAPTERISATION	15
2. LEGAL, POLICY AND ADMINISTRATIVE FRAMEWORK	17
2.1 INSTITUTIONAL FRAMEWORK – ENFORCEMENT ACTIVITIES.....	17
2.2 APPLICABLE REGULATORY/POLICY FRAMEWORK.....	24
2.3 APPLICABLE ENVIRONMENTAL STANDARDS	24
2.3.1 National Level Standards	24
2.3.2 IFC/WB Standards.....	25
2.3.3 IFC Performance Standards.....	30
2.3.4 IFC Categorization of Projects	34
2.3.5 EHS Guidelines of IFC	35
2.4 APPLICABLE ENVIRONMENTAL STANDARDS	38
2.4.1 AMBIENT AIR QUALITY	38
2.4.2 WATER QUALITY STANDARDS.....	39
2.4.3 AMBIENT NOISE STANDARDS.....	41
3. PROJECT DESCRIPTION.....	43
3.1 SITE SETTING	43
3.2 PROJECT COMPONENTS	44
3.2.1 Wind Farm	44
3.2.2 Wind Turbine Generator.....	45
3.2.3 Power Evacuation.....	51
3.2.4 Additional Project Infrastructure	51
3.2.5 Accessibility	51
3.3 LAND REQUIREMENT AND PROCUREMENT PROCESS	52
3.4 LAND DETAILS	52
3.4.1 Project related land procurement and specific issues.....	53
3.4.2 Land details and existing procurement status for specific components.....	57
3.4.3 Land Purchase Process	59

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 2

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

3.5	PROJECT PHASES AND ACTIVITIES	64
3.5.1	Planning Phase	65
3.5.2	Construction Phase	66
3.5.3	Operation and Maintenance Phase.....	66
3.5.4	Decommissioning Phase	67
3.6	RESOURCE REQUIREMENTS	67
3.6.1	Manpower requirement and facilities.....	67
3.6.2	Water requirement.....	68
3.6.3	Raw Materials.....	69
3.6.4	Fuel Requirement and Storage	69
3.6.5	Power Requirement.....	70
3.7	POLLUTION CONTROL MEASURES	70
3.7.1	Air Emissions.....	70
3.7.2	Wastewater Management	71
3.7.3	Solid & Hazardous Waste Management	72
3.7.4	Noise Control.....	73
3.7.5	Fire Safety and Security	74
3.8	PROJECT ORGANIZATION STRUCTURE	75
3.8.1	Engineering, Procurement and Construction (EPC) Contractor	75
3.8.2	Operation & Maintenance Contractor.....	76
4.	ENVIRONMENTAL AND SOCIAL BASELINE CONDITIONS.....	77
4.1	LOCATION AND SITE SETTINGS	77
4.2	AREA OF INFLUENCE.....	77
4.3	STUDY AREA.....	77
4.4	TOPOGRAPHY	78
4.5	GEOMORPHOLOGY AND DRAINAGE	78
4.6	HYDROGEOLOGY	80
4.7	DEPTH TO WATER LEVELS	80
4.8	GEOLOGY.....	83
4.9	WATER RESOURCES.....	84
4.9.1	SURFACE WATER	84
4.9.2	GROUND WATER.....	85
4.10	CLIMATE	86
4.10.1	TEMPERATURE	86
4.10.2	RAINFALL	87
4.10.3	WIND	87
4.10.4	NATURAL HAZARDS.....	89
4.8.4.2	Drought.....	90
4.10.5	ARCHAEOLOGY AND CULTURAL HERITAGE RESOURCES.....	90

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 3

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

4.11	AMBIENT AIR QUALITY.....	90
4.12	WATER QUALITY	94
4.12.1	WATER QUALITY MONITORING.....	94
4.13	SOIL QUALITY	99
4.14	NOISE ENVIRONMENT	101
4.15	ECOLOGY	105
4.15.1	Scope and Objectives.....	106
4.15.2	Biogeographic Description of the Study Area	106
4.15.3	Protected Area and Eco-Sensitive Zones	107
4.15.4	Primary and Secondary Survey.....	108
4.15.5	Methodology Adopted for the Study	110
4.15.6	Sampling Methodology Adopted for Flora.....	110
4.15.7	Observations and Results of Flora	118
4.15.8	Quantitative analysis	127
4.15.9	Analysis of the result:	131
4.15.10	Endangered/ threatened/ protected floral species	132
4.15.11	Faunal Profile	134
4.15.12	Avifauna.....	136
4.15.13	Mammals	145
4.15.14	Butterflies.....	151
4.16	SOCIO-ECONOMIC PROFILE.....	152
4.16.1	JAMJODHPUR TALUKA PROFILE	154
4.16.2	VILLAGES FALLING UNDER STUDY AREA	154
4.16.3	DEMOGRAPHIC DETAILS	155
4.16.4	OBSERVATIONS AND NEED BASED ASSESSMENT	158
5.	PUBLIC CONSULTATIONS AND STAKEHOLDER ANALYSIS	160
5.1	STAKEHOLDER IDENTIFICATION	160
5.2	STAKEHOLDER CONSULTATION	160
5.3	STAKEHOLDERS IDENTIFIED	164
5.4	FOCUSSED GROUP DISCUSSIONS (FGD) WITH LOCAL INHABITANTS/ VILLAGERS.....	166
6.	ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT	174
6.1	IMPACT ASSESSMENT CRITERIA.....	174
6.2	IMPACT IDENTIFICATION	177
6.2.1	IMPACT IDENTIFICATION MATRIX.....	177
6.3	IMPACT ASSESSMENT - CONSTRUCTION PHASE	182
6.3.1	Soil Resources and Quality	183
6.3.2	Land Use	185
6.3.3	Waste Generation, Storage and Disposal	186

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 4

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

6.3.4	Water Resources and Quality	188
6.3.5	Ecology.....	189
6.3.6	Traffic and Transport	193
6.3.7	Atmospheric Emissions	194
6.3.8	Noise and Vibration	195
6.3.9	Health and Safety Hazards	197
6.3.10	Socio-Economic Impacts.....	198
6.3.11	Archaeological, Historic and Cultural Aspects	203
6.4	IMPACT ASSESSMENT-OPERATION PHASE.....	204
6.4.1	Waste Disposal.....	204
6.4.2	Aesthetics and Visual Impact	205
6.4.3	Noise.....	220
6.4.4	Water Resource and Quality	227
6.4.5	Ecology.....	228
6.4.6	Health and Safety Risk.....	244
6.4.7	Socio-economic Impacts	246
7.	SCREENING AND SCOPING.....	248
7.1	SCREENING METHODOLOGY.....	248
7.2	CATEGORY JUSTIFICATION.....	249
7.3	SCOPING METHODOLOGY.....	250
8.	ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN.....	259
8.1	ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)	259
8.2	ORGANOGRAM (ENVIRONMENT, SOCIAL, HEALTH AND SAFETY)	260
8.2.1	Roles and Responsibilities	261
8.2.2	Contractors Management.....	261
8.3	COMMUNITY/STAKEHOLDER ENGAGEMENT AND GRIEVANCE REDRESSAL ...	262
8.4	ESMP REVIEW AND AMENDMENTS	263
8.5	INSPECTION, MONITORING & AUDIT	264
8.6	DOCUMENTATION AND RECORD KEEPING.....	265
8.7	PROPOSED ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN	265
9.	CONCLUSIONS AND RECOMMENDATIONS.....	285

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 5

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

1. INTRODUCTION

SPRNG Energy Private Limited is a renewable energy platform set up in India by Actis, with a total commitment of US\$450mn of equity from Actis Energy Fund 4 to set up 2GW of renewable energy capacity (solar and wind) in the next 4-5 years. In Feb 2017, Solenergi - a 100% Mauritius based holding company of SPRNG Energy Private Limited participated in the Rewa solar park auction and won a 250 MW PPA, which is currently under development. A Special Purpose Vehicle (SPV) has been formed for this project which is “SPRNG ALT Energy Private Limited”.

SPRNG ALT Energy Private Limited has won this project during bidding by GUVNL in June, 2017 for setting up 500 MW Wind Power projects in Gujarat at a tariff rate of Rs. 2.43/kWH. The company has signed an agreement with M/s Envision India Private Limited (hereafter referred as “Envision”) for turnkey Engineering, Procurement, Construction (EPC) including Wind Turbine Generator (WTG) and Balance of Plant (BOP). M/s. Opera Wind Private Limited (hereafter referred as “Opera”, 100% subsidiary of Envision is responsible for identification and procurement of revenue land and transfer in name of Company for the project. M/s. Enerfra Projects India Private Limited (hereinafter referred to as ‘Enerfra’) has been appointed by Envision for Civil and Electrical Works, laying of substation, land acquisition for RoW and EHV Line. Envision shall be further responsible for O&M of the 79 Wind Turbines of SPRNG (“Developer”)

TUV SUD South Asia Pvt. Ltd. (TUV SUD) has been assigned by SPRNG ALT Energy Private Limited (hereinafter referred as ‘SPRNG’) for undertaking Environmental and Social Impact Assessment (ESIA) of its proposed 197.5 MW Wind Power Project at Jamjodhpur Taluka, Jamnagar District, Gujarat.

This ESIA report has been prepared based on detailed reconnaissance visit carried out in the site, environmental monitoring, analysis and review of available documents and consultations/ discussions with the project proponents and related stakeholders.

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 6

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

1.1 OBJECTIVES AND SCOPE OF WORK

1.1.1 OBJECTIVES

The objective of the ESIA study is to evaluate the environmental and social impacts of the proposed Wind Power project and design an Environmental, Health, Safety and Social Management Plan to avoid adverse impacts during the project in compliance with the IFC Performance standards. The specific objectives are to:

- Determination of Environmental and Social settings near the proposed project site and in the vicinity
- Assess the Social and Environmental Impacts from the project on the environment and social setting; and
- Prepare mitigation measures and environmental and social management plan (ESMP) for the project; and
- Determination of the requirements for additional studies, such as a detailed bird and bat monitoring study.

1.1.2 SCOPE OF WORK

The scope of work for the study shall be as follows:

- Reconnaissance survey and primary site assessment to collect and review baseline environmental and social conditions;
- Ground-truthing the environmental features identified by desk study;
- Identification of environmental and social sensitivities based on survey and interaction with local communities;
- Social consultation with the relevant government agencies, gram panchayat members, and other relevant individuals or agencies to understand the land uptake process, current and previous use of the project site, dependence of local people on the land, and the concerns and expectations of the community from the project.
- Primary ecological survey for determination of baseline for the ecology of the area which includes forestry conditions, flora and fauna, bird and bat survey, determination of ecologically sensitive areas; natural habitat of species of special conservations, migratory bird paths and habitats, if any, etc.
- Socio-economic survey of local community/ project study area
 - Assessment of impacts on places of historical/archaeological importance and

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 7

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

- aesthetic impairment, if any
- Study of population, aesthetics, economic pattern and occupational structure around project site
- Socio-economic profile of nearby settlements: demographics, land use in the project area, main sources of income, poverty levels, culture, religion, skills and education levels, social service provision, business environment.
- Land, access requirements, land use, and involuntary resettlement
- Details on land acquisition/ transfer (loss of lands, houses, livelihood, etc.), and resultant involuntary resettlement extent;
- Review of the land take/lease process to assess any legacy or current/existing issues (like informal settlers, livelihood dependence, other usage etc) on the allotted land.
- Proximity to other existing or planned/permitted wind power sites.
- Impact of the project on local infrastructure of the area such as road network and whether any additional infrastructure would need to be constructed.
- Sample social perception survey based on questionnaire and formal interview of people within study area.
- Collection of additional secondary environmental, social and demographic information;
- Identification and review of the applicable standards and identification of key issues;
- Prepare a PAP profile through suitable survey using acceptable tool/s, as per the applicability;
- Focused Group discussion to identify the needs, problems, if applicable
- Socio economic survey by need base assessment study on the basis of secondary / primary information;
- To integrate the environmental and Social issues in the project planning and design; and
- Preparation of Environmental and Social Action Plan (ESAP) based on the ESIA and suggest procedures for mitigation and monitoring of environment and social impacts on an ongoing basis as well as to identify any requirements that may occur subsequent to the completion of the ESIA.

1.2 TUV SUDs APPROACH & BRIEF METHODOLOGY FOR THE STUDY

The broad approach and methodology adopted for the project is described below:

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 8

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

- a) Identified and reviewed applicable local, state, national and international environmental and social regulatory and institutional frameworks;
- b) Assessment of the proposed project for social and environment aspect with respect to the International Finance Corporation (IFC) Performance Standards. It covers IFC's Environmental, Health and Safety Guidelines for Wind Energy published on 7th August, 2015; IFC's General EHS Guidelines, published on April 30, 2007 and IFC's EHS Guidelines for Electric Power Transmission and Distribution (for construction and operation of transmission lines).
- c) Established environmental baseline conditions of the site and surrounding area through the following:
 - Detailed surveys to observe environmental and social characteristics of the project area in both the districts;
 - Discussions with the local community, project affected people, panchayats and identification key issues during planning, construction and operation phase of the project;
 - Primary baseline data collection of the site and study area with respect to water and soil quality, ambient air and noise quality and ecology mainly terrestrial flora & fauna and Avifauna in particular;
- d) Assessed the socio-economic environment through collation of secondary information of the site, supplemented by personal and group consultations with the local communities to understand community perception with regard to the project and its activities. The approach included:
 - Stakeholder identification;
 - Focussed group consultations with land owners, general community, SC community and other impacted groups;
 - Field surveys and data compilation;
 - Cumulative Impact Assessment on Ecology due to upcoming of the project
 - Group/Community Consultations: Group meetings and consultations with local and community representatives; and
- e) Reviewed the land related records, land procurement process, current HR, Social, Environmental, Occupational Health and Safety Management System to understand its adequacy and efficacy with respect to the PS requirements
- f) Identification of any probability of significant shadow flicker and noise impact that would potentially affect human settlements in the vicinity of the project

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 9

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

- (500m from a WTG) and if identified, to assess the potential shadow flicker/ noise impact and to develop mitigation measures to reduce the impacts;
- g) Identification, prediction and evaluation of potential aspects and impacts on various environmental and social sensitivities due to the project activities envisaged during land acquisition, construction, operation and decommissioning stages;
- h) Ascertain whether project footprint or its immediate environment is considered to be ecologically sensitive regarding endangered or protected species, as well as whether the location is a high risk zone for bird and bat activity (migratory routes, foraging and breeding areas);
- i) Recommendation of appropriate mitigation/enhancement measures for identified environmental, ecological and social impacts;
- j) Comparison and analysis of alternatives considered for the project with respect to location and technology; and
- k) Formulation of an Environmental and Social Management Plan (ESMP) in accordance with IFC's Performance Standards 2 through 8 with management tools and techniques including monitoring and reporting requirements for effective implementation

The present Report has been prepared based upon the reconnaissance survey and Environmental Monitoring carried out from 22nd April-2nd May 2018 by TUV SUD team for preliminary assessment of the site. This survey included verification of location and site condition viz terrain & topography, soil & geology, vegetation cover in the project area and conducting Environmental Monitoring for analysis of Ambient Air Quality, Noise levels, Surface water and groundwater, soil in study area of 10 km radius.

The report assesses the proposed project for social and environment aspect with respect to the International Finance Corporation (IFC) Performance Standards. It also covers IFC's Environmental, Health and Safety Guidelines for Wind Energy published on 7th August, 2015; IFC's General EHS Guidelines, published on April 30, 2007 and IFC's EHS Guidelines for Electric Power Transmission and Distribution.

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 10

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

1.3 OVERVIEW OF THE PROJECT

The details of Kageshree Wind Power Project are given below in **Table 1-1**.

Table 1-1: Details of Kageshree Wind Power Project

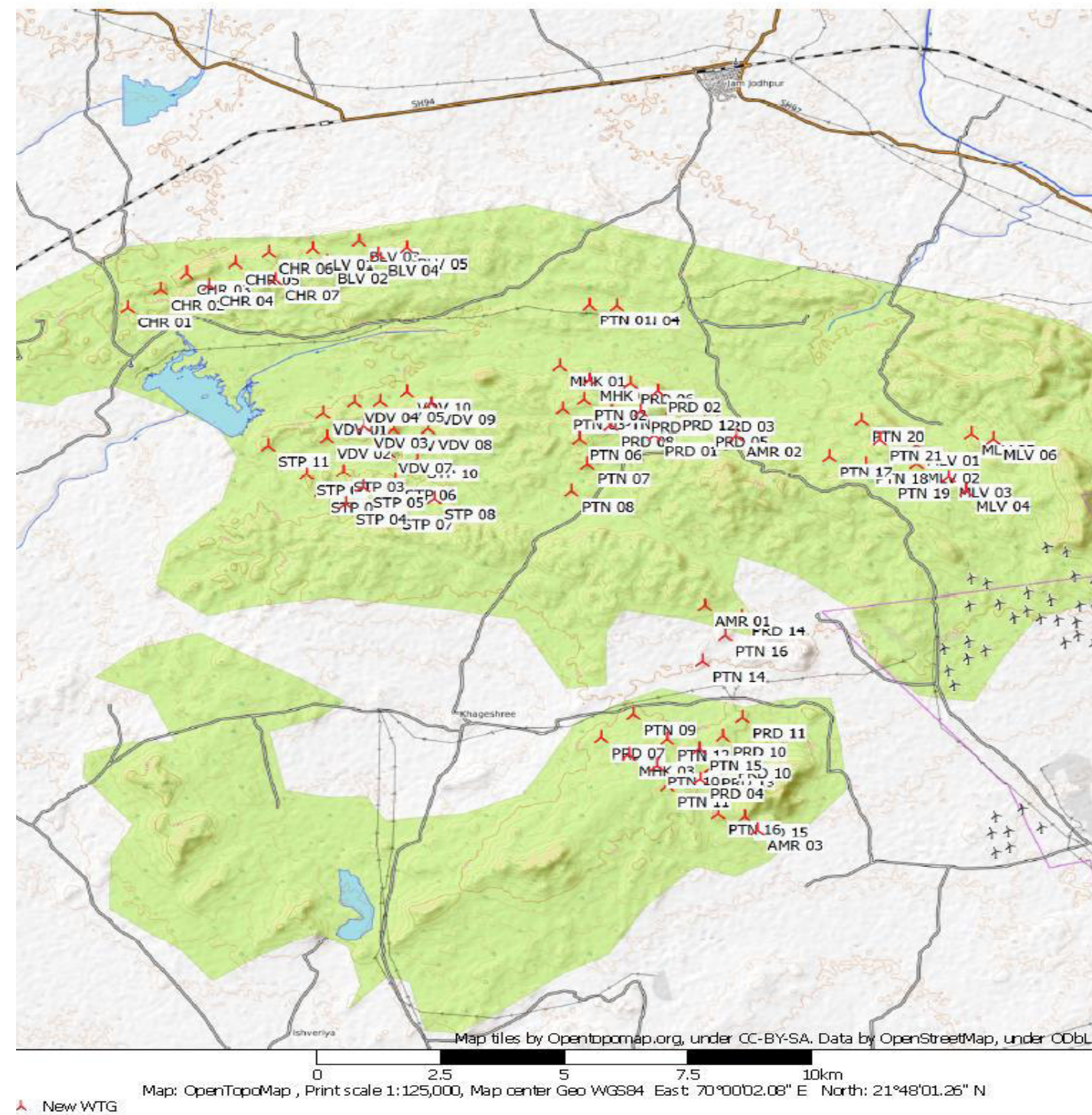
Detail	Description
Location	79 WTGs are spread over nine villages including Satapur, Vadvala, Balva, Chur, Mahiki, Aparapar, Malvada, Patan and Parvada of Taluka Jam Jodhpur, District Jamnagar, Gujarat, India.
Type of WTGs	79 WTGs of capacity 2.5 MW each with Hub Height of 120 m and rotor diameter of 131 m Model EN 131 2.5 MW (Envision make)
Power Evacuation	<ul style="list-style-type: none"> Approximately 60 km of 33 kVx 10 internal transmission line will be constructed for power evacuation from individual WTGs to the pooling substation located in Patan Village. Approximately 15 km of 220 kV external transmission line will be constructed for power evacuation from the 33/200 kV Pooling Substation to the Gujarat Energy Transmission Corporation Limited (GETCO) 220 kV Grid substation at Moti Paneli, Rajkot district.
Access road	Internal access road - 60 Km External access Road – 10 Km
Land Requirement	<ul style="list-style-type: none"> Approximately 1 Hectare of land is required per WTG Two (2) hectares of land has been procured for the pooling substation; Fifteen (15) acres of land has been procured for the material storage yard in Paradva village
Project Status	<ul style="list-style-type: none"> The project is presently in the land procurement stage with stamp duty paid for 31 WTG locations; and Anticipated commissioning date of the project is June, 2019.

The location of the project site and 79 WTG locations in Jamnagar District, Gujarat are given below in **Figure 1-1** and **Figure 1-2** respectively.

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 11

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat
Client: SPRNG ALT Energy Pvt. Ltd.

Figure 1-2: Project Layout Map



Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 13

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

1.3.1 AGENCIES CONTACTED

The following stakeholders were contacted during the ESIA study:

- Project Proponents:
 - Representatives from SPRNG- Onsite
 - Representatives from Envision, Enerfra and Opera Wind-Onsite
 - Representatives from SPRNG-Corporate Office
 - Representaives from International Finance Corporation (IFC)
- Local Community:
 - Residents – Patan, Paradva, Satapar, Vadvala and Mahiki village
 - PAP- Patan, Paradva and Vadvala village
 - DFO-Porbandar

TUV SUD South Asia Pvt. Ltd. has carried out baseline monitoring which is itself a National Accreditation Board for Testing and Calibration Laboratories (NABL) certified and MoEF approved Laboratory.

