

Executive Summary

Environmental & Social Impact Assessment (ESIA)

**9500 MW Hybrid (Wind+ Solar) Power Project at
Taluka Bhuj, District Kutch, Gujarat**

Ref. No. 10055695



Prepared by:
Arcadis India Private Limited

QUALITY ASSURANCE

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02- Draft Report	V.01	01 April 2023	Aditya Anchliya (Environment Expert), Mithilesh Kumar (Social Expert), Pinal Patel (Ecology Expert), Sritoma Bose (Team Support) and Lala Ram (GIS support)	Ananya Mukherjee (Team Lead)
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EXECUTIVE SUMMARY

Background

Adani Green Energy Four Limited (revised name Adani Green Energy Holding Four Limited (“AREH4L”)), a subsidiary of Adani Green Energy Limited (hereinafter referred as “AGEL”) is developing a 9500 MW Renewable energy park near village Khavda, tehsil Bhuj of district Kutch, Gujarat (hereinafter referred as the “project” or “proposed project”). However, as informed to Arcadis, the project development of 9500 MW is being carried out in phases & at present, the following SPV DPRs have been finalised: AGE24AL:T2 Khavda 500MW, AGE24BL:T2 Khavda 500MW, AGE25AL: T3 Khavda 500 MW, AGE25BL: T3 Khavda 500 MW, AGE26BL: T1/T4 167 MW and ARE41L: Wind 260 MW). The rest would be finalised later.

The project will be spread over approximately 19000 Ha of tehsil Bhuj in district Kutch of Gujarat. The proposed project site is located in Great Rann of Kutch region of the North-western part of Kutch District, about 125 km North of Bhuj Town and about 34 km North-West of Khavda Village. The project land, which lies between the Border Security Force-manned India Bridge and the India-Pakistan border was under the control of the Border Security Forces (BSF) and last point accessible to civilians is 30 km from the project land. The nearest village from the project site is 34 km away. The entire identified land for the project is un-surveyed and barren revenue wasteland.

The nearest villages to the project site are: Khavda, Kuran, Dhrobana and Dinara. The proposed project site and associated infrastructure (Transmission line) does not fall within 10 km of any Protected Areas such as National Parks, Wildlife Sanctuaries, etc. Banni Grassland (Protected Forest) and Chhari-dhand (Conservation Reserve) is present in the vicinity of 50 Km while Narayan Sarovar Sanctuary is located at around 65 km from the project area.

The project site lies between *Allah Bund*¹ and low hills of Nagar Parkar ridge near India-Pakistan border. The project site almost has a flat topography with elevation 3 to 4 m above MSL with presence of slightly raised patches of land in west and south direction of the project site having elevation between 4 to 6 m above MSL. The shallow areas of the project site which comprise of vast expanse of saline wasteland remains under water during the monsoon season and becomes dry again due to evaporation during the long dry season.

Arcadis India Private Limited (hereinafter referred as Arcadis) was appointed by AGEL to undertake an Environmental and Social Impact Assessment (ESIA) study of Hybrid Power Project in accordance with IFC’s Performance Standards, Equator principles, World Bank Group’s EHS Guidelines and applicable sector guidelines and national environmental laws and regulations.

The main purpose of the ESIA study is to identify, evaluate and manage environmental and social impacts that may arise due to construction and operation of the project. The document has been prepared following IFC’s Performance Standards, World Bank Group’s EHS Guidelines and applicable sector guidelines, Equator principles as well as applicable local and national regulations. The main objectives of the ESIA study may be highlighted as follows:

- To identify and establish the baseline environmental and socio-economic conditions, to analyse the environmental and social risk and impacts of the project and its associated components (facilities like transmission line, access road etc.)
- Review of the land sale process to assess any legacy or current/existing issues (like informal settlers, livelihood dependence, other usage etc.) on the procured land through suitable survey using acceptable socio-economic tools. This will help in assessing the impact of the project on the community/ villagers.