1.4 CATEGORIZATION OF THE PROJECT

In accordance to the screening criteria of IFC, TÜV SÜD has categorized Project as **Category B**, which specifies that the project can cause potential and limited adverse social or environmental impacts which are generally site-specific, largely reversible and readily addressed through mitigation measures. The major observations of the proposed project are as follows.

- The project is a greenfield project. The revenue land has been acquired for the project and there are no resettlement and rehabilitation or involuntary resettlement issues related to the project;
- The migratory bird pathway does not coincide with the WTG Locations in the Core Zone of the Study Area;
- The project is located at a distance of 37 km from Chaya Rann Wetland and at a distance of 41 km from coastal city Porbandar which attracts migratory birds;
- The Shadow Flicker and Noise Modelling assessments conducted reveal that there shall not be impacts on increase in noise levels and aesthetics during operation phase of the project

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 14

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

- There are 3-4 other upcoming windfarm projects at a distance of approximately 6-7 km from the proposed project site henceforth cumulative impact assessment on avifauna is a significant concern.

1.5 LIMITATIONS OF THE STUDY

The ESIA report has been prepared based on the professional judgement to certain facts with resultant subjective interpretations. Professional judgments expressed herein are based on the facts which were available within the limits of the scope of work, information provided by the client or its representative, prevailing secondary data, budget and schedule.

The consultation undertaken during the site visit was based on the present understanding of the project and the project footprint. This assessment may slightly change in case of a change in the plant location as finalized at the time of study. The documents like SOPs, policy and procedures for EHS&S management were limited for review at the time of visit.

Also, the consultations undertaken as part of the impact assessment were restricted to the stakeholders who were available during the site visit. Also, due to the large number of the villages within the study area and the limited time in which the assessment had to be completed, the ESIA team undertook consultation in a sample of the villages with a focus for coverage of maximum number of stakeholder groups.

1.6 STRUCTURE OF THE REPORT / CHAPTERISATION

The ESIA Report will be chapterized under following heads:

Chapter 1: Introduction: Project background, objectives and scope of work and approach & brief methodology for the study.

Chapter 2: Legal, Policy and Administrative Framework: Assess applicable laws and legislations and institutional framework for its implementation

Chapter 3: Project Description: Describes the proposed project and its geographic, ecological, social, health and temporal context, including any related facilities that may be required.

Chapter 4: Environmental and Social Baseline Conditions: Assess existing social and environmental baseline conditions of the study area which describe relevant physical, biological, socioeconomic, health and labour conditions in the project area of influence;

Chapter 5: Public Consultations and Stakeholders Analysis: Perception and views of the affected villagers, panchayat personal and other stakeholders like officials, other people of the community indirectly and directly affected by the upcoming project have been discussed in this chapter.

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 15

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

Chapter 6: Environmental and Social Impact Assessment: Impact Assessment and Mitigation Measures for environmental and social components for pre-construction/construction and operation phases. To minimize the adverse impacts of mitigation measures have been suggested.

Chapter 7: Screening and Scoping: Defines Screening Methodology, Category Justification and Scoping Methodology for the project

Chapter 8: Environmental and Social Management Plan (ESMP): It includes formulation of ESMP that includes the following:

- Mitigations for adverse environmental and social impacts and associated risks
- Institutional arrangement - management tools and techniques for the implementation of environmental impacts and risk mitigations
- Monitoring and reporting of requirements and mechanisms for the effective implementation of the suggested mitigations
- Monitoring arrangements for effective implementation of suggested mitigations for the proposed project and
- Reporting requirement to the regulatory agencies and funding institutes

Chapter 9: Conclusion and Recommendations

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 16

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

2. LEGAL, POLICY AND ADMINISTRATIVE FRAMEWORK

The emerging environmental scenario calls for attention on conservation and judicious use of natural resources. There is a need to integrate the environmental consequences of the development activities and for planning suitable measures in order to ensure sustainable development of a region. The environmental and social considerations in any developmental process have become necessary for achieving sustainable development. To achieve such goals, the basic principles to be adopted are:

- To enhance the quality of environment in and around the project area by adopting proper measures for conservation of natural resources;
- Prevention of adverse environmental and social impact to the maximum possible extent; and
- To mitigate the possible adverse environmental and socio-economic impact on the project-affected areas.

This section provides legal and regulatory framework along with Institutional framework for the Project, covering national requirements as well as applicable international treaties and conventions, guidelines and standards. The intent of this section is to lay out the regulatory and non-regulatory performance requirements for all stages of the Project. The section broadly focuses on the institutional framework, applicable environment, health and safety and social legislative, IFC's Performance Standards requirements relevant to the proposed project.

The approvals from various regulatory agencies authorized by the Central and State Governments, in the form of Licenses, Permits, or Authorizations, are required for the establishment and operation of proposed Project are discussed in below sections.

2.1 INSTITUTIONAL FRAMEWORK – ENFORCEMENT ACTIVITIES

A brief description of the relevant enforcement agencies with respect to the institutional framework is described in the following **Table 2-1**.

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 17

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

Table 2-1: Enforcement agencies relevant to the Project

Sr. No.	Agency	Functions	Relevance and Applicability to the Project
Central Level			
1	Ministry of New and Renewable Energy (MNRE)	<p>The Ministry of New and Renewable Energy (MNRE) is the nodal Ministry of the Government of India for all matters relating to renewable energy.</p> <p>The Ministry facilitates research, design, development, manufacture and deployment of new and renewable energy systems/devices for transportation, portable and stationary applications in rural, urban, industrial and commercial sectors.</p>	Project will be developed based on MNRE guidelines
2	National Green Tribunal	<p>The tribunal will have jurisdiction over all civil cases relating to implementation of the following regulations:</p> <ul style="list-style-type: none"> • The Water Act, 1974; • The Water Cess Act, 1977; • The Forest Conservation Act, 1980; • The Air Act, 1981; • The Environmental Protection Act, 1986; • The Public Liability Insurance Act, 1991; and • The Biological Diversity Act, 2002. <p>The Act provides compensation on account of following:</p> <ul style="list-style-type: none"> • Relief and compensation to the victims of pollution and other environmental damage arising under enactment of the above acts; • Restitution of property damaged; and • Restitution of the environment. 	U / s 17, any person responsible for any untoward incidents (defined in Schedule II of the Act) is liable to pay relief or compensation as determined by the tribunal, failing which a penalty (u/s 26 and 27) is imposable which may lead to imprisonment of up to 3 years or fine up to Rs. 10 crores or both and an additional fine of Rs. 25,000 per day for any delay which may be further increased to one lac per day.
3	Central Electrical Authority (CEA)	The Central Electricity Authority (CEA) is a statutory organization constituted under Section 3 of the repealed Electricity (Supply) Act, 1948, herein after replaced by the Electricity Act, 2003.	Project will be developed based on technical standards for CEA for electrical lines

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 18

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

		<p>Some of the functions performed by CEA include the following:</p> <ul style="list-style-type: none"> • Advise the Central Government on the matters relating to the national electricity policy, formulate short-term and perspective plans for development • of the electricity system and coordinate activities of the planning agencies for the optimal utilization of resources to sub-serve the interests of the national economy and to provide reliable and affordable electricity to all consumers; Specify the technical and safety standards for construction of electrical plants, electric lines and connectivity to the grid; • Specify the safety requirements for construction, operation and maintenance of electrical plants and lines; • Advise any State Government licenses or the generating companies on such matters which shall enable them to operate and maintain the electricity system under their ownership or control in an improved manner and where necessary, in coordination with any other Government license or the generating company owning or having the control of another electricity system etc. 	and grid connectivity.
4.	Petroleum and Explosives Safety Organization (PESO)	<p>The PESO is under the Department of Industrial Policy & Promotion, Ministry of Commerce and Industry, Government of India. The Chief Controller of explosives is responsible to deal with provisions of:</p> <ul style="list-style-type: none"> • The Explosive Act 1884 and Rules, 1983, • The Petroleum Act 1934 and the Rules 2002, • The Static and Mobile pressure vessels {Unfired} Rules, 1981 and amendment 2000,2004, • Manufacture, Storage and Import of Hazardous Chemical Rules, 1989 and amendment, 2000. 	Project to comply with PESO requirements.
5.	Centre for Wind Energy Technology	Centre for Wind Energy Technology (C-WET) has been established in Chennai in the year 1998, as an autonomous R&D institution by the Ministry of	Project will be developed based on technical standards

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 19

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

	(C-WET)	<p>New and Renewable Energy (MNRE), Government of India. It functions with the following structure.</p> <ul style="list-style-type: none"> • Research & Development unit: Its main focus towards novelty in developments of components as well as in sub-systems of wind turbines. • Wind Resource Assessment Unit: The unit identifies resource rich regions in the country by conducting wind resource micro survey and offers its services to the wind farm developers. • Standards and Certification Unit: The unit carries out Provisional Type Certification of Wind Turbines as per the Indian Certification Scheme for Wind Turbines viz. Type Approval - Provisional Scheme - TAPS – 2000 (amended). Standards on Wind Energy are being developed by the unit. • Information, Training & Commercial Service Unit: To establish and update the data bank and serve as finest information centre in wind energy by collecting, collating and analyzing the related information. 	described herein
State level			
1	Gujarat Urja Vikas Nigam Limited (GUVNL)	The Company is mainly incorporated to take over the assets, liabilities & personnel of the Residual Gujarat Energy Board (GEB). The one of the objects/functions of the Company apart from above includes Co-ordination of the activities of its subsidiaries, business, works to determine their economic and financial objectives/targets and to review, control, guide and direct their performance with a view to secure optimum utilization of all resources placed at their disposal.	Project needs to obtain necessary permission from GUVNL for grid connectivity.
2	Gujarat Energy Transmission Corporation Limited	GETCO is responsible for overseeing the transmission infrastructure within the state,	Project to comply with GETCO requirements

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 20

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

3	Gujarat State Pollution Control Board (GPCB)	The GPCB is a statutory authority entrusted to implement environmental laws and regulations within the state of Gujarat, India. The board ensures proper implementation of statuses, judicial and legislative procurements related to environmental protection within Gujarat	<p>The Project would generate used oil from DG sets and WTG maintenance. Authorization needs to be obtained under Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016 for the same.</p> <p>As per Central Pollution Control Board's (CPCB) recent notification dated March 7th, 2016 vide No. B-29012/ESS (CPA)/2015-16 for modified directions under Section 18 (1) (b) of the Water (Prevention & Control of Pollution) Act, 1974 and Air (Prevention & Control of Pollution) Act, 1981, regarding harmonization of classification of industrial sectors under red/orange/green/white categories. Industrial sectors having Pollution Index scores inclusive and up to 20, will fall under the White Category projects. Wind projects have been categorized as White Category. It has been mentioned in the</p>
---	--	---	--

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 21

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

			notification that there shall be no necessity of obtaining CTO for White Category industries. Intimation to GPCB shall suffice for the Kageshree Project.
4	Gujarat Energy Development Agency (GEDA)	<p>The main objectives of the GEDA is:</p> <ul style="list-style-type: none"> ▪ Sponsor, co-ordinate and promote research programmes or projects for prototype (demonstration projects) and pilot investigations in the area of new and renewable sources of energy. Provide technical and financial assistance for formulation of programmes, designs and projects meant for extension of renewable energy development in the state. ▪ Undertake, on its own or in collaboration with other agencies, programmes of research and development, applications and extension as related to various new and renewable energy sources. ▪ Undertake or sponsor, techno-economic/socio-economic feasibility studies/cost-benefit analysis. ▪ Formulate and implement a broad-based programme for conservation of energy at all stages, including extraction, conversion, distribution and consumption in all sectors of the economy. ▪ Study the environmental effects of all energy-related processes. ▪ Establish an Energy Resources Centre that will collect and collate 	<p>Project to comply with Wind Power Policy – 2007 and its amendments.</p> <p>The WTGs may be set up at sites notified by Gujarat Energy Development Agency (GEDA) and/ or any other sites identified as potential site, within the State by the Developer.</p>

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 22

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

		<p>energy and inter-related information.</p> <ul style="list-style-type: none"> Develop and support Documentation Services in area of energy in general and renewable energy in particular. Develop Communication and Education projects for wide spread dissemination of energy and environmental issues. 	
5	Gram Panchayats	The local Panchayats are empowered with management of local resources like forests, groundwater, common land and infrastructure like roads, buildings etc.	Panchayats are empowered to levy and collect local taxes on land, property and provisioning of facilities.
6	State Labour Department	The Department of Labour is responsible for formulation, implementation and enforcement of the labour laws in the Gujarat state. It also undertakes prevention and settlement of industrial disputes, Industrial safety, and health and promotes welfare of workers in the undertakings within the sphere of the State.	Workmen to be involved during the construction phase and a few in the operation, should be provided with wages and other facilities with state as well as local labour laws and acts.
7	Directorate Industrial Safety and Health Department (DISH).	<p>The Directorate of Industrial Safety and Health Department enforces the provisions of Factories Act 1948 and Gujarat Factories rule 1963 and the rules made there under to ensure safety health and welfare of the workers. It also plays a significant role in regularizing working hours, and working conditions and reducing the accident and dangerous occurrences in the factories, redressal of the grievances of the workers in respect of Safety Health and Welfare through a set of policies developed by both the Central and State Govt. Some of the functions of DISH are:</p> <ul style="list-style-type: none"> Elimination inequality and discrimination in the work place; Enhancing occupational health and safety 	Projects needs to comply with different rules under jurisdiction of DISH.

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 23

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

		<p>awareness and compliance in the workplace;</p> <ul style="list-style-type: none"> • Workforce and community participation, to employers, employees, workplaces, communities, businesses and unions; and • Providing policy advice and analysis to government on labour and employment related matters. 	
Other institutions			
1	National institute of wind energy (NIWE)	<p>NIWE has been established in Chennai in the year 1998, as an autonomous R&D institution by the Ministry of New and Renewable Energy (MNRE), Government of India. The Centre provides services such as:</p> <ul style="list-style-type: none"> • R & D for wind turbine technologies; • Identification of wind resource rich regions in the country; • Testing of complete Wind Turbine Generator Systems (WTGS) according to international standards (IEC) and Type Approval Scheme (TAPS-2000); and • Provisional Type Certification of Wind Turbines as per the Indian Certification Scheme. 	Project will be developed based on technical standards of WTGs specified by NIWE.

2.2 APPLICABLE REGULATORY/POLICY FRAMEWORK

The above table summarizes the key regulations that are relevant to the Project across its lifecycle. This document should be used to update/develop a comprehensive legal register for the Project which can be regularly monitored for compliance as well as updated to reflect changes/non-applicability of regulations, policies and standards.

2.3 APPLICABLE ENVIRONMENTAL STANDARDS

2.3.1 National Level Standards

Taking provision of EPA, 1986, the Central Pollution Control Board (CPCB) has stipulated different environmental standards w.r.t ambient air quality, noise quality, water and waste water for the country as a whole. Following standards are applicable for the Projects and need to be complied with during the Project life cycle.

- National Ambient Air Quality Standards (NAAQ Standards), as prescribed by MoEFCC vide, *Gazette Notification dated 16th November, 2009*;

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 24

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

- Drinking water quality – Indian Drinking Water Standard (IS 10500: 2012);
- General standards for discharge as prescribed under the Environment Protection Rules, 1986 and amendments (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);
- Noise standards specified by the MoEF vide gazette notification dated 14th February, 2000 (Noise Pollution (Regulation and control) Rules, 2000); and
- Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016.

2.3.2 IFC/WB Standards

The General EHS Guidelines (30th April 2007) of IFC/WB have outlined following environmental standards which needs to be compiled for the Project.

- IFC/WB Air Emissions and Ambient Air Quality Standards;
- IFC/WB Guidelines for treated sanitary sewage discharges;
- IFC/WB Noise Standards.

Table 2-2: Applicable Environmental and Social Legislative framework for Kageshree Wind Power Project

Sr. No.	Applicable Indian Legislation/Guidelines	Pre-construction	Construction	Operation	Decommissioning	Agency responsible	Remark/status
Land Purchase							
1.	Gujarat Land Revenue Rules 1972	Y	Y	N	N	District Collector and Revenue Department	Land procurement is under process for the Project and it is understood that only Revenue Land will be obtained. Land procurement details have been provided in Section 3.3. The applicability of these regulations has been covered in the process.
Environment Protection							
2.	Environment Protection Act, 1986 as	Y	N	N	N	GPCB CPCB MoEFCC	Permissible limits for ambient air quality, water quality, noise limits has been laid down by CPCB under EP Act, 1986 which

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 25

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

	amended						required to be compiled with.
3.	The Water (Prevention and Control of Pollution) Act, 1974, as amended.	N	Y	Y	N	GPCB	CPCB has introduced a new category of Industries (White Category) in their March 7th, 2016 notification. The list of industries that falls under this category, including wind power projects, no longer requires a CTO. In such a case, intimation to SPCB shall suffice. Gujarat State Pollution Control Board has accepted the new notification as part of their consent management process (1) and do not require CTE and CTO for white category industries.
4.	The Air (Prevention and Control of Pollution) Act, 1981, as amended.	N	Y	Y	N	GPCB	CPCB has introduced a new category of Industries (White Category) in their March 7th, 2016 notification. The list of industries that falls under this category, including wind power projects, no longer requires a CTO. In such a case, intimation to SPCB shall suffice. Gujarat State Pollution Control Board has accepted the new notification as part of their consent management process (1) and do not require CTE and CTO for white category industries.
5.	The Noise (Regulation and Control) Rules, 2000	N	Y	Y	Y	GPCB	Ambient noise levels are to be maintained as stipulated in the rules for different categories of areas – residential, commercial, and industrial and silence zones. SPRNG will need to abide by the limits prescribed for residential zones.
Storage of hazardous chemicals							
6.	Manufacture, storage and import of hazardous chemicals (MSIHC) Rules, 1989 and as amended	N	Y	Y	N	GPCB	Rules will be applicable during construction and operation stages if chemicals stored at site satisfy the criteria laid down in the Rules
Handling of Hazardous Waste							
7.	Hazardous and	N	Y	Y	Y	GPCB	Generation of waste oil and transformer oil

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 26

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

	Other Wastes (Management and Transboundary movement) Rules, 2016						at site attracts the provisions of Hazardous and Other Wastes Rules, 2016. The rules provide guidelines for the disposal and treatment of these wastes through approved recyclers.
Labour and Working Conditions							
8.	<ul style="list-style-type: none"> The Factories Act, 1948 and the Gujarat Factories Rule, 1963: Building and Other Construction Workers (Regulation of Employment and Conditions of Service), Act, 1996; Inter-state Migrant Workmen (Regulation of Employment and Condition of Service) Act, 1979; Contract Labour Act, 1970; Child Labour (Prohibition and Regulation) 	N	Y	Y	Y	Deputy Chief Inspector of Factories	Project proponent will need to comply to all requirements of factories rules and participate in periodic inspection during the Operations Phase.

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 27

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

	Act, 1986; • Bonded Labour Systems • (Abolition) Act, 1976; • Minimum Wages Act, 1948; • Equal Remuneration Act, 1976; • Workmen's Compensation Act, 1923; and • Maternity Benefit Act, 1961.						
9.	Companies Act, 2013.	N	N	Y	N	SPRNG	According to Schedule 135 sub-section 1, the companies meeting the threshold criteria specified should spend in every financial year, at least 2% of the average net profits of the company made during the three immediately preceding financial years, in pursuance of CSR Policy. The Project will need to comply with the requirements as stated in the law, if it attracts provision under the above mentioned schedule.
Applicable International Conventions							
10.	Conventions on the Conservation of Migratory Species of Wild Animals and Migratory Species.	Y	Y	Y	Y	State Forest Department	Migratory birds in the Project area bear protection from killing under Convention of Migratory Species (CMS) to which India is a signatory. Wetlands being utilized by these species are also protected under this convention.
11.	Kyoto Protocol: The 3 rd Conference of	Y	Y	Y	Y	NATCOM	The proposed Project being a wind power generation Project becomes the basis for qualifying for the Clean

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 28

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

	the Parties to the Framework Convention on Climate Change (FCCC) in Kyoto in December 1997 introduced the Clean Development Mechanism (CDM) as a new concept for voluntary green-house gas emission reduction agreements.						Development Mechanism
IFC/World Bank Guidelines							
12.	IFC Performance Standards	Y	Y	Y	Y	IFC	The ESIA report has to be prepared on lines of the IFC Performance Standards (2012).
13.	IFC/WB General EHS Guidelines	N	Y	Y	Y	IFC, IFC	During the construction, operation and decommissioning of the site, these guidelines will need to be followed
14.	IFC Guidelines for Power Transmission and Distribution	N	Y	Y	Y		
15.	IFC Guidelines for Wind Energy Project						
16.	IFC Guidelines on Worker Accommodation						During the construction stage of the Project, these guidelines will need to be followed.

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 29

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

2.3.3 IFC Performance Standards

The IFC Performance Standards stipulates that any proposed project shall meet the following requirements throughout the life of an investment by IFC or other relevant financial institution:

- Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impacts;
- Performance Standard 2: Labour and Working Conditions;
- Performance Standard 3: Resource Efficiency and Pollution Prevention;
- Performance Standard 4: Community Health, Safety, and Security;
- Performance Standard 5: Land Acquisition and Involuntary Resettlement;
- Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources;
- Performance Standard 7: Indigenous Peoples; and
- Performance Standard 8: Cultural Heritage.