¹ The 1819 earthquake had generated scarp – a high linear mound 60-70 km long, 16 km wide and between 2 and 4 metres off the ground stretching in an east-west direction on the plains of the Rann which was called the *Allah Bund* – “the mound of God” – it was silhouetted against the low hills of the distant Nagar Parker ridge near the India-Pakistan border. This scarp had blocked the course of the Nara river, a distant tributary of the Indus that used to flow through the Rann to the Gulf of Kachchh and was used to conduct trade between coastal and inland merchants, in the Sind province.

- Socio-economic survey involving consultation with local community, stakeholders, land sellers, to identify the needs and problems of community with respect to the project activities.
- To suggest appropriate safeguards for the associated environmental and social risk, which may not lead to project investment and activities at risk.

The site visit for the ESIA study was undertaken in June 2022 to assess any potential impacts (both negative and positive) that may arise from the construction, operation and decommissioning of the solar plant. The main purpose of the ESIA study is to identify, evaluate and manage environmental and social impacts that may arise due to implementation and operation of the project. The Environmental and Social Impact Assessment (ESIA) study for the project has been undertaken in accordance with the scope of work assigned to Arcadis.

Project Overview

The nearest villages to the project site are: Khavda, Kuran, Dhrobana and Dinara. The proposed project site and associated infrastructure (Transmission line) does not fall within 10 km of any Protected Areas such as National Parks, Wildlife Sanctuaries, etc. Banni Grassland (Protected Forest) and Chhari-dhand (Conservation Reserve) is present in the vicinity of 50 Km while Narayan Sarovar Sanctuary is located at around 65 km from the project area.

The project site lies between *Allah Bund* and low hills of Nagar Parkar ridge near India-Pakistan border. The project site almost has a flat topography with elevation 3 to 4 m above MSL with presence of slightly raised patches of land in west and south direction of the project site having elevation between 4 to 6 m above MSL. The shallow areas of the project site which comprise of vast expanse of saline wasteland remains under water during the monsoon season and becomes dry again due to evaporation during the long dry season.

Total 19,000 ha revenue land was allotted to M/s AGEL in December 2020 in accordance with the Gujarat Government policy "Allocation policy of Government waste land for Wind /solar /wind -solar hybrid Park" dated 25.01.2019. The term of lease agreement to allotted land is for 40 years. First 10 years will be for park development and other 30 years for generating of renewable energy. The annual rent of the leased land is Rs. 15,000 per hectare per year and other taxes to the government from the date of handing over the possession of the land. There will be 10% increase in annual rent after every three years.

Applicable IFC's Performance Standards

The following IFC's performance standards (PS) are applicable for this project:

- PS 1: Assessment and Management of Environmental and Social Risks and Impacts,
- PS 2: Labour and Working Conditions,
- PS 3: Resource Efficiency & Pollution Prevention,
- PS 4: Community Health, Safety and Security.
- PS 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources,

The following IFC's performance standards are not applicable for this project:

- PS 5: Land Acquisition and Involuntary Resettlement,
- PS 7: Indigenous People
- PS 8: Cultural Heritage

PS1: Social and Environmental Assessment and Management Systems

The project will have environmental and social impacts due to generation of onsite air emissions, noise, domestic wastes from site office and rest rooms, and generation of hazardous wastes from the construction site. AGEL has developed Environmental & Social Management System (ESMS) which needs to be followed and implemented to manage the risks associated with its operations. This ESIA report includes evaluation of project specific environment and social risks arising from the project activities along with recommended

mitigation measures. AGEL should also appoint qualified E&S personnel with appropriate responsibility to implement/ oversee/ monitor the ESMS.

Hence, PS1 is applicable.