These performance standards and guidelines provide ways and means to identify impacts and affected stakeholders and lay down processes for management and mitigation of adverse impacts.

Performance Standard 1

PS 1 establishes the importance of:

- Integrated assessment to identify the environmental and social impacts, risks, and opportunities of projects;
- Effective community engagement through disclosure of project-related information and consultation with local communities on matters that directly affect them; and
- The project proponent's management of environmental and social performance throughout the life of the project.

The PS 1 is applicable to projects with environment and/or social risks and/or impacts. The proposed project will have environmental and social impacts such as generation of waste and noise. PS 1 is therefore applicable for the project and thus requires an Environmental and Social Impact Assessment (ESIA) study to be conducted before commencement of the project SPRNG also needs to develop and implement an Environmental and Social Management System to manage the risks associated with its operations.

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 30

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

Performance Standard 2

PS 2 recognizes that the pursuit of economic growth through employment creation and income generation should be accompanied by protection of the fundamental rights of workers. The objectives of the PS 2 are:

- To promote the fair treatment, non-discrimination, and equal opportunity of workers;
- To establish, maintain, and improve the worker-management relationship;
- To promote compliance with national employment and labour laws;
- To protect workers, including vulnerable categories of workers such as children, migrant workers, workers engaged by third parties, and workers in the client's supply chain;
- To promote safe and healthy working conditions, and the health of workers; and
- To avoid the use of forced labour.

The applicability of PS 2 will be more important during the construction phase as operation phase will only have limited number of staff. It not only covers the main plant employees, but all employees/workers, even those working through contractors. Migrant workers will not be engaged for the project therefore standards pertaining to campsites will not be applicable. The contractor shall construct labour camp as per IFC Guidelines in case migrant labour is hired for the project

SPRNG / Envision shall take measures to prevent child labour, forced labour and discrimination at site. Freedom of association and collective bargaining shall be provided. Wages, work hours and other benefits shall be as per the national labour and employment laws. SPRNG / Envision will provide a grievance mechanism for workers (and their organizations, where they exist) to raise workplace concerns. In providing a grievance mechanism through which workers may raise workplace concerns, SPRNG should ensure that matters are brought to management's attention and addressed expeditiously. SPRNG Energy / Envision shall document all grievances and follow up on any corrective actions.

SPRNG / Envision will extend a safe and healthy work environment to contracted workers and to any other workers who provide project-related work and services and should ensure that training is provided to all workers on relevant aspects of OHS associated with their daily work, including emergency arrangements and OHS briefing for visitors and other third parties accessing the premises. All occupational injuries, illnesses and fatalities are to be documented.

SPRNG should develop and implement procedures to manage and monitor performance of third parties. These procedures should be integrated in the day-to-day operations of the

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 31

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

company and requirements should be clearly communicated to third parties, and if possible to workers engaged by these third parties.

Performance Standard 3

The PS 3 outlines approach to pollution prevention and abatement in line with internationally disseminated technologies and practices with the following objectives:

- Avoid or minimize adverse impacts on human health and the environment by avoiding or minimizing pollution from activities; and
- Promote the reduction of emissions that contribute to climate change.

SPRNG shall assess the impacts and risks associated with the generation, use, storage, release, and/or disposal of pollutants during the ESIA, planned as part of the ESMS, and implement them as per the Action Plan. Also the pollution control measures shall be planned and implemented right from the project conception stage. Practices like minimal release of waste, handling of hazardous waste, safe disposal of waste, waster water management etc. shall be considered prior to each phase. PS 3 is therefore applicable for the proposed project.

Performance Standard 4

PS 4 recognizes that project activities, equipment, and infrastructure can increase community exposure to risks and impacts. Its main stress is to ensure that the safeguarding of personnel and property is carried out in accordance with relevant human rights principles and in a manner that avoids or minimizes risks to the Affected Communities.

The proponent shall evaluate the risks associated with the project activities and will devise measures to address these impacts through the Environment and Social Management System.

Considering the nature and scale of the project, a Traffic Management Plan will be formulated to minimise and manage the risks associated with the project activities.

Performance Standard 5

PS 5 recognizes that project-related land acquisition and restrictions on land use can have adverse impacts on communities and persons that use this land. Its main aim is to anticipate and avoid, or where avoidance is not possible, minimize adverse social and economic

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 32

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

impacts from land acquisition or restrictions on land use by providing compensation for loss of assets at replacement cost and ensuring that resettlement activities are implemented with appropriate disclosure of Information, consultation, and the informed participation of affected persons and community.

Only revenue land is used for the project hence no involuntary resettlement (physical or economic) is expected. PS 5 is therefore not applicable for this proposed project.

Performance Standard 6

PS 6 recognizes that protecting and conserving biodiversity, maintaining ecosystem services, and sustainably managing living natural resources are fundamental to sustainable development. This standard is aimed to promote the sustainable management of living natural resources through the adoption of practices that integrate conservation needs and development priorities.

The proposed project does not involve any diversion of forest land. Barda Wildlife Sanctuary is located at a distance of 11 km from the proposed Site. The project activities are not likely to have any impact on the ecology. However, the proposed project will involve additional traffic movement which may impact the higher fauna.

For the protection and conservation of biodiversity, the mitigation hierarchy includes biodiversity offsets, which may be considered only after appropriate avoidance, minimization, and restoration measures. Baseline studies for ecological aspects have been described in Section 4.15 , Section 6.3.5 and Section 6.4.5 of the report. The study has been gathered through site survey, literature review, and initial desktop analysis. The extent of the literature review will depend on the sensitivity of the biodiversity attributes associated with the project's area of influence and the ecosystem services that may be impacted. PS 6 is therefore is applicable for this proposed project.

Performance Standard 7

PS 7 recognizes that Indigenous Peoples, as social groups with identities that are distinct from mainstream groups in national societies, are often among the most marginalized and vulnerable segments of the population. In many cases, their economic, social, and legal status limits their capacity to defend their rights to, and interests in, lands and natural and cultural resources, and may restrict their ability to participate in and benefit from development.

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 33

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

The project area or its surroundings is not native to any indigenous people. No material degradation or adverse impact is expected on land resources on which indigenous peoples are dependent. Hence, PS7 is not applicable for this project.

Performance Standard 8

PS 8 recognizes the importance of cultural heritage for current and future generations. Consistent with the Convention concerning the Protection of the World Cultural and Natural Heritage, this Performance Standard aims to ensure that clients protect cultural heritage in the course of their project activities. In addition, the requirements of this Performance Standard on a project's use of cultural heritage are based in part on standards set by the Convention on Biological Diversity.

This PS is applicable when tangible forms of cultural heritage, unique natural features or tangible objects that embody cultural values and certain instances of intangible forms of culture are impacted or are proposed to be used for commercial purposes. Religious structures were observed to be located at a distance of 134 SW and 340m NE from WTG location nos. CHR 05 and MLV 03. However, the access to these structures will not get restricted as a result of the project activities. Hence, PS8 is not applicable for this project.

2.3.4 IFC Categorization of Projects

As part of its review of a project's expected social and environmental impacts, IFC uses a system of social and environmental categorization. This categorization is used to reflect the size of impacts understood as a result of the client's social and environmental assessment and to specify IFC's institutional requirements. The following categories are used by the IFC:

- **Category A Projects:** Projects with potential significant adverse social or environmental impacts that are diverse, irreversible or unprecedented;
- **Category B Projects:** Projects with potential limited adverse social or environmental impacts that are few in number, generally site-specific, largely reversible and readily addressed through mitigation measures;
- **Category C Projects:** Projects with minimal or no adverse social or environmental impacts, including certain financial intermediary (FI) projects with minimal or no adverse risks;
- **Category FI Projects:** All FI projects excluding those that are Category C projects.

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 34

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

IFC therefore categorizes projects primarily according to the significance and nature of impacts. IFC defines the project's area of influence as the primary project site(s) and related facilities that the client (including its contractors) develops or controls; associated facilities that are not funded as part of the project (funding may be provided separately by a client or a third party including the government), and whose viability and existence depend exclusively on the project and whose goods or services are essential for the successful operation of the project; areas potentially impacted by cumulative impacts from further planned development of the project; and areas potentially affected by impacts from unplanned but predictable developments caused by the project that may occur later or at a different location. The area of influence does not include potential impacts that would occur without the project or independently of the project.

2.3.5 EHS Guidelines of IFC

The environmental, health and safety requirements needs to be adhered as per the following guidelines released by IFC on 30 April 2007:

1. Environmental, Health, and Safety General Guidelines
2. Environmental, Health, and Safety Guidelines for Wind Energy.

The key requirements stated in the EHS guidelines have been discussed in **Table 2-3**.

Table 2-3: Key Requirements as per EHS Guidelines of IFC

S.No.	Relevant Requirements as Stated in EHS Guidelines
1.	Noise and vibrations
a.	Planning activities in consultation with local communities to minimise disturbance.
b.	Avoiding or minimizing project transportation through community areas.
2.	Soil Erosion
i.	<i>Sediment mobilization and transport</i>
a.	Scheduling to avoid heavy rainfall periods (i.e., during the dry season) to the extent practical.
b.	Contouring and minimizing length and steepness of slopes
C.	Re-vegetating areas promptly
ii.	<i>Clean runoff management</i>
a.	Segregating or diverting clean water runoff to prevent it mixing with water containing high solids content, to minimize the volume of water to be treated prior to release.
iii.	<i>Road design</i>
a.	Limiting access road gradients to reduce runoff-induced erosion
b.	Providing adequate road drainage based on road width, surface material, compaction, and maintenance.

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 35

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

3.	Air Quality
a.	Implementing dust suppression techniques such as applying water or non-toxic chemicals to minimize dust from vehicle movements.
b.	Avoiding open burning of solid waste
i.	<i>Mobile Sources</i>
a.	Implementation of manufacturer recommended engine maintenance programs by vehicle operators.
b.	Instructions to drivers on safe and efficient driving practices.
4.	Solid Waste
a.	Avoiding or minimizing the generation waste materials, as far as practicable.
5.	Hazardous Materials
a.	Providing adequate secondary containment for fuel storage tanks and for the temporary storage of other fluids such as lubricating oils and hydraulic fluids.
6.	Wastewater Discharges
a.	Water use efficiency to reduce the amount of wastewater generation.
b.	Compliance with national or local standards for sanitary wastewater discharges.
7.	Occupational Health and Safety
i.	<i>Over-exertion</i>
a.	Training of workers in lifting and materials handling techniques including the placement of weight limits.
b.	Planning work site layout to minimize the need for manual transfer of heavy loads.
c.	Implementing administrative controls into work processes, such as job rotations and rest or stretch breaks.
ii.	<i>Slips and Falls</i>
a.	Implementing good house-keeping practices, such as the sorting and placing loose construction materials or demolition debris in established areas away from foot paths.
b.	Cleaning up excessive waste debris and liquid spills regularly.
iii.	<i>Work in Heights</i>
a.	Training and use of temporary fall prevention devices
b.	Training and use of personal fall arrest systems
iv.	<i>Stuck by Objects</i>
a.	Maintaining clear traffic ways to avoid driving of heavy equipment over loose scrap.
b.	Wearing appropriate PPE, such as safety glasses with side shields, face shields, hard hats, and safety shoes.
v.	<i>Moving Machinery</i>
a.	Planning and segregating the location of vehicle traffic, machine operation, and walking areas, and controlling vehicle traffic through the use of one-way traffic routes, establishment of speed limits, and on-site trained flag-people wearing high-visibility vests or outer clothing covering to direct traffic.
b.	Using inspected and well-maintained lifting devices that are appropriate for the load, such as cranes, and securing loads when lifting them to higher job-site elevations.
vi.	<i>Dust</i>

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 36

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

a.	Implementation of Dust suppression techniques such as applying water
8.	Community Health and Safety
i	<i>Disease Prevention</i>
a.	Providing surveillance and active screening and treatment of workers.
ii	<i>Traffic Safety</i>
a.	Adoption of safety measures that are protective of project workers and of road users, including those who are most vulnerable to road traffic accidents.
c.	Regular maintenance of vehicles and use of manufacturer approved parts.
1.	Visual Impacts
a.	Consider the landscape character during turbine siting;
b.	Consider the visual impacts of the turbines from all relevant viewing angles when considering locations
c.	Maintain uniform size and design of turbines (e.g. direction of rotation, type of turbine and tower, and height);
d.	Paint the turbines a uniform colour, typically matching the sky (light gray or pale blue), while observing marine and air navigational marking regulations;
2.	Noise
a.	Proper siting of wind farms to avoid locations in close proximity to sensitive noise receptors
b.	Adherence to national or international acoustic design standards for wind turbines
3.	Species Mortality or Injury and Disturbance
a.	Implement appropriate storm water management measures to avoid creating attractions such as small ponds which can attract birds and bats for feeding or nesting near the wind farm.
4.	Shadow Flicker and Blade Glint
a.	Site and orient wind turbines so as to avoid residences located within the narrow bands, generally southwest and southeast of the turbines, where shadow flicker has a high frequency
5.	Occupational Health and Safety - Working at Heights
a.	Prior to undertaking work, test structure for integrity;
b.	Implementation of a fall protection program that includes training in climbing techniques and use of fall protection measures; inspection, maintenance, and replacement of fall protection equipment; and rescue of fall-arrested workers;
c	Install fixtures on tower components to facilitate the use of fall protection systems;
d.	Avoid conducting tower installation or maintenance work during poor weather conditions and especially where there is a risk lightning strikes;
7.	Community Health and Safety
i	Public Access
a.	Fence the wind farm site, or individual turbines, to prohibit public access close to the turbine;
b.	Prevent access to turbine tower ladders;

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 37

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

2.4 APPLICABLE ENVIRONMENTAL STANDARDS

The applicable environmental standards for the proposed project have been discussed in the subsequent sections. The ambient air quality standards will be applicable only during the construction phase of the project and the wastewater discharges from the project during both construction and operation phases shall be as per the general discharge standards as sector specific standards are not available for wind power projects. Noise standards notified by MoEF&CC for different land uses will be followed.

2.4.1 AMBIENT AIR QUALITY

As per EHS guidelines of IFC, “the ambient air quality standards are ambient air quality levels established and published through national legislative and regulatory process and ambient quality guidelines refers to ambient quality level primarily developed through clinical, toxicological and epidemiological evidences (such as those published by the World Health Organization)”.

In India, the Central Pollution Control Board (CPCB) has specified National Ambient Air Quality Standards (NAAQS) for residential, commercial, industrial and sensitive zones for the country as a whole. Revised National Ambient Air Quality Standards (MoEF notification G.S.R 826(E), dated 16th November, 2009) have been presented below in **Table 2-4**.

Table 2-4: Ambient Air Quality Standards

S. No	Pollutant	Time Average	Weighted	Concentration in ambient air for Industrial Residential, Rural & other Areas
1	Sulphur Dioxide(SO ₂)	Annual Avg*		50.0 µg/m ³
		24 hours**		80.0 µg/m ³
2	Oxides of Nitrogen as NO ₂	Annual Avg*		40.0 µg/m ³
		24 hours**		80.0 µg/m ³
3	Particulate matter (size less than 10µm)	Annual Avg*		60.0 µg/m ³
		24 hours**		100.0 µg/m ³
4	Particulate matter (size less than 2.5 µm)	Annual Avg*		40.0 µg/m ³
		24 hours**		60.0 µg/m ³
5	Lead (Pb)	Annual Avg*		0.5.0 µg/m ³
		24 hours**		1.0 µg/m ³
6	Carbon Monoxide (CO)	8 hours**		2.0 µg/m ³

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 38

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

7	Ozone	1 hour	4.0 µg/m ³
		8 hours**	100.0 µg/m ³
		1 hour	180.0 µg/m ³
		24 hours**	60.0 µg/m ³
8	Ammonia (NH ₃)	Annual Avg*	100.0 µg/m ³
		24 hours**	40.0 µg/m ³
9	Benzene	Annual Avg*	5.0 µg/m ³
10	Benzo(a) pyrene	Annual Avg*	1.0 ng/m ³
11	Arsenic	Annual Avg*	6.0 ng/m ³
12	Nickel		20.0 ng/m ³

Note:

*Annual Arithmetic mean of minimum 104 measurements in a year taken twice a Week 24 hourly at uniform interval

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

2.4.2 WATER QUALITY STANDARDS

The designated best use classification as prescribed by CPCB for surface water is given in **Table 2-5** below.

Table 2-5: Primary Water Quality Criteria for Designated Best Use Classes

Designated Best Use	Class of Water	Criteria
Drinking water source without conventional treatment but after disinfections	A	1. Total coliform organisms (MPN/100 ml) shall be 50 or less 2. pH between 6.5 to 8.5 3. Dissolved Oxygen (DO) 6 mg/l or more, and 4. Biochemical Oxygen Demand (BOD) 2 mg/l or less
Outdoor bathing (Organised)	B	1. Total coliform organisms (MPN/100 ml) shall be 500 or less 2. pH between 6.8 to 8.5 3. Dissolved Oxygen 5 mg/l or more, and 4. Biochemical Oxygen Demand 3 mg/l or less
Drinking water with conventional treatment followed by disinfections	C	1. Total coliform organisms (MPN/100 ml) shall be 5000 or less 2. pH between 6 and 9 3. Dissolved Oxygen 4 mg/l or more, and

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 39

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

		4. Biochemical Oxygen Demand 3 mg/l or less
Propagation of wild life and fisheries	D	1. pH between 6.5 to 8.5 2. Dissolved Oxygen 4 mg/l or more, and 3. Free ammonia (as N) 1.2 mg/l or less
Irrigation, industrial cooling, controlled waste disposal	E	1. pH between 6.0 and 8.5 2. Electrical conductivity less than 2250 micro mhos/cm, 3. Sodium Absorption Ratio (SAR) less than 26, and Boron less than 2 mg/l.
	Below E	Not meeting A, B, C, D & E Criteria

Note: MPN= Most Probable Number

Source: Central Pollution Control Board

The drinking water quality standards as per IS 10500, 2012 by Bureau of Indian Standards (BIS) is presented in **Table 2-6** below.

Table 2-6: Drinking Water Standards as per IS 10500, 2012

S. No	Parameters	Measurement Unit	IS 10500* specification for drinking water Desirable limit (Permissible limit)
1	pH Value	Unit	6.5-8.5 (No relaxation)
2	Turbidity	NTU	1 (5)
3	Colour	Hazen units	5 (15)
4	Total Dissolved Solids	mg/L	500 (2000)
5	Total Alkalinity (as CaCO ₃)	mg/L	200 (600)
6	Nitrate	mg/L	45 (No relaxation)
7	Chlorides (as Cl)	mg/L	250 (1000)
8	Sulphate	mg/L	200(400)
9	Calcium (as Ca)	mg/L	75 (200)
10	Magnesium (as Mg)	mg/L	30 (100)
11	Fluorides (as F)	mg/L	1.0 (1.5)
12	Total Hardness (as CaCO ₃)	mg/L	200 (600)
13	Arsenic (as As)	mg/L	0.01 (0.05)
14	Iron (as Fe)	mg/L	0.3 (No relaxation)
15	Copper (as Cu)	mg/L	0.05 (1.5)

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 40

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

16	Mercury (as Hg)	mg/L	0.001 (No relaxation)
17	Zinc (as Zn)	mg/L	5 (15)
18	Total Chromium (as Cr)	mg/L	0.05 (No relaxation)
19	Barium (as Ba)	mg/L	0.7 (No relaxation)
20	Cadmium (as Cd)	mg/L	0.003 (No relaxation)
21	Conductivity	mS/cm	--
22	Total Suspended Solids (TSS)	mg/L	---
23	Salinity	mg/L	---
24	Oil & Grease	mg/L	---
25	Dissolved Oxygen (DO)	mg/L	---
26	COD	mg/L	---
27	BOD	mg/L	---
28	Phosphate	mg/L	---
29	Lead	mg/L	0.01 (No relaxation)
30	Total Coliform	MPN/100mg	10 (No relaxation)
31	Faecal Coliform	---	---

**The figures in the brackets indicated permissible limit in absence of alternate source*

2.4.3 AMBIENT NOISE STANDARDS

As per EHS guidelines of IFC, for residential, institutional and educational area, the one hourly equivalent noise level (Leq hourly) for day time is 55 dB (A) while the Leq hourly for night time is prescribed as 45 dB (A). Noise standards notified by the MoEFCC vide gazette notification dated 14 February 2000 based on the A- weighted equivalent noise level (Leq) are as presented in **Table 2-7**.

Table 2-7: 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 pm to 6.00 am;*

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 41

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

*** Silence zone is defined as area up to 100 meters around premises of hospitals, educational institutions and courts. Use of vehicle horns, loud speakers and bursting of crackers are banned in these zones.*

2.4.3.1 Noise Standards for Occupational Exposure

Noise standards in the work environment are specified by Occupational Safety and Health Administration (OSHA-USA) which in turn are being enforced by Government of India through model rules framed under the Factories Act. The standards for Occupational Noise Exposure are given in **Table 2-8**.

Table 2-8: Standards for Occupational Noise Exposure

Total Time of Exposure per Day in Hours (Continuous or Short term Exposure)	Sound Pressure Level in dB(A)
8	90
6	92
4	95
3	97
2	100
3/2	102
1	105
3/4	107
1/2	110
1/4	115
Never	>115

Note:

- No exposure in excess of 115 dB (A) is to be permitted.
- For any period of exposure falling in between any figure and the next higher or lower figure as indicated in column (1), the permissible level is to be determined by extrapolation on a proportionate scale.