PS2: Labour and Working Conditions	<p>Labourers would be involved during construction and operation phase. The contractor's workforce will comprise of both skilled and unskilled labours, which may be sourced from the nearby village settlements depending on their skills and capabilities.</p> <p>In the operational phase too there will be a significant deployment of labourers at the project site including security guards, operation and maintenance staff.</p> <p>Hence, PS 2 is applicable.</p>
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PS3: Resource Efficiency & Pollution Prevention	<p>The project involves use of resources like land and water. Improper handling of broken and damage solar panel may result in soil contamination. Improper handling of spent oil may lead to contamination of soil and ground water.</p> <p>The Project site and its peripheral area represent a wide variety of land use/land cover type. In general, it comprises of vast expanse of saline wasteland which remains under shallow water during the monsoon season. The elevated bays/ bays are dominated with wastelands with scrubby vegetation. The land use and land cover (LULC) of the project site and its adjoining areas are divided into seven geo-ecological classes, viz; saline area, barren land, agriculture, grassland, water, Suaeda and forest/ vegetation area. Construction activities may lead to air and noise emission which needs to be managed. Broken / damaged solar panels may result in contamination of soil and ground water. The project would involve clearing of ground vegetation along with construction and demolition waste. Infrastructure facility like Batching plant, STP, and labor colony are common facility under AGEL. STP outflow: will be reused for plantation</p> <p>Water will be required for both construction as well as operation phases along with domestic purpose. Diesel/ transformer oil/ spent oil may contaminate soil and water.</p> <p>Hence, PS 3 is applicable.</p>
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PS4: Community Health, Safety and Security	<p>During construction phase the project envisages influx of labourers from nearby villages and these migrant labourers are expected to interact with community hence there is a possibility of conflict between migrant labourers and local community. AGEL and contractors should ensure proper stakeholder consultations, grievance redressal mechanism, communication to workers and other stakeholders to avoid any conflict between migrant labour and local community.</p> <p>Shadow flicker and noise emission during wind turbine operation may impact community health and safety, However, since the project site is devoid of any settlements, this doesnot hold true for this project</p> <p>Heavy vehicles would use the existing village roads. Several staff will remain involved during the operation period. The generated electrical energy will be transmitted through high voltage power line, thereby exposing the staff and community to electrical injury cannot be ignored.</p> <p>Construction of boundary wall may result in restriction of access/ increased distances from common property. Interaction of community with project staff especially security staff would occur.</p> <p>Thus, PS 4 is applicable.</p>
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PS5: Land Acquisition and Involuntary Resettlement	<p>A total of 19,000 ha of revenue land has been allotted to AGEL for the development of 9500 MW hybrid solar-wind power project. The proposed project land is located in Great Rann of Kutch region of the North-western part of Kutch District, about 125 km North of Bhuj Town and about 34 km North-West of Khavda Village. The project site, which lies between the Border Security Force-manned India Bridge and the India-Pakistan border was under</p>
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the control of the Border Security Forces (BSF) and last point accessible to civilians is 30 km from the project land. The nearest village from the project site is 34 km away. The entire identified land for the project is un-surveyed and barren revenue wasteland.

Land was allotted to AGEL in December 2020 in accordance with the Gujarat Government policy "Allocation policy of Government waste land for Wind /solar /wind -solar hybrid Park" dated 25.01.2019. The term of lease agreement to allotted land is for 40 years. First 10 years will be for park development and other 30 years for generating of renewable energy. The annual rent of the leased land is Rs. 15,000 per hectare per year and other taxes to the government from the date of handing over the possession of the land. There will be 10% increase in annual rent after Every three years.

There is no economic and physical displacement envisaged due to the procurement of land for the hybrid power project. Since the project land was not accessible to civilians or local people hence no agriculture or livelihood activities are being done on this land. This was confirmed during consultations with the local people during the site visit. This project does not involve any resettlement in terms of physical aspects and do not attract Resettlement plan as per applicable national/state legislation. No community property Resources (CPR) and private or government structures identified on the procured land. The project does not involve any restriction on access to land or use of other resources including communal property and natural resources. **PS 5 is therefore not applicable for the project.**

PS 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources

Proximity analysis to check the presence of forested area, Eco sensitive area or protected area in the vicinity of the project site reveals that no notified/designated forest area exists within 10 km of the project site. Banni Grassland (Protected Forest) and Chhari-dhand (Conservation Reserve) is present in the vicinity of 50 Km while Narayan Sarovar Sanctuary is located at around 65 km from the project area. GIB potential & priority area are in the vicinity of 100 Km. According to E-bird, 193 species of birds are recorded in Greater Rann of Kutch, 268 species in Chhari-Dhand and 265 species in Banni Grassland, while 44 species are recorded in Dhordo Road near Khavda village. Out of all this recorded species there are around 5 Critically Endangered species including historical record of 3 vulture species and Great Indian Bustard and Sociable Lapwing. Furthermore 9 Species belong to Vulnerable category, 3 Species belong to Endangered category and 17 species belong to Near Threatened Category. The project site falls in an area which comes under Central Asian Flyway.

Consultation with forest department revealed that transmission line for the renewable energy park will probably pass through the Banni grassland which could be a concern, especially for birds with large wingspan like cranes, vulture, flamingos, storks and various other raptors.

However, the Banni Grassland is outside the Khavra Project Influence Area (starts about 22 kms away from the project boundary). GIB presence is very rare in this area, there has been only 1 sighting of GIB (the critically endangered species) in the Banni grassland in 2012, no further sighting. The transmission lines in the grassland falls under PGCIL, not Adani; however, mitigation measures suggested for the transmission line routes to avoid collision & electrocution will take care of the risks.

PS -6 is applicable for the project.

PS 7: Indigenous Peoples

The study area located in Kutch district does not fall in any notified tribal area of Gujarat state. There is nearly 1% of tribal population in Kutch, which has been verified from the secondary data of Census of India 2011.

In addition to this, entire 19,000 ha of the project land is un-surveyed and barren revenue wasteland which has been allotted to AGEL in December 2020 in accordance with the Gujarat Government policy "Allocation policy of Government waste land for Wind / solar / wind-solar hybrid Park" dated 25.01.2019. As reported, the land parcels are devoid of any settlements, Based on the information,

Therefore, PS 7 is not applicable.

PS8: Cultural Heritage

There is no designated archaeological or cultural heritage site within 10 Km radius of the study area village and there no cultural or religious important place is affected due to the project. However, as many Indus valley civilization sites has been discovered in Kutch district like Dholavira, Lothal etc., AGEL should develop a comprehensive Framework for Cultural Heritage² and Chance Find³ through which all aspects related to identification; assessment & management of the Cultural Heritage aspect will be covered.

Based on the information available and observation made, PS 8 is not applicable at present.

Key impacts during construction phase

Impact on air quality: Generation of fugitive dust due to movement of project vehicles, transportation of fine material (if not covered) and emission from diesel generators and vehicles. Impact will be limited to the construction phase only.

Water resources: As reported to Arcadis, water will be sourced either from safe authorized sources through vendor and supplied by tanker during construction phase and will be under the scope of the EPC Contractor or through the proposed Desalination plant. Drinking water requirement during the construction phase will be met via local tankers/ approved vendors. As per the categorization by CGWB the Blocks where the project sites are located falls under over Critical category. Hence, impact on the ground water is anticipated to be High.

Conflict between migrant and local community: During construction phase the project envisages influx of labourers from nearby villages and migrant labourers, these labours are expected to interact with community, there is a possibility of confrontation between migrant labourers and local community.

Traffic Load: The project site is connected to the National Highway (NH-45). Apart from this, a suitable approach road from nearest public road to park entry and site office is under constructed. Road will be of 7.0m wide carriageway with drain on both the side of road shall be constructed. The road will be bituminous flexible pavement. The top of road (TOR) elevation will be minimum 150 mm above FGL to avoid flooding of roads during rains. The roads will be provided with alongside drains as per design requirements of drainage system for effective disposal of storm water and to avoid cross flow of storm water over the road.

Impact on Ecology: Major habitat in the study area includes stretches of saline desert, salt marshes and grasslands resembling Banni grassland and Chhari- dhand wetland. Low-lying plain is formed by the detritus brought down and deposited predominantly by the Indus River, supporting grassland popularly known as Banni in the district. The prominent feature of the landscape is seasonal waterbodies interspacing this grassland filling up during years of heavy precipitation. The water gradually turns saline due to excessive evapotranspiration and the high content of dissolved salts in the soil. There will be minimal clearing of vegetation during the construction phase. Therefore, the impact on ecology is envisaged to be Moderate.

Conflict between migrant and local community: About 600 number of workers is expected to be involved in the construction activities. Social impact associated with migrant workers is negligible.

Health and safety: The construction phase activities such as installation of solar PV panels and WTG erection, construction of transmission lines and substations and movement of material and personnel may result in impacts on the health and safety of the workers and the community. These activities will involve the use of heavy machinery and live

² Tangible or in some cases intangible culture that represents the past history or surviving beliefs or knowledge of traditional peoples.