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 42

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

3. PROJECT DESCRIPTION

This section of the report provides a description of the site settings and project components along with other associated facilities. This section also elaborates on the various phases of the project along with its associated project infrastructure and activities during the project lifecycle.

3.1 SITE SETTING

The proposed wind farm is located near Village Satapur, Taluka Jam Jodhpur, District Jamnagar in the State of Gujarat in India. The site boundaries for the wind farm site are given below in **Table 3-1**.

Table 3-1: Boundaries of the Wind Farm

Boundary	WTG Name	Geographical Coordinates
Northern Boundary	BLV 03	21°52'3.87"N 69°57'39.73"E
Southern Boundary	AMR 03	21°43'58.66"N 70° 2'21.01"E
Eastern Boundary	MLV 06	21°49'21.44"N 70° 5'7.21"E
Western Boundary	STP 11	21°49'15.84"N 69°56'35.42"E

The Project site is spread over nine villages including Satapur, Vadvala, Balva, Chur, Mahiki, Aparapar, Malvada, Patan and Parvada. All the 79 WTGs are located on revenue land and are spread across 7 hills in these villages. The topography of the site is undulating and ranging from 300 m to 600 m above mean sea level. The land-use around the wind farm site is both revenue land and private agricultural land. There is no reserve forest near the vicinity of the project site. The closest Reserve Forest called Barda Wildlife Sanctuary located at 11 KM west of the Western Boundary of the project site from WTG STP 11. The Umiyasagar Water Resources Project located on Venu river lies at 10 Km from WTG MLV06s to southeast of the project site whose tributaries fill the Satpara dam during monsoon season.

The closest town to the Project site is the port city Porbandar, which is located 40 km west of WTG STP 11. There are no major industries located within a 5 km radius of the Project site with the exception of a Bela stone quarry at distances of 500 m from the proposed WTG S05

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 43

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

and a stone crusher in the village Parvada. However, the project site is surrounded on all side by other wind power projects and solar power projects. Some of the oldest wind power projects of India (more than 20 years) are situated at the eastern edge of the project site in Dhank village of neighboring Upleta Taluka. The list of projects in the vicinity is given in the following **Table 3-2**.

Table 3-2: List of Projects surrounding the project site

Sr. No.	Name of Project	Type	Distance/ Direction	Capacity	Location
1	Aravali Infrapower Private Limited (AIPL)	Solar	30 Km E	5 MW	Dhank village, Upleta Taluka, Rajkot district
2	Enercon	Wind	20 Km E	850 Kv	Dhank village, Upleta Taluka, Rajkot district
3	Tadas Wind Energy Limited (GJ)	Wind	30 Km, E	4 MW	Rabarika Village, Khambha Taluka, Amreli District
4	Gujarat Industries Power Company Limited (GIPCL)	Wind	40 Km, SW	21 MW	Kuchhadi, Village, Porbandar District
5	M/s Venkatalaxmi Renewable Energy Pvt. Ltd. (VREPL)	Wind	40 Km SW	0.6 MW	Ratdi, Village, Porbandar District
6	Rolex Rings	Wind	65 Km, NW	8.75	Bhogat Village, Kalyanpur Tehsil, Jamnagar, Gujarat

3.2 PROJECT COMPONENTS

3.2.1 Wind Farm

The Project comprises of 79 WTGs with an individual capacity of 2.5 MW each, totalling 197.5 MW. The minimum distance that has been maintained between WTGs is 300 m.

As part of the ESIA study, social and environmental sensitivities were identified for each of the WTG locations. Any structures that fall in a 500 m radius of a proposed WTG were identified as a receptor for shadow flicker assessment and noise impact. The WTG profiling for the wind farm is given in **Table 3-4**.

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 44

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

3.2.2 Wind Turbine Generator

The technical specifications of the WTGs are provided in **Table 3-3**.

Table 3-3: Technical specifications of the wind turbines

Parameters	Details
General Data	
No. of WTGs	79
WTG Rated Power	2.5 MW
WTG Model	EN 131 2.5 MW
Operational Data	
Cut-in Speed	3 m/s
Cut-out Speed	20 m/s
Normal Power at	9m/s
Temperature range	-10 to +40 C
IEC Wind Class	IEC S
Blade/Tower	
Length	64.5 m
Material	Glass fiber reinforced plastic (epoxy resin)
Tower Type	Cylindrical and tapered tubular
Hub Height	120 m
Generator / Gear Box	
Generator Type	Double Fed
Rotor Speed	1820 rpm
Voltage	690/50V/Hz
Gear Box Ratio	148
Gear Box Type	3 stage Planetary Spur Gear
Rotor	
Type	3 Bladed, Horizontal Axis
Position	Upwind Direction
Diameter	131 m
Swept Area	13519 m ²
Power Regulation	Pitch Regulation with Variable Speed

Source: EN 131 2.5 MW Product Brochure

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 45

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat
Client: SPRNG ALT Energy Pvt. Ltd.

Table 3-4: WTG Profiling of 197.5 MW Wind Farm (based on an eye view distance of 218 m)*

Sr. No.	WTG ID	WTG Coordinates (in UTM)	WTG Site Elevation (m)	WTG Footprint Area		Nearest house/ structure within 500 m from WTG footprint)					Nearest Village		Nearest Cultural Site		Distance from the Nearest Road		Land use around WTG Location (Explain) based on visual observation			
				Topogra phy	Land-use (Based on Land Records)	Identifi cation (Name/ ID in Map)	Distanc e (km) and Directio n	Type of structure	Use of Structure	Any window in direct ion of WTG	Name	Distance	Name/ Identification ID in Map	Distance	Unpaved	Paved	North	East	West	South
1	STP 01	21°48'51.32"N 69°57'3.16"E	309	Flat Land	Revenue Land	-	-	-	-	-	Vadvala	2.7 Km N	-	-	100 m N	2.2Km E	-	-	-	-
2	STP 02	21°48'37.25"N 69°57'12.64"E	319	Flat Land	Revenue Land	-	-	-	-	-	Vadvala	1.9 Km N	-	-	55 m S	1.9Km E	-	-	-	-
3	STP 03	21°48'53.64"N 69°57'29.09"E	330	Undulatin g Land	Revenue Land	-	-	-	-	-	Vadvala	2.7 Km NW	-	-	300 m E	1.45Km E	-	-	-	-
4	STP 04	21°48'27.62"N 69°57'30.86"E	371	Undulatin g Land	Revenue Land	-	-	-	-	-	Satapar	1.6 Km E	-	-	220 m N	1.1Km E	-	-	-	-
5	STP 05	21°48'41.50"N 69°57'42.76"E	389	Undulatin g Land	Revenue Land	-	-	-	-	-	Satapar	1 Km SE	-	-	180 m S	1km E	-	-	-	-
6	STP 06	21°48'47.38"N 69°58'5.06"E	332	Undulatin g Land	Revenue Land	-	-	-	-	-	Satapar	650 mS	-	-	120m E	390 m E	-	Agriculture	-	-
7	STP 07	21°48'23.62"N 69°58'2.88"E	384	Undulatin g Land	Revenue Land	E	309 m E	Permanen t	Residential	Yes	Satapar	309 m E	-	-	160m N	260 m E	-	-	-	-
8	STP 08	21°48'31.61"N 69°58'33.23"E	366	Undulatin g Land	Revenue Land						Satapar	390 m W	-	-	120m S	444m W	-	-	-	-
9	STP 10	21°49'5.18"N 69°58'20.82"E	350	Undulatin g Land	Revenue Land						Satapar	950 m S	-	-	100m S	160m S	-	-	-	-
10	STP 11	21°49'15.84"N 69°56'35.42"E	340	Undulatin g Land	Revenue Land	-	-	-	-	-	Vadvala	2km NE	-	-	120m S	2.4 km W	-	-	-	-
11	VDV 01	21°49'42.06"N 69°57'14.50"E	370	Undulatin g Land	Revenue Land	-	-	-	-	-	Vadvala	1.1 Km N	-	-	120m W	1.4 Km E	-	-	-	-
12	VDV 02	21°49'22.49"N	340	Undulatin	Revenue	-	-	-	-	-	Vadvala	1.7Km	-	-	160m S	1.6Km E	-	-	-	-

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat
Client: SPRNG ALT Energy Pvt. Ltd.

		69°57'17.16"E		g Land	Land							NW							
13	VDV 03	21°49'31.29"N 69°57'43.13"E	377	Undulatin g Land	Revenue Land	-	-	-	-	-	Vadvala	1.7Km NW	-	-	83m N	800m E	-	-	-
14	VDV 04	21°49'51.04"N 69°57'36.16"E	366	Undulatin g Land	Revenue Land	-	-	-	-	-	Vadvala	1.1Km NW	-	-	100m N	900m E	Agricult ure	-	-
15	VDV 05	21°49'52.07"N 69°57'54.56"E	355	Undulatin g Land	Revenue Land	-	-	-	-	-	Vadvala	1.45 Km NW	-	-	142m S	404m E	-	-	-
16	VDV06	21°49'28.63"N 69°58'4.12"E	453	Undulatin g Land	Revenue Land	-	-	-	-	-	Vadvala	2.1 Km NW	-	-	300m N	220m E	-	-	-
17	VDV 07	21°49'10.37"N 69°58'0.55"E	362	Undulatin g Land	Revenue Land	-	-	-	-	-	Vadvala	1.7 Km S	-	-	116m SE	713m E	-	-	-
18	VDV08	21°49'29.20"N 69°58'28.92"E	385	Undulatin g Land	Revenue Land	-	-	-	-	-	Vadvala	1.9 km S	-	-	75 m E	312 m SW	-	-	-
19	VDV 09	21°49'49.67"N 69°58'30.87"E	395	Undulatin g Land	Revenue Land	C	340m N	Permanen t	Residential	Yes	Vadvala	2.3 km NW	-	-	75m E	430m NW	-	-	-
20	VDV 10	21°49'59.21"N 69°58'13.24"E	348	Undulatin g Land	Revenue Land						Vadvala	1.7Km NW	-	-	135m S	120m E	Agricult ure	-	-
21	BLV 01	21°51'57.65"N 69°57'7.18"E	438	Undulatin g Land	Revenue Land	-	-	-	-	-	Balva	2Km N	-	-	670m E	530m N	-	-	-
22	BLV 02	21°51'46.47"N 69°57'17.10"E	454	Undulatin g Land	Revenue Land	-	-	-	-	-	Balva	2.3Km N	-	-	600m E	920m N	-	-	-
23	BLV 03	21°52'3.87"N 69°57'39.73"E	477	Undulatin g Land	Revenue Land	-	-	-	-	-	Balva	1.9Km N	-	-	165m W	520m N	-	-	-
24	BLV 04	21°51'52.83"N 69°57'53.14"E	457	Undulatin g Land	Revenue Land	F	390m SW	Permanen t	Residential	Yes	Balva	2.4Km N	-	-	290m W	960m N	-	-	-
25	BLV 05	21°51'58.24"N 69°58'13.52"E	535	Undulatin g Land	Revenue Land	-	-	-	-	-	Balva	2.5Km N	-	-	240m E	1.3Km NW	-	-	-
26	CHR 01	21°51'10.06"N 69°54'56.96"E	341	Undulatin g Land	Revenue Land	-	-	-	-	-	Chur	1.9Km NE	-	-	125m W	235m W	-	-	-
27	CHR 02	21°51'24.93"N 69°55'19.42"E	376	Undulatin g Land	Revenue Land	-	-	-	-	-	Chur	1.1 Km NE	-	-	160m S	495m N	-	-	-
28	CHR 03	21°51'37.50"N 69°55'38.14"E	384	Undulatin g Land	Revenue Land	D	550m N	Permanen t	Residential	Yes	Chur	630m N	-	-	290m S	540m N	-	-	-
29	CHR 04	21°51'28.44"N 69°55'54.21"E	480	Undulatin g Land	Revenue Land	-	-	-	-	-	Chur	1Km N	-	-	340m W	1Km N	-	-	-
30	CHR 05	21°51'45.41"N	485	Undulatin	Revenue	-	-	-	-	-	Chur	1Km NW	Churi	Aai	134m	260m W	380m N	-	-

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 47

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat
Client: SPRNG ALT Energy Pvt. Ltd.

		69°56'12.40"E		g Land	Land							Mandir	SW						
31	CHR 06	21°51'54.38"N 69°56'36.39"E	445	Undulating Land	Revenue Land	-	-	-	-	-	Chur	1.7Km W	-	-	150m W	260m N	-	-	-
32	CHR 07	21°51'32.60"N 69°56'40.43"E	510	Undulating Land	Revenue Land	-	-	-	-	-	Chur	2Km NW	-	-	420m NW	940m N	-	-	-
33	MHK 01	21°50'20.91"N 70° 0'1.23"E	403	Undulating Land	Revenue Land	-	-	-	-	-	Mahiki	2.5Km NW	-	-	220m W	2.2Km N	Agriculture	-	Agriculture
34	MHK 02	21°51'11.80"N 70° 0'22.59"E	414	Undulating Land	Revenue Land	-	-	-	-	-	Mahiki	3.6Km SW	-	-	700m W	1.3 Km NW	Agriculture	-	-
35	MHK 03	21°51'11.07"N 70° 0'41.68"E	424	Undulating Land	Revenue Land	-	-	-	-	-	Mahiki	4.1Km SW	-	-	1.2 Km W	1.6Km NW	Agriculture	-	-
36	AMR 01	21°44'12.14"N 70° 1'53.09"E	365	Undulating Land	Revenue Land	-	-	-	-	-	Amrapar	2.5Km SE	-	-	300m W	300m W	-	-	-
37	AMR 02	21°44'9.39"N 70° 2'11.94"E	433	Undulating Land	Revenue Land	-	-	-	-	-	Amrapar	2 Km SE	-	-	310m S	850m W	-	-	-
38	AMR 03	21°43'58.66"N 70° 2'21.01"E	342	Undulating Land	Revenue Land	-	-	-	-	-	Amrapar	1.6Km SE	-	-	250m W	1.1Km W	-	-	-
39	MLV 01	21°49'17.12"N 70° 4'12.78"E	555	Undulating Land	Revenue Land	-	-	-	-	-	Malvada	790m NE	-	-	150m S	600m N	-	-	-
40	MLV 02	21°49'1.11"N 70° 4'13.04"E	550	Undulating Land	Revenue Land	-	-	-	-	-	Malvada	950m NE	-	-	270m N	1km N	-	-	-
41	MLV 03	21°48'49.23"N 70° 4'35.83"E	560	Undulating Land	Revenue Land	-	-	-	-	-	Malvada	1.1Km N	Vegad Pariva Na Surapura Haji Pir Bapa	310m NE	110m E	240m N	-	-	-
42	MLV 04	21°48'38.48"N 70° 4'48.15"E	563	Undulating Land	Revenue Land	-	-	-	-	-	Malvada	1.5Km N	-	-	240m E	570m N	-	-	-
43	MLV 05	21°49'25.22"N 70° 4'52.23"E	501	Undulating Land	Revenue Land	B	350m W	Permanent	Residential	Yes	Malvada	425m W	-	-	240m W	620m NW	-	-	-
44	MLV 06	21°49'21.44"N 70° 5'7.21"E	540	Undulating Land	Revenue Land	-	-	-	-	-	Malvada	900m W	-	-	590m W	1Km NW	-	-	-
45	PTN 01	21°50'7.79"N 70° 0'21.56"E	516	Undulating Land	Revenue Land	-	-	-	-	-	Patan	3.1Km SE	-	-	400m W	2Km S	-	-	-
46	PTN 02	21°49'52.07"N 70° 0'18.03"E	512	Undulating Land	Revenue Land	-	-	-	-	-	Patan	2.75Km SE	-	-	120m S	1.4 Km S	-	-	-
47	PTN 03	21°49'44.84"N 70° 0'3.36"E	501	Undulating Land	Revenue Land	-	-	-	-	-	Patan	3.3 Km SE	-	-	210m S	1.74Km S	-	-	-

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 48

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat
Client: SPRNG ALT Energy Pvt. Ltd.

48	PTN 04	21°49'45.66"N 70° 0'37.98"E	536	Undulating Land	Revenue Land	-	-	-	-	-	Patan	2.4 Km SE	-	-	270m S	1.23Km S	-	-	-	-
49	PTN 05	21°49'32.13"N 70° 0'37.43"E	528	Undulating Land	Revenue Land	-	-	-	-	-	Patan	2.25Km SE	-	-	150m N	840m S	-	-	-	-
50	PTN 06	21°49'21.34"N 70° 0'15.41"E	540	Undulating Land	Revenue Land	-	-	-	-	-	Patan	2.8Km E	-	-	340m W	1Km SE	-	-	-	-
51	PTN 07	21°49'0.59"N 70° 0'20.77"E	522	Undulating Land	Revenue Land	-	-	-	-	-	Patan	2.6Km E	-	-	230m S	750m E	-	-	-	-
52	PTN 08	21°48'37.86"N 70° 0'9.33"E	418	Undulating Land	Revenue Land	-	-	-	-	-	Patan	3.1Km NE	-	-	285m N	540m SE	-	-	-	-
53	PTN 09	21°50'6.71"N 70° 0'51.50"E	480	Undulating Land	Revenue Land	-	-	-	-	-	Patan	2.45Km SE	-	-	290m W	1.8Km S	-	-	-	-
54	PTN 10	21°49'43.03"N 70° 0'58.61"E	595	Undulating Land	Revenue Land	-	-	-	-	-	Patan	1.82Km SE	-	-	260m S	1Km S	-	-	-	-
55	PTN 11	21°49'59.60"N 70° 1'10.96"E	650	Undulating Land	Revenue Land	-	-	-	-	-	Patan	1.9Km SE	-	-	800m E	1.66Km S	-	-	-	-
56	PTN 12	21°49'45.07"N 70° 1'20.81"E	541	Undulating Land	Revenue Land	-	-	-	-	-	Patan	1.36Km SE	-	-	500m E	1Km S	-	-	-	-
57	PTN 13	21°49'24.20"N 70° 1'8.02"E	490	Undulating Land	Revenue Land	-	-	-	-	-	Patan	1.3Km SE	-	-	270m W	475m S	-	-	-	Agriculture
58	PTN 14	21°49'43.60"N 70° 1'48.18"E	461	Undulating Land	Revenue Land	-	-	-	-	-	Patan	970m S	-	-	200m S	400m E	-	-	-	-
59	PTN 15	21°49'32.21"N 70° 1'44.37"E	505	Undulating Land	Revenue Land	-	-	-	-	-	Patan	664m S	-	-	109m S	670 NE	-	-	-	Agriculture
60	PTN 16	21°49'23.52"N 70° 2'5.52"E	490	Undulating Land	Revenue Land	-	-	-	-	-	Patan	400m S	-	-	200m E	200m E	-	-	-	-
61	PTN 17	21°49'7.07"N 70° 3'11.82"E	450	Undulating Land	Revenue Land	-	-	-	-	-	Patan	2.1Km W	-	-	180m S	1.7Km W	-	-	-	-
62	PTN 18	21°49'0.89"N 70° 3'37.10"E	506	Undulating Land	Revenue Land	-	-	-	-	-	Malvada	1.7Km NE	-	-	190m SE	2.5Km W	-	-	-	-
63	PTN 19	21°48'48.56"N 70° 3'52.57"E	510	Undulating Land	Revenue Land	-	-	-	-	-	Malvada	1.6 Km NE	-	-	250m W	3Km NW	-	-	-	Agriculture
64	PTN 20	21°49'36.35"N 70° 3'34.92"E	485	Undulating Land	Revenue Land	-	-	-	-	-	Malvada	1.6Km E	-	-	190m NW	2.3Km W	-	-	-	-
65	PTN 21	21°49'20.89"N 70° 3'46.93"E	482	Undulating Land	Revenue Land	-	-	-	-	-	Malvada	1.3Km E	-	-	360m SW	2.7Km W	-	-	-	-

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 49

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat
Client: SPRNG ALT Energy Pvt. Ltd.

66	PRD 01	21°45'16.10"N 70° 0'56.35"E	366	Undulating Land	Revenue Land	-	-	-	-	-	Paradva	1.7Km NE	-	-	210m N	710m N	-	-	-	-
67	PRD 02	21°44'54.73"N 70° 1'1.25"E	406	Undulating Land	Revenue Land	-	-	-	-	-	Paradva	1.9Km NE	-	-	90m S	1.35Km N	-	-	-	-
68	PRD 03	21°45'15.62"N 70° 1'54.83"E	357	Undulating Land	Revenue Land	-	-	-	-	-	Paradva	420m N	-	-	310m E	300m W	-	-	-	-
69	PRD 04	21°45'0.89"N 70° 1'47.24"E	358	Undulating Land	Revenue Land	-	-	-	-	-	Paradva	920m N	-	-	60m W	60m W	-	-	-	-
70	PRD 05	21°44'46.98"N 70° 1'54.12"E	367	Undulating Land	Revenue Land	-	-	-	-	-	Paradva	1.3Km N	-	-	100m S	320m W	-	-	-	-
71	PRD 06	21°45'0.34"N 70° 0'48.52"E	403	Undulating Land	Revenue Land	-	-	-	-	-	Paradva	2.1Km NE	-	-	75m S	1Km N	-	-	-	-
72	PRD 07	21°45'13.65"N 70° 0'30.86"E	353	Undulating Land	Revenue Land	-	-	-	-	-	Paradva	2.5Km NE	-	-	70m S	600m N	-	-	-	-
73	PRD 08	21°45'26.12"N 70° 0'31.52"E	315	Undulating Land	Revenue Land	-	-	-	-	-	Paradva	2.4KmE	-	-	60m W	240m N	-	-	Agriculture	-
74	PRD 09	21°45'33.88"N 70° 0'53.06"E	340	Undulating Land	Revenue Land	-	-	-	-	-	Paradva	1.8Km E	-	-	180m W	170m N	-	-	-	-
75	PRD 10	21°45'31.94"N 70° 2'10.02"E	343	Undulating Land	Revenue Land	A	377m NW	Permanent	Residential	Yes	Paradva	350m W	-	-	180m W	450m N	-	-	-	-
76	PRD 11	21°45'8.00"N 70° 2'15.56"E	330	Undulating Land	Revenue Land	-	-	-	-	-	Paradva	1Km N	-	-	160m W	970m NW	-	Agriculture	-	-
77	PRD 12	21°46'20.17"N 70° 1'42.82"E	332	Undulating Land	Revenue Land	-	-	-	-	-	Paradva	1.1Km S	-	-	10m N	200m W	-	Agriculture	-	-
78	PRD 13	21°46'40.04"N 70° 1'59.12"E	364	Undulating Land	Revenue Land	-	-	-	-	-	Paradva	1.6Km S	-	-	240m S	154m NW	-	-	-	-
79	PRD 14	21°46'58.04"N 70° 2'12.95"E	435	Undulating Land	Revenue Land	-	-	-	-	-	VadaKhan	1.4Km E	-	-	230m SW	270m W	-	-	-	-
80	PRD 15	21°46'13.52"N 70° 2'16.87"E	360	Undulating Land	Revenue Land	-	-	-	-	-	Paradva	1Km S	-	-	80m S	970m NW	-	-	-	Agriculture

* As per IFC ENVIRONMENTAL, HEALTH, AND SAFETY GUIDELINES WIND ENERGY August 7, 2015 the minimum setback distance is 1.5 x turbine height (tower + rotor radius) which is 218 m for this model.

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 50

Project: Draft ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

3.2.3 Power Evacuation

The Kageshree wind farm site will be connected to proposed 33/220 kV pooling substation via 10 x33 kV feeder line. This pooling substation will then be connected to the Gujarat Energy Transmission Corporation Limited (GETCO) 220 kV Grid substation at Moti Paneli, Rajkot district at about 15 km. The total length of the proposed transmission lines will be around 90 km passing constructed on mostly revenue land parcels. Power evacuation approval has been obtained from GETCO vide letter no. GUVNL/COM/GM (IPP)/RE/44 dated 11th January, 2018.

3.2.4 Additional Project Infrastructure

Associated facilities and utilities such as the following are required as part of the larger wind farm site planning:

- Batching Plant
- Metering point for measuring production from each WTG;
- Material storage yards and stores; and
- Central monitoring station building and facilities.

The storage yard and pooling substation lands have already been identified for the Project.

3.2.5 Accessibility

The Kageshree site can be accessed from the coastal port city Porbandar via NH 8E and SH 27. The other nearest town is Jam Jodhpur situated at 10 km northeast of the project site. The details of 197.5 MW Kageshree Wind farm accessibility has been provided in **Table 3-5**.

Table 3-5: Details of Site Accessibility

Sr. No.	Nearest Access	Location Name	Aerial Distance and direction w.r.t nearest WTG
1	City	Porbandar	40 Km West
		Rajkot	100 KM Northeast
2	Town	Jam Jodhpur	6 Km North
		Kutiyana	14 Km South
3	Road	NH 8E	27 Km West
		SH 23	15 Km East
4	Airport	Porbandar Airport	34 Km West

Assignment	Draft Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 51

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

3.3 LAND REQUIREMENT AND PROCUREMENT PROCESS

Land for the wind power project is required for the following components;

- Wind Turbine Generators (WTGs);
- RoW for transmission lines – internal and external;
- Pooling Substation (PSS);
- Batching plant;
- Access Roads – internal and external
- Temporary Labour Camps; and
- Material Storage.

Land may also be required for the central monitoring station and other utilities like canteen etc. depending upon the need. The details of land requirement for the various components and the present status of the land procurement and process followed for the same is captured below.

3.4 LAND DETAILS

The information on total land requirement for each of the project component, type of land, village from which land is procured, and the status of the land procurement is provided in **Table 3-6**.

Table 3-6: Summary of the land required for the Project

Project Facility	Land Area	Land use Classification			Status of Procurement	Mode of Procurement
	Required (ha)	Forest	Revenue	Private		
Wind Turbine	1	No	Revenue	No	Under process	Lease
Access Road	--	No	Revenue	Private	Under process	Lease
Substation/ Switchyard/ Administration	2	No	No	Private	Under process	Purchase

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 52

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

Building						
Transmission Lines up to Pooling Sub Station # (no of KMs)	15 KMs	No	Revenue	Private	Under process	User rights (ROW)
Material Storage Yard	8	No	No	Private	Under process	Lease

The developer –Envision has appointed land aggregators – M/s. Opera Wind for procuring land for the project. The land aggregators are responsible for surveying the identified land parcels. The land team working on site is reported to be comprised 2 of members from Opera wind and site team members both from SPRNG and Enerfra. The land purchase process for the project started in December 2017 with an original deadline for project commissioning by June, 2019. The purchase of all 79 proposed WTG locations has already been completed with payment of stamp duty to the district collector. The District Inspector Land Record Office (DILR) survey has been completed for all locations and land deed for 31 locations are expected by 7th May, 2018. It was reported by Enerfra Site In-charge that no construction is allowed to start unless all land documents are acquired by the project developer. The current status of the land procurement is given in **Table 3-7**.

Table 3-7: Status of Land Procurement

Number of Land Parcels	Status
64	Fees paid for demand note paid, awaiting collector order
7	Applied
9	File with Dy. Collector

3.4.1 Project related land procurement and specific issues

On the basis of the information available presently, some of the observations especially with respect to the project related land procurement are mentioned below.

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 53

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

Schedule V Area¹

The project area does not fall under Schedule V area as defined in the Indian constitution.

Forest land

The WTG locations are being developed on revenue land. As reported, no forest land falls in the project area.

Tribal (Scheduled Tribe) land²

The land in the study area predominantly belongs to caste Hindus such as *Brahmins, Bharwad, and* some other Scheduled Castes (SC). A very few percent of Muslims are also reported to inhabit the region.

Landlessness

Since the project comprises wholly of revenue land no landlessness will occur due to the project.

¹ In the Constitution of India, the expression “Scheduled Areas” means such areas as the President may by order declare to be Scheduled Areas. The criteria followed for declaring an area as Scheduled Area are preponderance of tribal population; compactness and reasonable size of the area; under-developed nature of the area; and marked disparity in economic standard of the people. These criteria are not spelt out in the Constitution of India but have become well established. (Source: Official website of the Ministry of Tribal Affairs (MoTA), Government of India (GoI). URL: <http://tribal.nic.in/Content/DefinitionofScheduledAreasProfiles.aspx>. Accessed on 27.08.2016.

² Article 366 (25) of the Indian Constitution defines scheduled tribes as “such tribes or tribal communities or parts of or groups within such tribes or tribal communities as are deemed under Article 342 to be Scheduled Tribes for the purposes of this constitution”. The criterion followed for specification of a community, as scheduled tribes are indications of primitive traits, distinctive culture, geographical isolation, shyness of contact with the community at large, and backwardness. This criterion is not spelt out in the Constitution but has become well established. Source: Official website of the Ministry of Tribal Affairs (MoTA), Government of India (GoI). URL:

<http://tribal.nic.in/Content/DefinitionpRfiles.aspx>. Accessed on 27.08.2016.

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 54

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

Encroachment

No encroachments is envisaged in any of the 80 land parcels for WTGs, the PSS land and in the RoW corridor for the 33 kV internal and 110 kV external transmission lines since surrounding lands of the WTGs are also predominantly revenue lands.

Common Property Resources (CPR)³

No CPRs were reported on any of the 80 land parcels for WTGs, the PSS land and in the RoW corridor for the 33 kV internal and 110 kV external transmission lines. Each village in project area has a common Gauchar (grazing land) and during consultation with the villagers and Sarpanch it was reported that no WTG is located near these Gauchar.

NOC from Panchayat

The State of Gujarat does not require wind power projects to take a NoC (No Objection Certificate) from the Gram Panchayat of the impacted villages prior to initiation of construction activities. It was further reported that the final NOC will only be issued by the concerned Panchayat after the entire project land is allotted by Dist. Collector.

Land use change

All the land for the project is revenue land.

Mutation

The land is being purchased in the name of the Land Aggregator, Opera Wind which will be later transferred to the name of the project proponent – SPRNG ALT Energy. The ownership of the land will be transferred after procurement of all the land parcels and project-related construction activities are complete. It was also reported that the mutation process of land will be undertaken once procurement of all the identified/ required land parcels is complete.

³ Common Property Resources (environmental) are natural resources owned and managed collectively by a community or society rather than individuals

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 55

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

Gujarat Wind Power Policy 2016-2021

The state has a wind energy policy - Gujarat Wind Power Policy 2016-2021⁴. Clauses relevant to the procurement of private land, allotment of government land and diversion of forest land mentioned in the policy are as follows

Clauses relating to private land:

4. Eligible Sites: The WTGs may be set up at sites notified by Gujarat Energy Development Agency (GEDA) and/ or any other sites identified as potential site, within the State by the Nodal Agency or Developer/s.

9. Land The WTGs may be set up on private land, or revenue wasteland allotted by the State Government / GEDA land, if available. The allotment of GEDA land on lease shall be done upon approval of the Coordination Committee consisting of the following members. Issues other than the allotment of GEDA land including interpretation of any of the provisions of this Policy will also be decided by a Committee of following members:

1. ACS/ PS/ Secretary (EPD), Chairman
2. AS/ JS/ Deputy Secretary (EPD), Member
3. Chief Electrical Inspector & Collector of Elect. Duty, Member
4. General Manager (Comm.), GUVNL, Member
5. Respective District Collector, Member
6. Director, GEDA Member, Secretary

Cultural heritage

During site visit, TUV team came across two temples situated at close proximity of two proposed WTGs. One was Chur Mata Mandir at 134m SW of WTG CHR 05. The road to the temple situated on the small hilltop was not accessible by vehicle. The other temple was Vegad Pariva Na Surapura Haji Pir Bapa situated at 310m NE of WTG MLV 03.

⁴ https://geda.gujarat.gov.in/policy_files/Gujarat%20Wind%20Power%20Policy-2016.pdf

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 56

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat
Client: SPRNG ALT Energy Pvt. Ltd.

Review of information available on the internet indicates that the temple has not been recognized as a ‘Cultural Heritage’ site by the Archaeological Survey of India (ASI) or the Gujarat State Archaeological Department. The same was confirmed during the site visit as it was not earmarked by any signage of the concerned authorities.

Figure 3-1: Photographs of the Temple near Chur village taken during TUV Site Visit



3.4.2 Land details and existing procurement status for specific components

The land requirement for the various components and the existing procurement status is captured below.

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 57

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

WTGs

Kageshree has 79 WTG locations and an area of approximately 81 acres is being procured by the client for all the WTG location. Land deed of 31 out of the 81 land parcels has been expected during the week of the site visit.

Transmission lines

- External transmission line (110 kV): The total length of the external transmission line is 90 Kms. RoW and construction (erection and stringing) was not yet started at the time of TUV site visit; and
- Internal transmission line (10x33 kV): The total length of the internal transmission line is estimated to be approximately 60 Kms. Construction was not yet started at the time of TUV site visit. The breakup of the above two lines is given below in **Table 3-8**.

Table 3-8: Details of Associated Facilities

Particular	Total length (m)	Width (m)	Name of villages through which it passes
Internal access road	60000	5	Chur, balva, patan, mahiki, Satapar, Vadvala, pardva, Amarapar, Malvada
External access Road	10000	5	Kageshree, patan, mahiki, Vadvala, chur, balva, Paradva,
Transmission line	90000	3	Chur, balva, patan, mahiki, Satapar, Vadvala, pardva, Amarapar, Malvada

Temporary Labour Camps

No labour camp will be constructed at the site as most of the labour will be sourced locally.

Material storage

Enerfra has procured a land measuring 8 Ha on lease basis for material storage up to Dec 2018). The project office of the developer is also located on the same land parcel.

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 58

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

Pooling Substation (PSS)

Enerfra has procured a land measuring 2 Ha through direct purchase based on willing seller-willing buyer negotiations.

Access roads

The details of the extent and type (private and government) of land required for access roads have not been prepared yet. However, it was informed by the site team of Enerfra that preliminary assessment indicates that 1 acre of land per WTG will be used for developing access roads.

Batching Plant

Enerfra has procured a land measuring 2 acres on lease basis for setting up its batching plant from a local farmer for the construction period.

3.4.3 Land Purchase Process

As indicated earlier, land for the project is reported to be procured by Enerfra through two land aggregators from Opera Wind. The procedure adopted for land procurement is given below:

Land Acquisition Process - REVENUE LAND

The Revenue Lands in the state of Gujarat are classified into two types namely:

- Waste Land
- Gauchar Land

Waste Lands in the state of Gujarat can be granted for the purposes of establishment of Wind Power Projects The lands which are assigned for specific purposes, reserved/ encroached shall not be granted.

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 59

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

- The Grant of Gauchar lands shall be subject to obtaining a Resolution from Gram Panchayat and Gauchar land shall be more than the extent as mentioned in animal patrak⁵.
 - Revenue Wasteland to be allotted for setting up of Wind farms to the Developers, on long term lease of 20 years.
 - Developer can sub lease the land once to its client/owner of the Wind farm.
 - Leased land equivalent to maximum One hectare / WTG.
 - Allotted area to be considered for land conversion tax.
 - Deemed N A status for the land leased for Wind farm.
 - Lease rent shall be paid as per govt rules.
 - District Collector authorized to lease the land to the Developer.
- On company letterhead, will file application to concerned Dist. Collector (Revenue Department) in the name of Company / Subsidiary, on need basis along with Letter from GEDA earmarking the extent of Land required on Village Maps and other necessary documents.
- User Agency shall attach the following.
- Copy of Allotment
 - Certified Copy of village Form 7/12.
 - Opinion of competent authority i.e. DIC / IC.
 - Zoning Certificate, if applicable.
 - Consent for payment of price, as may be fixed by appropriate forum.
 - Resolution of Village Panchayat in case of Gauchar Land.
- File forward to Jurisdictional Asst. Collector, Mamlatdar, R & B., Health, PGVCL, DILR, Forest Department and NOCs to be obtained from the respective departments
- On receipt of application for alienation of land, the land should be identified and if it is free from encroachments and if it is not proposed for other purposes previously

⁵ Gauchar (grazing land) related provision given in a booklet as per Gujarat Panchayat Act, 1993 and Collector Manual Revenue Department Government of Gujarat.

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 60

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

- Follow up with Mamlatdar, RAK, Circle Officer, Talati, Village Sarpanch, for site visit of the proposed area and recommendations of the Mamlatdar
- Mamlatdar will submit the recommendations to Dist. Collector along with following documents and enclosures through Asst. Collector
 - Application
 - Combined sketch of the lands
 - Particulars of lands such as Extent, Sy. No. Village
 - Basic land Records
 - Questionnaire and Checklist duly filled by the Circle Officer.
 - Our Acceptance letter to pay all types of payment to Government
- DILR Mapani to be paid and followed up at the project area for getting DILR measurement sheet.
- Submission of Mapani to Collector office and payment of processing charges as determined by the DC to the Treasury.
- Letter for payment of annual lease rent from DC office.
- The lands allotted by the DC shall be considered as deemed NA land and that the NA Charges shall be paid as per the rules. There is no necessity to file a separate application seeking permission for NA.
- DC will issue final proceedings for Lease of Lands.
- The District collector shall complete the allotment procedure within a period of 45 days from the date of allotment.
- DC will execute the lease deed for a period of 20 Years on payment of Rs.10,000/- Per Ha.
- DC will issue Final Possession Order (Lease Order).
- The Mamlatdar office will issue possession letter (Kabja Pavti) as per the Final Possession Order.
- Release for constructions.
- Conversion charges as determined by the DC shall be paid. Therefer mutation of the name of the user agency shall also be entered in the Hakpatrak i.e. Form No.6.
- Yearly Gram Panchayat taxes to be paid to Talati Mantri with respect to allotted area.

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 61

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

- The lands allotted has to be utilized and constructed within six month or as per lease order.
- If no construction is carried out as per term & condition of lease order, the land shall be resumed back to Government without any compensation.

Transfer of Lease:

After the completion and commissioning of the Wind Turbines, and as per the provisions of the prevailing legislations with regard to Allotment of Govt. Lands on lease for setting up of wind farms, Govt of Gujarat, after due permission from the Revenue Department, Deed of Transfer of Lease will be executed by Revenue Department and Customer subject to compliance of conditions of Lease and payment of future annual Lease Rents by the customers.

Land Procurement Process - PRIVATE LANDS

Purchase directly from the land owners.

- Ground Marking of Location and Identification of the Land Owners.
- Land Survey of Location & Approach roads, Ground Marking of Location and Roads
- Obtain Land Revenue Records, like
 - **RoR/Hakpatrak for 30 Years** : For establishing Ownership pattern of the land
 - **Encumbrance Certificate**: Provides details of land transfer details thru sale, Mortgaged loans etc.
 - **Relevant Mutation Extracts**: Provides the instances of Land transfers approved for title change in the revenue records.
 - **Village Map**: To identify the location of the turbine.
 - **FMB/Survey Sketch**: To ascertain holding
 - **Grant Certificate**: in case the land being a grant from Govt.
 - **Original sale deeds**: If the land is being self-acquired property and entire extent is being purchased.
 - **Genealogy Of family** : To ascertain no of legal heirs and claimants

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 62

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

- Obtain the Legal opinion with respect to the title of the land from a Local Advocate and publishing notice in local news paper.
- Negotiation With owner for Price and Extent, Clearance of Bank Loans and Encumbrances.
- The price negotiation is based on Market Value.
- Conduct land survey for preparation of Survey/ Sub division drawing of the land.
- Land Registration in the Name of COMPANY / Subsidiaries
- Obtain transfer of land title in the name of COMPANY's /Subsidiaries and Sub-divisional sketch of Land.
- The user agency shall intimate about the change of land use to the District collector within 30 days from the date of commencement of use of land.
- Submit application for Land Conversion to Non Agril. purpose with Dist. Collector as per Sec 55 and 65B of the Land Revenue Code .
- Process the File at DC office.

Land use Conversion: -

An application for such conversion of the agricultural land for non-agricultural purposes shall be made before the competent authority in the form prescribed along with following documents:

- a. Gram namuna No. 7/12 & 8A
 - b. Zone Certificate
 - c. In the case of New Tenure Land a receipt of premium
 - d. Proposed lay out plan
 - e. Construction permission of the competent authority
 - f. F form with map (if applicable)
 - g. An affidavit under ULC & ALC Act.
- The collector shall also take the opinion of the Town planning and other concerned departments.
 - As per the provisions of the Act the conversion process shall complete with in span of 90 days from the date of application.

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 63

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

- Conditions for conversion under Sec 65- B followed by the District collector for conversion:

The occupant has a clear title to such land Such land or part thereof, :-

- (a) Is not shown as reserved for a public purpose.
- (b) Is not notified for acquisition
- (c) Does not fall within the alignment of any road or the command area of any irrigation project.
- (d) Is not situated within 30 m from the railways
- (e) Is not situated within 15 m of the high voltage transmission line.
- (f) Is not situated within 5 m of the periphery of the area of ADA & UDA.

- Payment of prescribed amount towards Conversion fees.
- Conversion order by DC.

Sub-station/ Pooling station land / Office Building/ SCADA Building

- As the Sub Station / Office buildings will be permanent features of a project and they will be held by COMPANY on Free hold basis.
- The lands required for the purposes are purchased by COMPANY directly from the Land owners or thru Facilitator as described in the above paragraphs.

Grievance redressal process and stakeholder engagement

Envision does not have a formal grievance redressal mechanism to address the concerns of the land sellers and local community. However, it was not clear whether they propose to set up a system for the project in the future. Similarly, no systematic process for stakeholder engagement is being followed at site. Stakeholders in the form of landowners, local youth, government officials are being engaged in a need-based manner.

3.5 PROJECT PHASES AND ACTIVITIES

The land procurement process has already been initiated and the allotment of land is yet to be obtained from District Collector's Office for the identified 80 WTG locations. Presently, no

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 64

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

construction activity has started at the site. The tentative schedule for all the project activities is given in below **Table 3-9**.

Table 3-9: Schedule for Project Implementation

Sr. No.	Activity	Expected date of commencement	Expected date of completion
1	Land Procurement	Already Applied , under process	15 th July 2018
2	Access Roads	15 th May 2018	Jan 2019
3	Pooling station and transmission line	15 th May 2018	December 2018
4	Foundation of WTGs	1 July 2018	Feb 2019
5	Erection of WTGs	--	--
6	Commissioning of WTGs	--	--

The Project life-cycle can be divided into four phases as follows:

- Planning and pre-construction phase;
- Construction phase;
- Operation (including maintenance and repair) phase; and
- Decommissioning.

3.5.1 Planning Phase

The planning phase includes the following components:

- Identification of land area and site;
- Site surveys as topographic, geo-technical investigation, micro-siting studies, electrical grid studies, etc.;
- Obtaining all necessary approvals/clearances; and
- Finalization of contractors.