³ Chance Find: A previously unknown tangible cultural heritage resource Chance Find encountered during any part of a project lifecycle. Most commonly these are archaeological sites found during construction or surface clearing.

transmission power lines. Accidents in workplace may lead to occupational health and safety issues, for which proper training to workers need to be given to combat the same as well as it needs to be further ensured that the workers wear appropriate PPE's according to their nature of work.

Key impacts during operation phase

Soil & ground water contamination: Improper handling of broken/ damaged solar panels spent oil may result in contamination of soil and ground water. Diesel/ transformer oil/ spent oil may contaminate soil and water.

Water resources: As reported to Arcadis, during the operation phase, water will be sourced from safe authorized sources through vendor and supplied by tanker. Drinking water requirement will be met via local tankers/ approved vendors or Desalination Plant.

As per Project DPR, the project will have in-house developed semi-automatic module cleaning system which uses compressed air and water for module cleaning. The AGEL will also implement the dry (waterless) robotic cleaning technologies which will be included intermittently with semi-automatic cleaning system. It is proposed to develop rainwater harvesting cum storage facilities within site to meet the water requirement of the project as well as for the benefit elevating ground water level.

The robotic cleaning will lessen water usage during operation phase to a great extent. Thus, the project will not contribute to water stress in the area. The impact on water resource in Operation phase will be Low.

Occupational health and safety of workers: Accidents like electrocution, short circuits may lead to occupational health and safety issues, for which proper training to workers need to be given to combat the same as well as it needs to be further ensured that the workers wear appropriate PPE's according to their nature of work involved.

Social Welfare: Locals may get dissatisfied due to influx of migrant labour. To reduce dissatisfaction among local people regarding the project activity, maximum job opportunity should be provided to the locals on priority during construction phase. Besides, a community development plan along with a grievance redressal mechanism should be followed. It should be ensured that a complaint register is maintained onsite so that any complaints from the stakeholders, locals or labours can be registered, investigated, and timely resolved.

Ecological Risk: Project Site falls in an area which comes under Central Asian Flyway. According to E-bird, 193 species of birds are recorded in Greater Rann of Kutch, 268 species in Chhari-Dhand and 265 species in Banni Grassland, while 44 species are recorded in Dhordo Road near Khavda village. Out of all this recorded species there are around 5 Critically Endangered species including historical record of 3 vulture species and Great Indian Bustard and Sociable Lapwing. Furthermore 9 Species belong to Vulnerable category, 3 Species belong to Endangered category and 17 species belong to Near Threatened Category. Considering this, possibility of collision and electrocution of these birds with WTG and transmission line cannot be ruled out. Therefore, the impact on ecology is envisaged to be High. However, conductor to conductor distance is above 15 ft, also host of other measures like bird diverters will reduce the risk.

Community Health and Safety: Impact may be envisaged due to electromagnetic fields, noise, shadow flicker and accidental blade throw. But with appropriate mitigation measures, the same can be minimized.

Noise: Wind turbines produce noise through a number of different mechanisms, which can be roughly grouped into mechanical and aerodynamic sources. Wind turbines noise could impact on annoyance, sleep and health of the residents at close proximity to the wind turbines.

Shadow flicker impact: Shadow Flicker will impact potential receptors like workers etc.

Blade Throw: A failure of the rotor blade can result in the “throwing” of a rotor blade, or part thereof, which may affect public safety which are mainly because of mechanical failures. The overall risk of blade throw is extremely low with regular maintenance.

Soil contamination: Storage/ improper disposal of broken/ damaged solar panel may result in soil/ ground water contamination.

Waste generation: The waste generated from project includes domestic solid waste at Office building and substation and hazardous waste like waste oil, lubricants and solar panels.

Employment: During the operations phase, the requirement for unskilled and semi-skilled labour is expected to reduce. The locally procured services will include maintenance work of the facility, 24-hour security, bush and undergrowth cleaning and housekeeping activities.

Social Welfare: A community development plan along with a grievance redressal mechanism should be implemented. Complaints received by locals should be registered, investigated and timely resolved.