The identification and purchase of land is a key component of the planning and pre-construction phase. The process of purchasing land can be divided into two phases (a) land title verification and (b) purchase of land. This is coordinated by Opera Wind the Land Team of Enerfra in the various villages that come under the Project. At the time of the ESIA visit, Enerfra had finalized 80 locations required for the 79 WTGs (keeping two as buffer) construction of the wind farm. Initially Enerfra had identified 114 location and made

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 65

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

application for 104 locations to the district revenue office for purchase of revenue land. While they have finalized and paid stamp duty for all the 80 locations they have not withdrawn the application for remaining 24 locations identified.

3.5.2 Construction Phase

The construction phase includes the following components:

- Deployment of labour and establishment of labour camp;
- Site preparation, including subcontractor mobilization, installation of fencing or suitable barriers, and construction of site compounds and lay down areas;
- Establishment of borrow pits (if required);
- Construction, widening and strengthening of access roads;
- Establishment and operation of batching plant;
- Establishment of pooling substation at Batkurki Village;
- Laying of turbine foundations, turbine delivery and installations;
- Internal electrical connections;
- Construction of Extra High Voltage (EHV) line;
- Turbine testing to verify proper operation of the facility; and
- Commissioning of the wind farm.

At the time of the ESIA study, Enerfra had not begun the construction phase of the project. The route for Extra-high-voltage (EHV) transmission has been identified along with the land for storage yard and substation. While the substation and storage yard land is private the transmission line will mostly be composed of revenue land with very little passage through private land for which ROW will be obtained on lease basis.

3.5.3 Operation and Maintenance Phase

The operation and maintenance phase includes the following activities:

- Regular remote monitoring of WTG operations;
- Normal greasing and cleaning of WTG components;
- Annual shut-down maintenance, which will mostly include cleaning and greasing, change of parts, etc.; and

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 66

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

- Internal road repairs, as and when required.

The design life of the Project is expected to be 20 years from the date of commissioning. Regular maintenance would be required to ensure that the turbines are kept in optimal working order. Most day-to-day facility operations are done remotely through the use of computer networks and a small team. Some limited maintenance and repair activities would need to be undertaken occasionally on site.

3.5.4 Decommissioning Phase

The wind farm site, after having remained in operation for the lifecycle estimated at 20 years, will not lose its value as a wind power generation system. However, it is not yet decided if the Project would approach for upgrading/expansion, once this Project life is completed.

If the site is to be abandoned after completion of the designed plant life, decommissioning should be initiated by dismantling the turbines, supporting towers, O&M building and transporting them out of the Project area. It is expected that this activity will take approximately 3-4 months. The turbine components should be sold as scrap.

The concrete should be broken up and removed to a landfill site. The stored fuel and oil should be transported out of the site for sale/disposal to the authorised seller/disposal facility. The site should be restored as far as possible to its original condition. Infrastructure such as roads and transmission lines should be handed over to the government for use.

3.6 RESOURCE REQUIREMENTS

The resource requirements for the 197.5 MW wind farm are provided in the subsequent sections.

3.6.1 Manpower requirement and facilities

The break up of estimated no. of workers required during construction phase in the below **Table 3-10**.

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 67

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

Table 3-10: Manpower Requirements for the Project

Activities	Normal Period	Peak Period
Foundation and Civil Works	25	50
Electrical Works	40	75
Transportation of turbine components (drivers of construction vehicles and project vehicles) and Erection	12	18
Stock yard (security and staff)	8	12
Site Office	2	4
Total	87	159

3.6.2 Water requirement

Construction Phase

During construction, water will be required for construction activities, domestic purposes and some drinking water for labourers and Project teams. For construction it is anticipated that 170 L of water would be needed for each m³ of concrete. As the Project anticipates 180 m³ concrete for the site, a total of 30,600 L of water per foundation would be required for construction activities. This water is being sourced through tankers provided by neighbouring villagers. Reportedly, the original source of the water is groundwater or surface water bodies.

At the peak of construction, approximately 159 people would be anticipated in the site at any given point mostly local manpower. Assuming an average of 4L of water per person, a total of 336 L of drinking water would be required per person per day at the maximum. Drinking water would also be sourced from nearby villages. The details of water requirement during construction phase is given below in **Table 3-11**.

Table 3-11: Water requirement during construction phase

Sr. No.	Area	Approximate Quantity	Source
1	Construction activities	30,600 L per foundation	Tanker Water
2	Domestic water requirement	30,000 to 16,000 L per day	Tanker Water

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 68

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

3	Potable water	336 L max./day	Tanker Water
---	---------------	----------------	--------------

The water requirement for the Project is presently being met from nearby villages.

Operation Phase

Approximately 2-3 m³/day of domestic water will be required during the O&M phase. The water will be sourced from nearby villages through tankers.

3.6.3 Raw Materials

Construction Phase

For the construction of WTGs including foundation and erection of poles for transmission lines, raw materials like steel, sand, stone and cement will be required. Sand and aggregates should be procured from government approved quarries and suppliers to avoid dealing with or promotion of illegal mining. Cement and steel can be supplied by local vendors.

Operation Phase

Raw material utilised during the operation phase will mainly include supplies for site staff and maintenance needs for the WTGs. The maintenance needs for the WTGs, including fuel, oil and spare parts, should be procured from nearby towns and the international market by the Envision's procurement department.

3.6.4 Fuel Requirement and Storage

Construction Phase

The onsite fuel requirement during construction phase is being procured from nearby petrol pumps.

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 69

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

Operation Phase

Approximately 500 litres of oil per WTG will be required for five years for gearbox maintenance activities. Oil should be stored at designated areas with secondary containment.

3.6.5 Power Requirement

Construction Phase

Power requirement during the construction phase will be met through Diesel Generator (DG) sets. Three DG sets have already been procured for the Project – (i) 85 kVA for operation of batching plant, (ii) 20 kVA for welding activities by subcontractor and (iii) 15 kVA for site office. It was anticipated by the client that grid electricity would soon be made available for the stock yard and site office.

Operation Phase

The power requirement during the operation phase for the site office and WTG monitoring building will be provided by GETCO. An emergency back- up DG set will be placed near the site office as well.

3.7 POLLUTION CONTROL MEASURES

3.7.1 Air Emissions

Construction Phase

There will be potential impact on air quality due to onsite construction activities. The likely emissions from construction activities would include the following:

- Fugitive emissions from site clearing, digging, filling, material
- handling, transportation, use of construction machinery, etc.;
- Fugitive dust emissions from unpaved roads;
- Dust emissions from batching plant;

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 70

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

- Vehicular emissions from increased traffic volume from vehicles used
- for transport of construction material; transportation of WTGs and
- accessories; and
- Emissions from operation of diesel generators.

In order to control air emission during construction phase from operation of DG sets, adequate stack height as per CPCB norms should be provided. Fugitive dust emission arising from various activities such as excavation, transportation of material (loading and unloading), vehicular movement (on unpaved roads) should be minimized through sprinkling of water and maintaining vehicular speed to 10-15 km/hr. Vehicular emission should be controlled through proper maintenance of vehicles and vehicles with proper PUC will be operated at Project site.

Operation Phase

Under normal operations there will be no gaseous emissions from the operating areas. There will be gaseous and fugitive dust emissions owing to plying of maintenance vehicles. It will be ensured that well maintained vehicles with proper PUC are used for maintenance purposes. DG sets deployed as back-up power, will emit a limited amount of gaseous pollutants into the ambient air.

3.7.2 Wastewater Management

Construction Phase

The liquid effluents generated during the construction phase will include domestic sewage from soak pits/ septic tanks. The sewerage system should consist of soak pits for the collection of waste water from washing area. Sewage from the toilets should go into septic tanks. Sewage disposal trucks should be used to periodically remove the sludge/sewage from the site.

Operation Phase

The operational phase will have negligible wastewater generation at site office. Septic tank and soak pits will be provided at the site office for disposal of sewage.

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 71

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

3.7.3 Solid & Hazardous Waste Management

Construction Phase

The solid waste generated by the Project will consist of domestic waste, garbage waste, metal scrap and excess construction materials. The main types of waste that will be generated and sources are shown below in **Table 3-12**.

Table 3-12: Details of Waste generation, source and mode of disposal

Sr. No.	Waste Type	Source	Estimated Quantity	Method of Disposal
Non-hazardous waste				
1	Domestic solid waste	Labour activities	~56 kg/day	Waste will be segregated onsite and will be disposed of at site as approved by local authority.
2	Construction debris (excavated Earth)	Construction of WTG, access road, storage yard etc.	0.5 – 1.0 tonnes/day	Excavated materials to be used for backfilling and leveling and other debris shall be used for road construction.
3	Packaging waste containing paper, plastic, cardboard and other recyclables.	Packaging material for WTGs and accessories.	~ 10 kg/WTG	Return back to the supplier.
4	Sludge from Septic Tank	Soak pits/Septic tanks	~ 4-5 kg/month	Collected and disposed off through contractors.
5	All non-recyclables waste	Construction activities	5-10 kg/day	Collected and disposed off by the contractor at designated landfill sites.
Hazardous waste				
1	Used oil/waste oil	DG set, construction machinery	5-10 ltr/month	Collected and disposed off through approved recyclers in accordance to

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 72

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

				Hazardous Waste Rules, 2008.
2	Oil contaminated rags	Cleaning activities	1-2 kg/month	Collected and disposed off through approved vendors in accordance to Hazardous Waste Rules, 2016

Operation Phase

- During operation phase, the waste generated from the Project will include domestic waste at site office, scrap materials like scrap tools, damaged PPEs etc. and hazardous waste like waste oil, lubricants, oil contaminated rags, damaged batteries and waste oil filter;
- Sewage will be disposed through a combination of septic tanks and soak pits;
- The hazardous wastes will be stored temporarily onsite at separate designated covered area provided with impervious flooring. The storage containers/bins/drum will be clearly marked and identified for their hazards. From site hazards waste materials will be sent to central store for disposal;
- The hazardous wastes will be disposed of in accordance to Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016; and
- Non-recyclable material will be collected, segregated onsite and handed over to local Municipal Corporation for disposal.

3.7.4 Noise Control

Construction Phase

Noise emissions generated from DG sets to be used for emergency power supply will be minimized through provision of acoustic enclosures. High noise generating activities will be restricted to day time only (Refer Section 2.5.3). Workers near noise generating machines will be provided with ear plugs as safeguard against high noise hazards.

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 73

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

Operation Phase

Wind turbines produce noise when operating. The noise is generated primarily from mechanical and aerodynamic sources. Mechanical noise may be generated by machinery in the nacelle of the wind turbines. Aerodynamic noise emanated from the movement of air around the turbine blades, therefore turbine designs which allow lower rotational speeds in higher winds will limit the amount of noise generated.

3.7.5 Fire Safety and Security

Construction Phase

Appropriate firefighting system and equipment shall be provided throughout the construction period. The fire extinguishers will be placed at all strategic locations such as camp site, batching plant, site office, storage yard, heavy construction machinery etc. Besides this, emergency contact numbers will also be displayed onsite.

Operation Phase

Structural Fire Protection

Wind Turbines comprise predominantly non-flammable materials. Most components of the WTGs are predominantly metal. The only inflammable components are rotor blades and the panelling of the machine house, which are made from fibre glass, electric cables and electrical components, gear box, transformer and hydraulic oils, hoses and other plastic components. It is difficult for a fire to spread from the transformer station to the wind turbine or vice versa.

Fire prevention

The service personnel will take all appropriate measures to prevent fires, Lightning protection system will be based on lightening protection zone concept and in accordance to

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 74

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

IEC 61400-24, 62305-1, 3, 4 and DIN EN 50164- 1,2. A lightning strike as a cause of fire has been therefore excluded.

Fire extinguishers

One portable dry chemical powder fire extinguisher (Category C) will be maintained at each WTG. These extinguishers are meant for immediate fighting of fire in early stages.

3.8 PROJECT ORGANIZATION STRUCTURE

The 197.5 MW Kageshree Project is overseen by a management team of SPRNG at the corporate level at Pune and an onsite team at the Project site. The overall structure of organizational control is given in the following **Figure 3-2**.

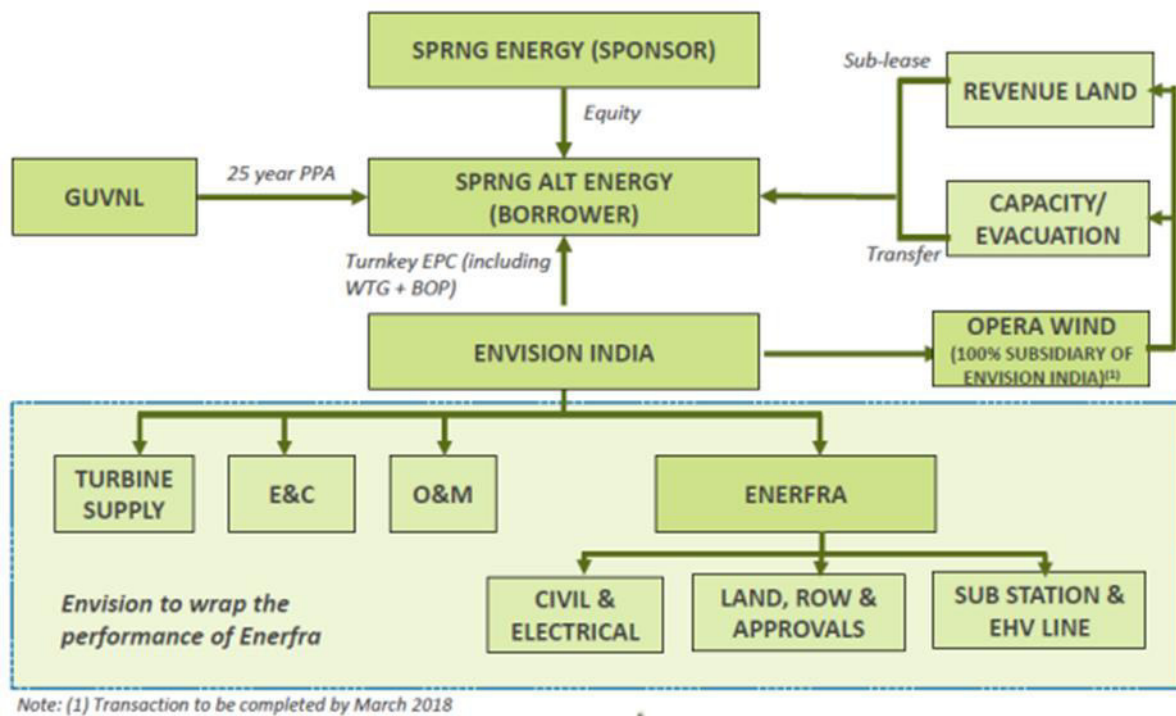
3.8.1 Engineering, Procurement and Construction (EPC) Contractor

SPRNG ALT Energy has signed an agreement with Envision for awarding Turnkey EPC contract for the responsibility of engineering, procurement, supply, construction, installation and commissioning of the WTGs. It has further appointed Enerfra for undertaking Civil and Electrical Works, Acquisition of land for Transmission Lines, handling RoW and associated approvals; and for substation and EHV line.

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 75

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat
Client: SPRNG ALT Energy Pvt. Ltd.

Figure 3-2: Organizational structure and responsibility matrix of Kageshree Wind Farm Project



3.8.2 Operation & Maintenance Contractor

Envision will be responsible for operation and maintenance activities at the Kageshree Site. Their responsibilities include:

- **Operations:** Provide onsite monitoring and operations of the WTGs;
- **Maintenance:** Onsite maintenance and service for WTGs, supply of spare parts, maintenance of spares, consumables and tools, provision of crane for maintenance, disposal of solid waste.

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 76

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

4. ENVIRONMENTAL AND SOCIAL BASELINE CONDITIONS

4.1 LOCATION AND SITE SETTINGS

The Kageshree Wind Farm Site is located near Village Paradva, Satapar, Vadvala, Balva, Chur, Amarapar, Malvada and Patan; Jamjodhpur Taluka in Jamnagar District of Gujarat, India. Jamnagar District is located in West of Gujarat and borders Gulf of Kachchh in the North. It borders Rajkot district in East, Devbhumi Dwarka district in West, Morvi district in North and Junagadh in South direction. The wind farm site is spread across Paradva, Stapar, Vadvala, Balva, Chur, Mahiki, Amarapar, Malvada and Patan villages in Jamjodhpur Taluka, Jamnagar District of Gujarat.

4.2 AREA OF INFLUENCE

The area falling within 500 m from the proposed project has been considered as Area of Influence (AoI) for evaluation of impact assessment of the project on noise and shadow flicker on the receptors in area falling with 0.5 km from the Wind Turbines.

4.3 STUDY AREA

This chapter summarises the available baseline data on physical and biological resources within the principal area of interest i.e. the project area that would comprise of project components and associates facilities. Key existing sources of information used for this section comprises of government departments, analysis of available research papers and secondary data review from established sources such as Indian Meteorological Department, etc. Reconnaissance visits and physical, social and biological field surveys were carried out in April-May, 2018 to supplement the existing baseline data.

The area falling within 10 km radius from the project boundary has been considered as “Study Area” for the purpose of conducting ESIA Study. Primary environmental monitoring was carried out in the study area in April-May, 2018 and the details are presented in subsequent sections of the Chapter. The baseline data generation includes site visits,

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 77

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

ecological surveys, social surveys and interviews, and secondary data review from established sources such as Indian Meteorological Department, Census of India.

The details pertaining to both the project taluka and district, from authentic government sources, have been presented where project area / project site specific information was not available in public domain.

4.4 TOPOGRAPHY

The topography in the project site comprises of gentle slope as well as undulated terrain sloping from West to South-East. The elevation in the project periphery varies from 95-162 m amsl.

The study area falls under Jamnagar South Plains. The relief feature reflects that the eastern part of the study area is covered by hillocks, attaining the maximum altitude of 170 meters above M.S.L. and the minimum height is recorded at 45 meters in the western portion. The general slope of the region is towards south-west. The geology of the region is mainly composed of Deccan Trap and Trap Dykes formations. Small tracts of Alluvium, blown sand etc., Nari and Gaj Series and sun-nummulitic beds are also seen in this area.

4.5 GEOMORPHOLOGY AND DRAINAGE

The study area comprises of hilly terrain as per physiographic division of Jamnagar district, Gujarat. Mount Venu is the highest summit of Barda hills that attains a height of 617.1 metres.

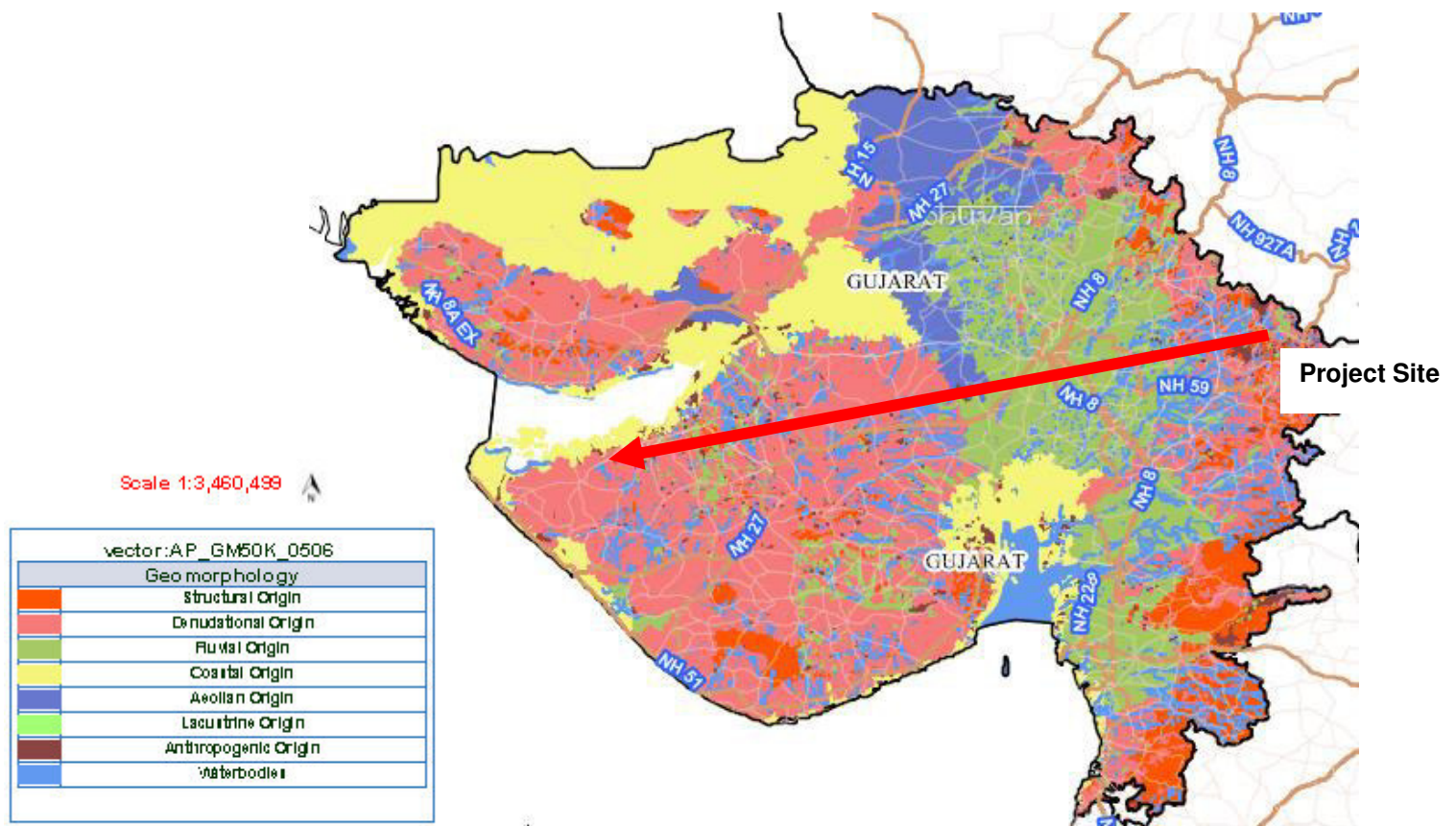
The Jamnagar district is devoid of any large perennial streams. Most of the rivers are small and flow towards the Gulf of Kutch in the North and North-West. None of them have any large tributaries and most of them are dry channels till the advent of the monsoon. The district is drained from South to North and from the South-East to the North-West to the Gulf of Kutch or Arabian Sea. The principal rivers are the Aji, Und, Vartu, Venu, Ghee, Rangmati, Nagmati, Fuljar, Phulhar, Sasoi, Sihan, Ruparel, and Demi. All these are rain fed and dry up soon after monsoon is over. The Geomorphological Map of Gujarat State showing Project Site location is shown in **Figure 4-1**.

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 78

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

Figure 4-1: Geomorphological Map of Gujarat



Source: BHUVAN

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 79

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

4.6 HYDROGEOLOGY

Hydrogeologically the study area can be categorized as soft rocks comprising “Tertiaries and Alluvium”. The study area comprises of Porous formations of Quarternary to Tertaiary age. The hydrogeological data is given below in **Table 4-1**.

Table 4-1: Hydrogeological Formations

Age	Rock Formation	Distribution	Hydrogeological Characteristics
Porous Formation			
Quaternary to upper Tertiary	Impure limestones, limestones, sandstones, conglomerates, pebble beds, silt stones, sands, pebbles, gravels etc.	Ahmedabad, Amreli, Banaskantha, Bhavnagar, Bharuch, Kachchh, Kheda, Jamnagar, Junagadh, Rajkot, Mahesana, Surendranagar and Valsad Districts	Unconfined shallow aquifer, leaky confined/ confined and deeper aquifer. Large to moderate yield prospects: 10 to 40 lps, Storativity: 1.6×10^{-4} to 7.3×10^{-4} , Hydraulic Conductivity: 5 to 20m/day, Transmissivity: 50 to 2000m ² /day

The sandstones have been encountered at depths of 200 – 250 mbgl below Traps, in semi-confined conditions. The weathered zone extends to about 20m bgl in the surface flows. Weathered flow contacts extend to greater depths. The permeability of these zones are further intensified by fracturing and jointing. These interflow zones and fractured and jointed zones have given rise to stratified aquifer system, which is responsible for occurrence of water even at greater depths. Weathering of basalts, which extends down to 20m and the fractured basalts beneath the weathered mantle have given rise to water table aquifers down to 40 m bgl. The depth of water level in the area ranges from 3.30 m bgl to 25.40 bgl during the pre monsoon period while during the post monsoon the water level ranges from 0.06 to 17.50 m bgl. The yields of the wells tapping weathered basalts are in the range of 20-100m³/day. Those in which interflow zones have been tapped 100-400m³/day. The bore wells drilled in the district have yields ranging from 100 to 500m³/day.

4.7 DEPTH TO WATER LEVELS

The Central Ground Water Board findings for Jamnagar district indicate that the depth to water level in the district ranges from 1.74 to 38.41mbgl during the pre monsoon period with

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 80

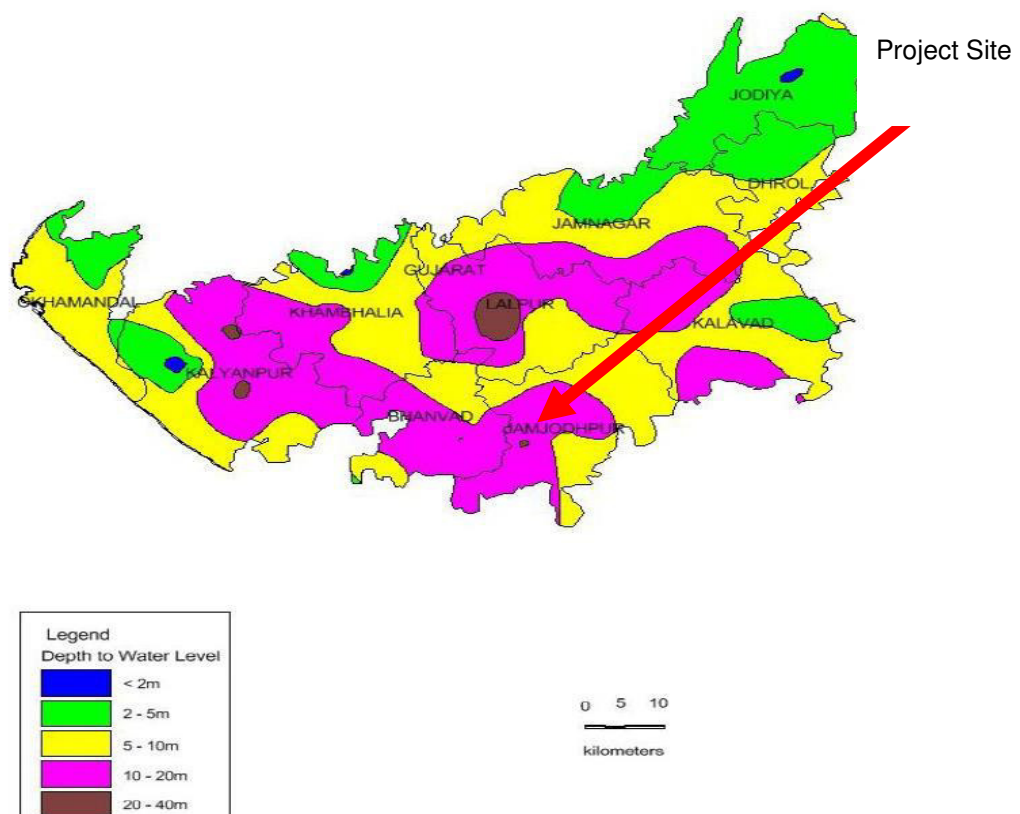
Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat
Client: SPRNG ALT Energy Pvt. Ltd.

75% of the stations showing water level less than 10m. During the post monsoon period the depth to water level ranged from 2.05 mbgl to 56.25 mbgl.

4.7.1 Long Term Water Level Trend

Analysis of the long-term groundwater level trend for 10 years (2003-2012) of the Jamnagar district reveals that rise in groundwater level predominant throughout the district. Long term rise in water level during the pre-monsoon period ranged from 0.0016 to 1.47m/yr while the fall ranged from 0.0009 to 0.62 m/yr. The long term water level fluctuation for the Post monsoon period also reveals that rise in water level ranged from 0.011 to 0.73m/yr while fall recorded in the district ranged from 0.017 to 1.42 m/yr.

Figure 4-2: Depth to Water Levels (Pre-Monsoon)

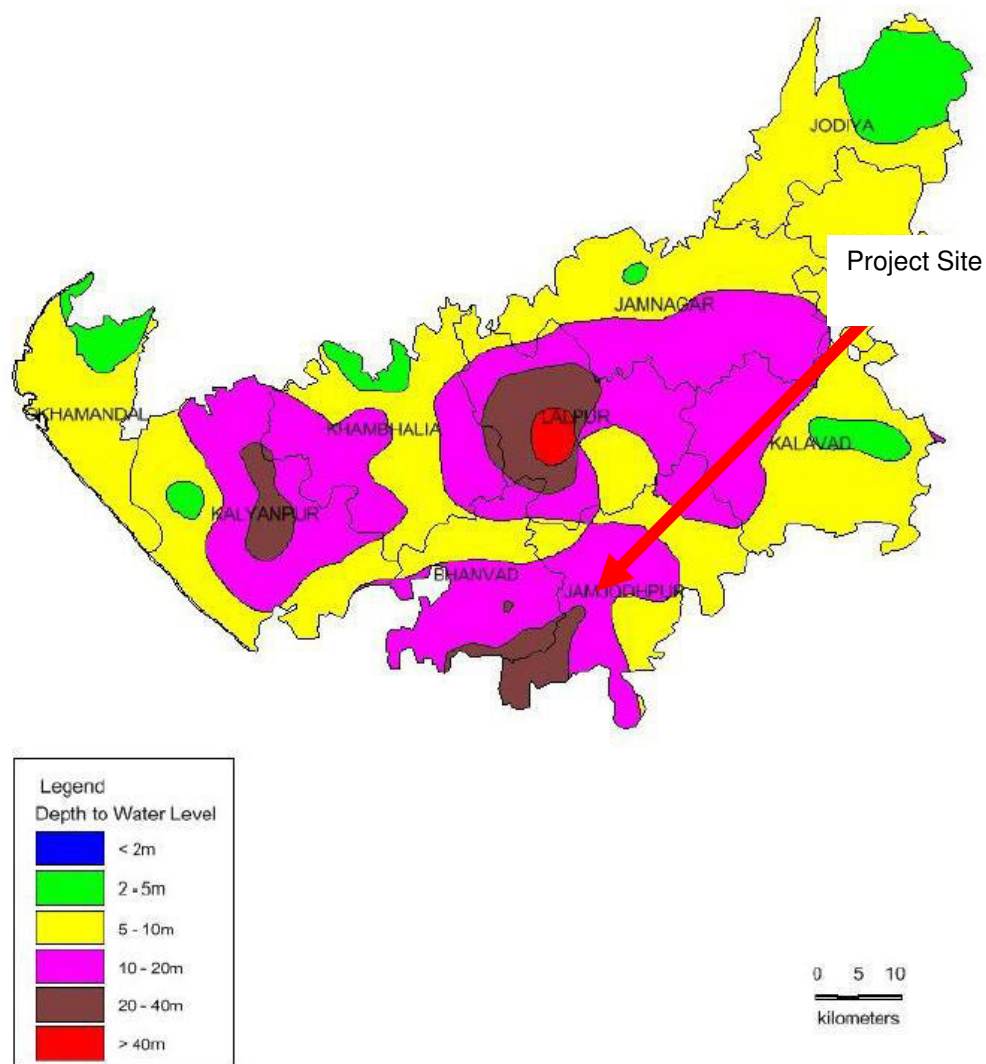


Source: District Groundwater Brochure, Jamnagar District, Gujarat, November 2013

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 81

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat
Client: SPRNG ALT Energy Pvt. Ltd.

Figure 4-3: Depth to Water Levels (Post-Monsoon)



Source: District Groundwater Brochure, Jamnagar District, Gujarat, November 2013

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 82

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

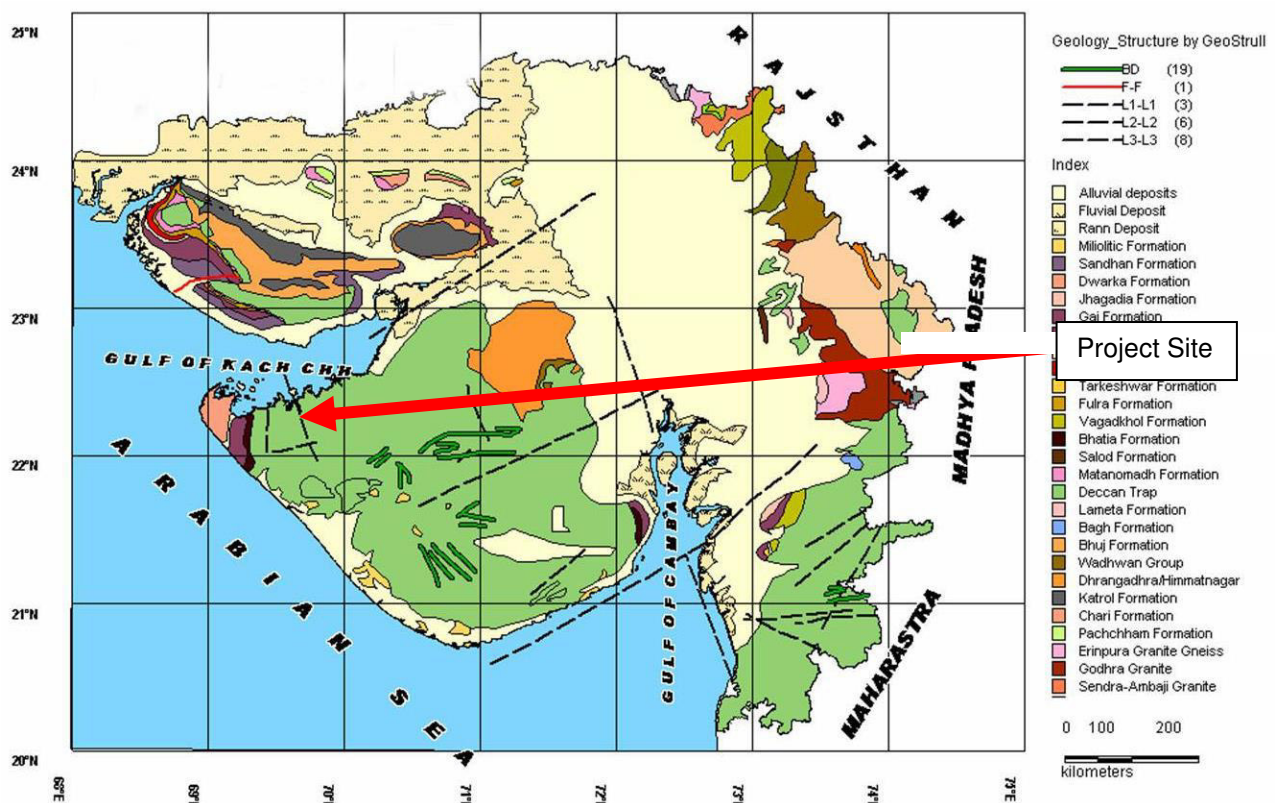
4.8 GEOLOGY

The study area lying in Jamnagar district is mainly composed of Deccan Trap and Trap Dykes formations. Small tracts of Alluvium, blown sand etc., Nari and Gaj Series and sun-nummulitic beds are also seen in this region. The geological map showing project site is shown in **Figure 4-4** and the stratigraphy of the study area falling in Jamnagar district is given below in **Table 4-2**.

Table 4-2: Geological Succession of Jamnagar District

Era	Period	Epoch	SuperGroup/Formation	Locality
Cenozoic	Tertiary	Palaeocene-Eocene	Bhatia	Jamnagar

Figure 4-4: Geological Map of Jamnagar District



Source: Narmada, Water Resources, Water Supply and Kalpsar Department

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 83

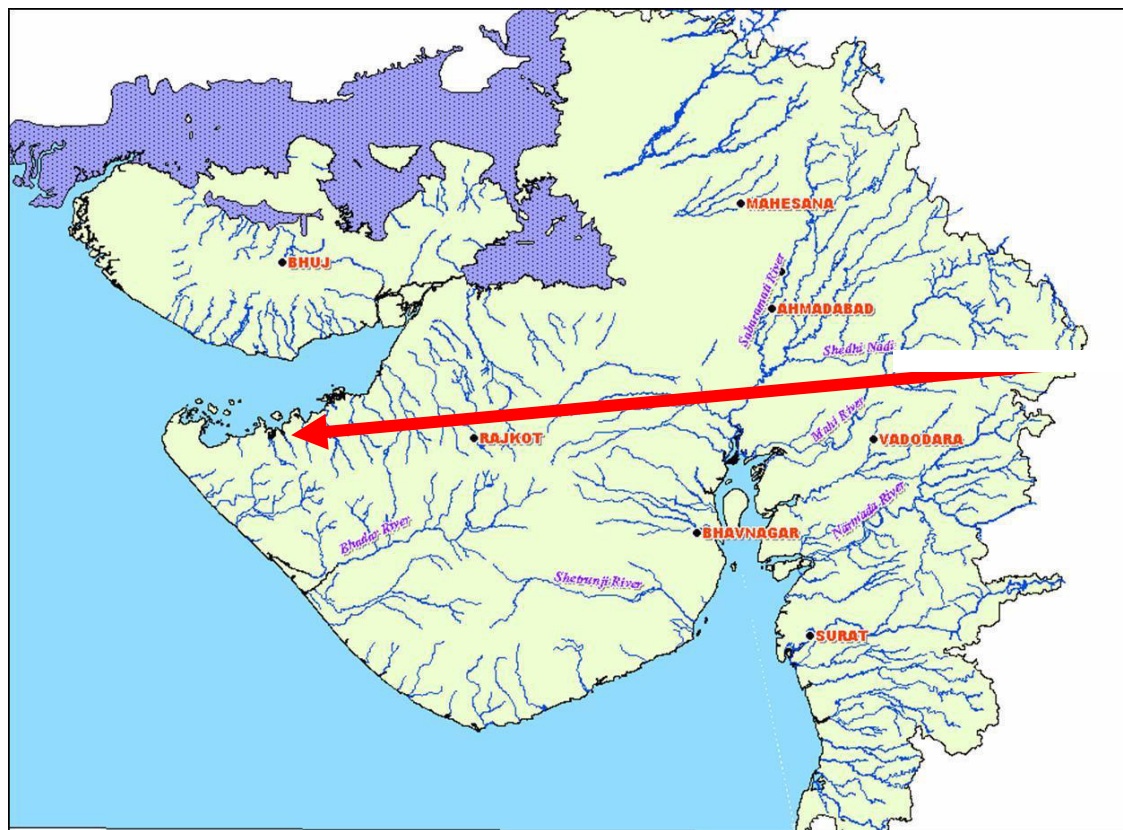
Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat
Client: SPRNG ALT Energy Pvt. Ltd.

4.9 WATER RESOURCES

4.9.1 SURFACE WATER

The study area lying in Jamnagar district falls in Bhadar basin. Fodara dam is at a distance of 17 km in West direction. The Bileshvary River originates in Kotda 20Km SW of Satapar and passes at 8Km W of Satpar (between site and Barda). Khambala Dam is located at 20km SW of Satpar village (STP11)

Figure 4-5: River Map of Gujarat



Project
Site

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 84

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat
Client: SPRNG ALT Energy Pvt. Ltd.

Figure 4-6: Waterbodies in Study Area



4.9.2 GROUND WATER

The study area lying in Jamjodhpur Taluka, Jamnagar District of Gujarat fall under safe category and the stage of ground water development of the study area falling in Jamjodhpur Taluka is 64.50%. The groundwater recharge potential is given below in **Table 4-3**.

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 85

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

Table 4-3: Groundwater Resource Potentail in Jamjodhpur Taluka, Jamnagar District, Gujarat

S.No.	Taluka	Net Annual Ground water Availability (Ham)	Total Annual Groundwater Draft (Ham)			Projected Demand for Domestic and Industrial Uses upto 2025 (Ham)	Groundwater Availability for future irrigation (Ham)	Stage of Groundwater Development (%)
			Irrigation	Domestic and Industrial Uses	Total			
1.	Jamjodhpur	12536.55	7730.70	355.00	8085.70	476.00	4329.75	64.50

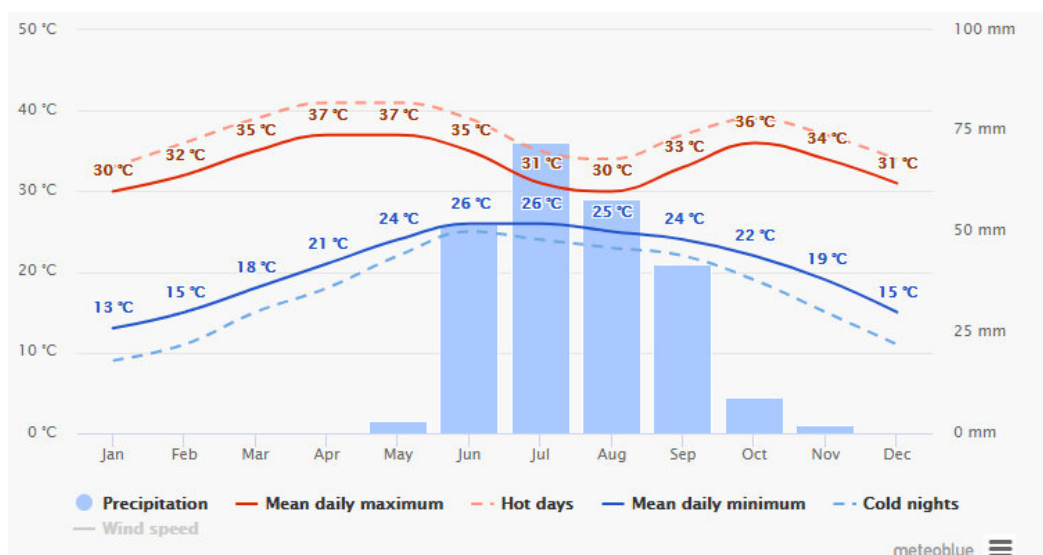
Source: District Groundwater Brochure, Jamnagar District, Gujarat, November 2013

4.10 CLIMATE

The district has semi arid climate. Extreme temperatures, erratic rainfall and high evaporation are the characteristic features of this type of climate. The average annual normal rainfall is 573.4 mm for 30 years.

4.10.1 TEMPERATURE

The temperature in summers varies from 18°C - 37°C and in winters, it varies from 13°C – 32°C. The temperature variation in pre-monsoon season i.e. June-September is 26°C – 33°C.



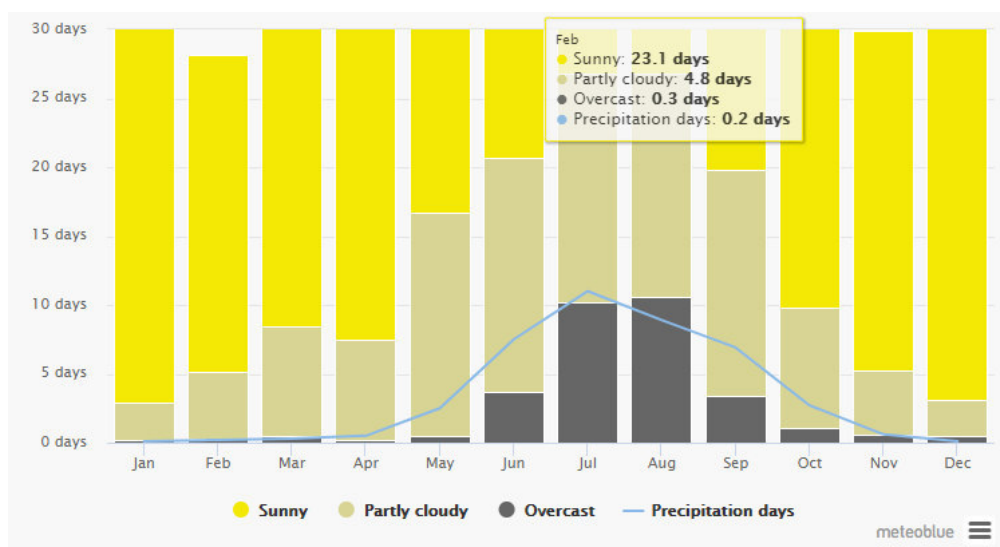
Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 86

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

4.10.2 RAINFALL

The average rainfall in the study area lying in Jamnagar District is 573.4 mm with maximum rainfall during June-August of around 469.5 mm and 40–60% coefficient of variation (CV). The southwest monsoon sets in during mid June and withdraws by mid-September from these states. The number of rainy days during this period is 10–30. Winter rains are also poor, with about 20 mm of rain from October to December. Nearly 90% of the annual rainfall occurs during June-September.



4.10.3 WIND

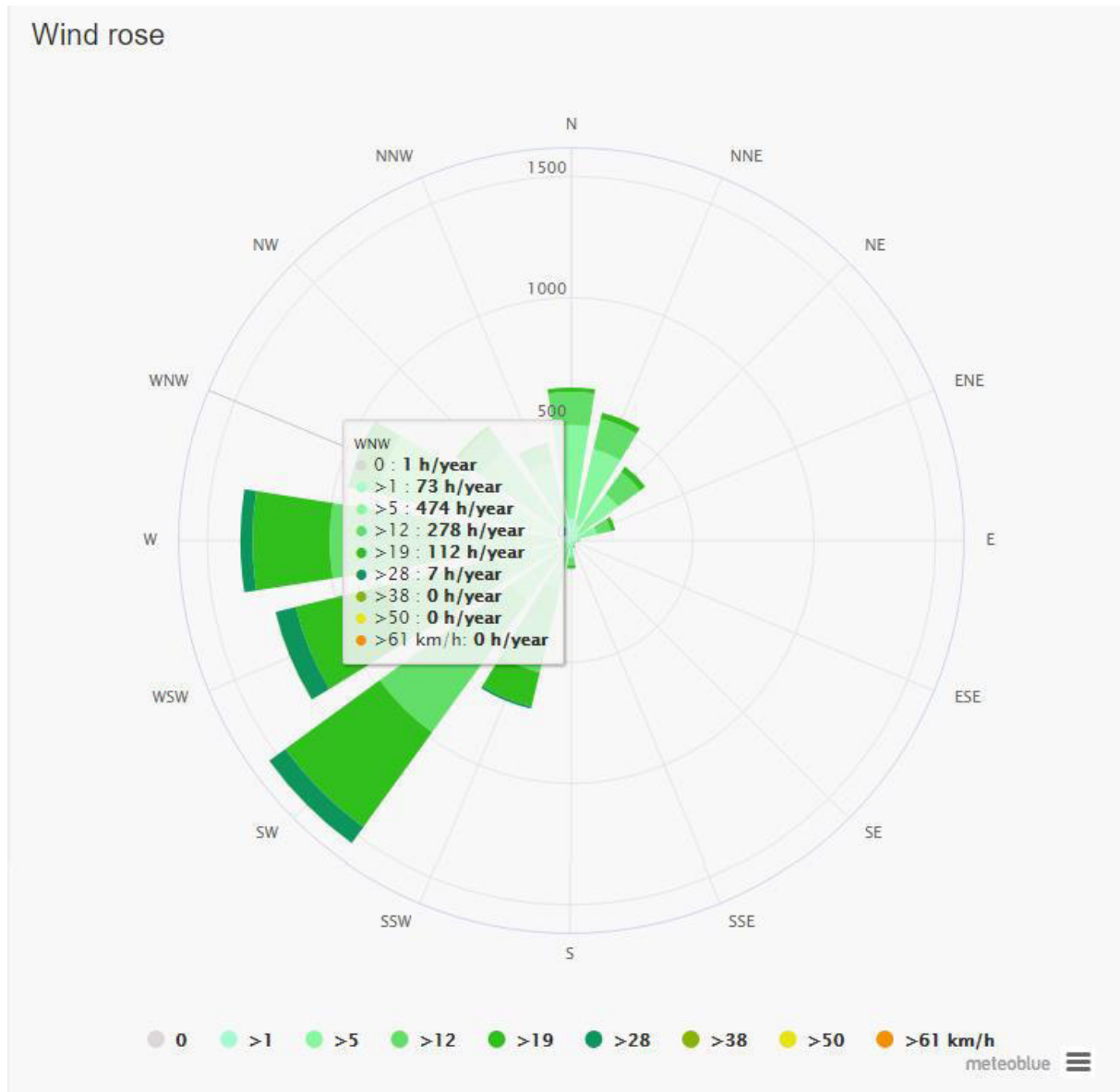
The predominant wind direct in Jamjodhpur Taluka is West and West-South-West to North-East. The wind-rose diagram for Jamjodhpur Taluka is given in **Figure 4-7**.

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 87

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

Figure 4-7: Wind Rose Diagram of Jamjodhpur Taluka



Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 88

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

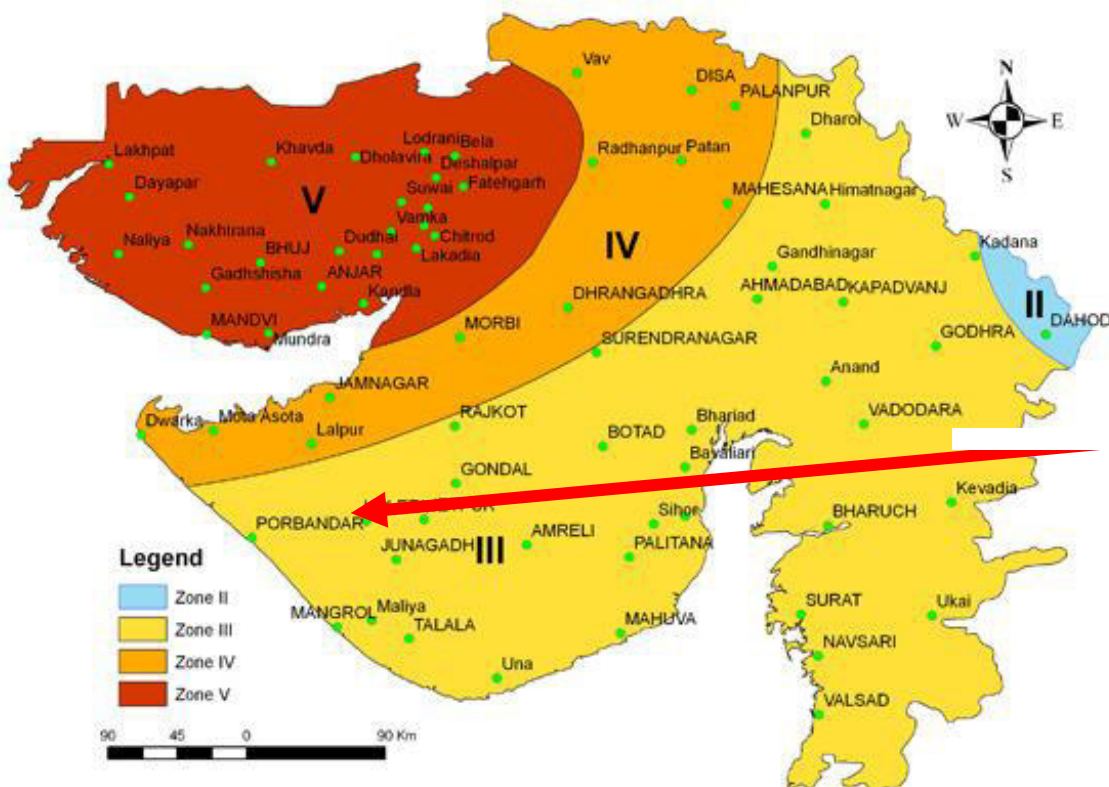
4.10.4 NATURAL HAZARDS

Natural hazards are naturally occurring physical phenomena caused either by rapid or slow onset events which can be geophysical (earthquakes, landslides, tsunamis and volcanic activity), hydrological (floods), climatological (droughts, etc.), meteorological (cyclones and storms/wave surges) or biological (disease epidemics and insect/animal plagues). Natural hazards can have impacts on the developments; hence assessment of the natural hazards in the area is important for any proposed development.

4.8.4.1 Seismicity

The study area falls in Moderate Damage Risk Zone (MSK VII). Hence, the threat of damage due to an earthquake is of moderate intensity. The seismic map is shown in **Figure 4-8**.

Figure 4-8: Wind Rose Diagram of Jamjodhpur Taluka



Project
Site

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 89

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

4.8.4.2 Drought

The area has faced drought consecutively from 2015-2018. The study area falling in Jamnagar district has faced continuous rainfall deficiency, with 1987 being the worst drought year (rainfall deficits of -74%)

4.10.5 ARCHAEOLOGY AND CULTURAL HERITAGE RESOURCES

There are no structures of archaeological importance in the vicinity and in study area.

4.11 AMBIENT AIR QUALITY

Ambient Air Quality Monitoring (AAQM) was carried out from 23rd April, 2018 to 30th April, 2018 at a frequency of twice a week at 2 locations by TUV-SUD - a NABL and MoEF&CC accredited laboratory. The air samples were analysed as per standard method specified by Central Pollution Control Board (CPCB), IS: 5184, and American Public Health Association. The monitored parameters, sampling frequency, code of practice and methods of measurement is given in **Table 4-4** below.

Table 4-4: Monitored Parameter, Sampling Frequency, Code of Practice and Method of Measurement

S. No	Parameter	Sampling Frequency	Code of Practice	Method of Measurement
1.	Particulate Matter (PM10)	24 hours twice a week	IS-5182 (PART-23):2006 & CPCB Guidelines	Gravimetric
2.	Particulate Matter (PM2.5)			
3.	Sulphur Dioxide (SO ₂)	24 hours twice a week	IS-5182 (Part-II):2001 & CPCB Guidelines	Improved West and Geake
4.	Oxides of Nitrogen (NO _x)	24 hours twice a week	IS-5182 (Part-VI): 2006 & CPCB Guidelines	Modified Jacob & Hochheiser (Na-Arsenite)
5.	Carbon Monoxide (CO)	8 hourly for 24 hours twice a week	IS: 5182 (Part-X) & CPCB Guidelines	Non Dispersive Infra-Red (NDIR) spectroscopy

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 90

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

The ambient air quality stations are described below in **Table 4-5**.

Table 4-5: Details of Ambient Air Quality Stations

S.No.	Monitoring Location	Geographical Coordinates	Reasons for selecting location
1	AAQ1	21°45'42.54"N, 70° 1'47.61"E	Upwind direction located in Residential Area (Paradva) near PRD 05 and proximity to village road
2	AAQ2	21°50'20.59"N 69° 57'14.72"E	Near Valvada village and in proximity to MLV 05
3	AAQ3	21°53'23.59"N, 69° 57'17.51"E	Near Balva village, in proximity to BLB 05
4	AAQ4	21°50'43.05"N, 69°59'07.44"E	Near Mahiki village, in proximity to VDV 09
5	AAQ5	21°52'02.94"N, 69°55'35.42"E	Near Chur village, in proximity to CHR03 and CHR 05
6	AAQ6	21°50'12.75"N, 69°54'51.09"E	Near Satapar village and in proximity to STP 07

The results of ambient air quality monitoring carried out in the study area are presented in **Table 4-6** below.

Table 4-6: Ambient Air Quality Monitoring Results

Parameter	Unit		AAQ1	AAQ2	AAQ3	AAQ4	AAQ5	AAQ6
PM ₁₀	µg/m ³	NAAQS (24 hrs)	100.0	100.0	100.0	100.0	100.0	100.0
		Minimum	68.2	63.8	47.3	57.4	38.4	53.6
		Maximum	76.1	74.6	58.4	66.4	44.8	68.4
		Average	72.2	69.2	52.9	61.9	41.6	61.0

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 91

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

		98 percentile	68.4	64.0	47.5	57.6	38.5	53.9
PM _{2.5}	µg/m ³	NAAQS (24 hrs)	60.0	60.0	60.0	60.0	60.0	60.0
		Minimum	28.3	28.4	19.2	23.1	16.4	21.4
		Maximum	30.1	29.2	23.4	27.2	17.8	27.8
		Average	29.2	28.8	21.3	25.2	17.1	24.6
		98 percentile	28.3	28.4	19.3	23.2	16.4	21.5
SO ₂	µg/m ³	NAAQS (24 hrs)	80.0	80.0	80.0	80.0	80.0	80.0
		Minimum	8.1	9.2	7.8	7.9	7.7	8.1
		Maximum	8.3	9.4	8.4	8.8	8.2	8.9
		Average	8.2	9.3	8.1	8.4	8.0	8.5
		98 percentile	8.1	9.2	7.8	7.9	7.7	8.1
NO _x	µg/m ³	NAAQS (24 hrs)	80.0	80.0	80.0	80.0	80.0	80.0
		Minimum	18.6	21.8	19.8	18.1	20.6	20.8
		Maximum	19.4	22.2	21.4	20.4	22.4	22.2
		Average	19.0	22.0	20.6	19.3	21.5	21.5
		98 percentile	18.6	21.8	19.8	18.1	20.6	20.8
CO	mg/m ³	NAAQS (8 hrs)	2.0	2.0	2.0	2.0	2.0	2.0
		Minimum	0.4	0.7	0.6	0.5	0.5	0.6
		Maximum	0.5	0.7	0.6	0.6	0.5	0.7
		Average	0.5	0.7	0.6	0.5	0.5	0.7
		98 percentile	0.4	0.7	0.6	0.5	0.5	0.6

Source: TUV SUD Environmental Monitoring

NAAQS: Revised National Ambient Air Quality Standards dated 18th November, 2009

ND: Not Detectable

Source: Lab Results

Particulate Matter (PM₁₀)

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 92

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

The Particulate Matter (PM₁₀) concentrations varied from 38.4 µg/m³ to 76.1 µg/m³ in all the six monitoring locations. The highest concentration of 76.1 µg/m³ was observed in Paradva village due to proximity of village road direction and the lowest concentration of 38.4 µg/m³ was observed in Chur village. However, the PM₁₀ concentrations at all the monitoring locations were found to be below permissible limits of CPCB.

Particulate Matter (PM_{2.5})

The Particulate Matter (PM_{2.5}) concentrations varied from 16.4 µg/m³ to 30.1 µg/m³ in all the six monitoring locations with average PM_{2.5} concentration varying from 17.1µg/m³ to 29.2 µg/m³. The highest concentration of 30.1 µg/m³ was observed in Paradva village and the lowest concentration of 16.4 µg/m³ was observed in Chur village. However, the PM_{2.5} concentrations at all the monitoring locations were found to be below permissible limits of CPCB.

Sulphur Dioxide (SO₂)

The Sulphur Dioxide (SO₂) concentrations varied from 7.7 µg/m³ to 9.4 µg/m³ in all the six monitoring locations with average SO₂ concentration varying from 8.0 µg/m³ to 9.3 µg/m³. The highest concentration of 9.4 µg/m³ was observed in Valvada village and the lowest concentration of 7.7 µg/m³ was observed in Chur village. However, the SO₂ concentrations at all the monitoring locations were found to be below permissible limits of CPCB.

Oxides of Nitrogen (NO_x)

The concentrations of oxides of Nitrogen (NO_x) concentrations varied from 18.1 µg/m³ to 22.4 µg/m³ in all the six monitoring locations with average NO_x concentration varying from 19.0 µg/m³ to 22.0 µg/m³. The highest concentration of 22.4 µg/m³ was observed in Chur village and the lowest concentration of 18.1 µg/m³ was observed in Mahiki village. The local Traffic and Vehicle Movement one of the main source to produce the Nox compounds. microorganisms). However, the NO_x concentrations at all the monitoring locations were found to be below permissible limits of CPCB.

Carbon Monoxide (CO)

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 93

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

The Carbon monoxide (CO) concentrations at all locations were found to be below 1.5 mg/m³ at all locations.

Inferences:

The ambient air quality observed in the area is good as all the parameters observed are considerably below National Ambient Air Quality Standards (NAAQS). The site and surrounding is predominantly rural with no identified major sources of pollution in the area. The movement of traffic was also observed to be limited in the area.

4.12 WATER QUALITY

The CGWB Study indicates that the ground water in the study area is general alkaline in nature. The results of chemical analysis of the ground water samples collected during the ground water network monitoring of May 2012 in Jamnagar district shows that EC>3000 micro S/Cm, where as F>1.5mg/l and NO₃ > 50mg/l were observed.

4.12.1 WATER QUALITY MONITORING

Two groundwater samples, and two surface water samples were collected to evaluate the water quality in the study area. Details of the sampling locations are given in the **Table 4-7** and **4-8** below.

Table 4-7: Ground Water Quality Sampling Locations

S.No.	Monitoring Location	Geographical Coordinates	Reasons for selecting location	Source of Water
1	GW1	21°53'13.16"N, 69°57'24.14"E	Balva village in proximity to BLB05	Well
2	GW2	21°44'58.71"N, 70°02'12.84"E	Paradva village in proximity to PRD05	Borewell

Table 4-8: Surface Water Quality Sampling Locations

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 94

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

S.No.	Monitoring Location	Geographical Coordinates	Reasons for selecting location
1	SW1	21°53'28.90"N, 70°03'57.24"E	Near Makadiya Vadi Rivulet
2	SW2	21°05'49.94"N, 70°05'48.68"E	Near Satapar Dam

Ground Water Analysis

The ground water sample was analyzed for parameters as mentioned in IS: 10500:2012 standards and the analysis was undertaken as per IS 10500 and relevant American Public Health Association (APHA) standard methods. The results of the analysis are presented in **Table 4-9** below.

Table 4-9: Results of Water Quality Analysis

Sr. No.	Parameter	IS: 10500 (Drinking Water Standards), 2012*	Unit	Ground Water	
				GW-1	GW-2
1	Color	--	Hazen	<1	<1
2	Electrical Conductivity	--	uS /cm	1800	1130
3	Turbidity	1 (5)	NTU	<1	<1
4	pH	6.5-8.5	-	7.7	7.4
5	TDS	500 (2000)	mg/l	1040.0	730.0
6	Total hardness	200 (600)	mg/l	692.6	310.8
7	Alkalinity	200 (600)	mg/l	512.9	446.0
8	Chlorides	200 (600)	mg/l	197.3	181.2
9	Sulphate	200 (400)	mg/l	109.9	40.5
10	Boron	0.5 (1)	mg/l	<0.2	0.22

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 95

Project: Final ESIA Report for 197.5 MW Kageshree Wind Power Project, Jamjodhpur Taluka, Jamnagar District, Gujarat

Client: SPRNG ALT Energy Pvt. Ltd.

11	Manganese	0.01 (0.03)	mg/l	<0.02	0.067
12	Residual Chlorine	0.2 (1)	mg/l	<0.2	<0.2
13	Calcium	75 (200)	mg/l	152.7	71.0
14	Magnesium	30 (100)	mg/l	75.5	32.4
15	Iron	0.3	mg/l	0.13	0.20
16	Cadmium	0.003	mg/l	<0.003	<0.003
17	Arsenic	0.001 (0.05)	mg/l	<0.005	<0.005
18	Lead	0.01	mg/l	<0.01	<0.01
19	Zinc	5 (15)	mg/l	0.12	<0.01
20	Chromium Hexavalent	--	mg/l	<0.05	<0.05
21	Copper	0.05 (1.5)	mg/l	<0.02	<0.02
22	Selenium	0.01	mg/l	<0.005	<0.005
23	Total Coliform	Shall not be detectable in any 100 ml sample	MPN	10	ND

Source: TUV SUD Environmental Monitoring

* Values in () indicate permissible limits

ND: Not Detected

BDL: Below Detectable Limit

Inferences:

- The pH of groundwater samples is highly alkaline and varies from 7.4-7.7
- The turbidity in GW-1 and GW-2 was observed as <1 NTU which is below permissible limits.
- Electrical Conductivity in groundwater samples varied from 1130-1800 uS /cm and TDS was observed to be ranging from 730.0-1040.0 mg/l.
- The alkalinity and hardness observed in both GW-1 and GW-2 were found to be within permissible limits

Assignment	Final Environmental and Social Impact Assessment Report for 197.5 MW Kageshree Wind Power Project, Gujarat	Tool : IFC Performance Standards
Version-01		Page 96