Key Mitigation Measures

For the purpose of providing site specific mitigation measures to mitigate key identified impacts from the project, an ESMP has been developed. The ESMP specifies the standards and controls required to manage and monitor environmental and social impacts during construction and operation phases. To achieve this, the ESMP identifies potential adverse impacts from the planned activities and outlines mitigation measures required to reduce the likely negative effects on the physical, natural and social environment.

Construction phase:

- Raw/fine material should be covered with tarpaulin sheet during transportation and in storage area.
 - Proper water sprinkling of road should be undertaken to reduce the fugitive emissions during transportation.
 - Proper PPE's viz. gloves, glasses, helmet and shoes should be worn by workers/labours while handling solar panels as well as during other activity during construction phase.
 - It should be ensured that the accommodation provided to the migrant workers should meet national and international standards laid down by ILO, IFC. Basic amenities such as electricity, potable drinking water, waste disposal, health & sanitation facility and kitchen to be provided.
 - Integral noise shielding to be used where practicable and fixed noise sources to be acoustically treated by using for example silencers, acoustic louvers and enclosures.
 - Strict prohibition shall be implemented on trapping, hunting or injuring wildlife within subcontractors and shall bring a penalty clause under contractual agreements.
 - Camp and kitchen waste shall be collected in a manner that it does not attract wild animals.
 - Septic tank to be installed. Periodic maintenance of septic tank to be ensured to avoid overflowing.
 - The speed limit of the heavy vehicles should be maintained.
 - All project vehicles will comply with national emission standards and have valid PUC certificate.
 - Hazardous materials such as waste oil, used oil should be stored at designated locations in enclosed structures over impermeable surface. Secondary containment to be used for fuel storage tanks.
 - Hazardous Waste authorization as per Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016 should be obtained.
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- The construction contractor should ensure collection and timely ((bi-monthly) disposal of construction waste generated debris, concrete, metal cuttings wastes as per the Construction and Demolition Waste Management Rules 2016.
- NOC for ground water abstraction or surface water procurement should be obtained in the event developer/project proponent install bore well for ground water abstraction or procure borewell water or procure surface water to meet water requirement for the project activity as it is a highly water scarce area.
- Complaint register should be maintained onsite to receive complaints from locals and workers.
- Temporary barriers/fencing shall be installed in excavated areas.
- Broken Solar panels will be stored at a designated area within the plant with appropriate safety measures until the same is disposed of to the manufacturer/authorized dealer.
- Grievance Redressal mechanism should be followed by AGEL and its sub-contractors. It should be ensured that a complaint register is maintained onsite so that any complaints from the locals or labours can be registered, investigated and timely resolved.
- Contracting opportunities for locals possessing tractors, dumper trucks or other vehicles which would be needed to carry away excavated soil and other material. Creation of indirect employment for local community through establishing small shops like tea stalls, supply of intermediate raw materials, repair outlets, hardware stores etc.

Operational phase:

- Implement the recommended complaint resolution procedure (Grievance Redress Mechanism) to assure that any complaints regarding noise or any other issue related to project activity is not left unnoticed. The complaints should be registered, investigated and timely resolved.
 - Adani will implement semi-automatic module cleaning system which uses compressed air and water for module cleaning or preferably dry robotic cleaning system to reduce the stress on local water resources, especially groundwater resources.
 - Rainwater harvesting structures/ water conservation structures should be used to meet the operational water needs.
 - Water to be used from authorised vendors, potable packaged water for staff & workers.
 - The sewage generated onsite will be treated and disposed through septic tanks and soak pits. Ensure that septic tanks are emptied and collected by contractor at appropriate intervals to avoid overflowing. The sewage generated onsite shall be treated and disposed through septic tanks and soak pits as per specifications given in IS 2470: 1995 (Part I and II)
 - The hazardous waste (such as transformer waste oil & bottom sludge) generated will be disposed through SPCB/CPCB approved vendors in accordance with Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016, as amended.
 - Covered conductors, daytime visual markers, visibility enhancement objects such as marker balls, bird deterrents, or diverters shall be installed on any guy wires and transmission lines to enhance visibility of towers/transmission lines for bird. to avoid avian collision;
 - Daytime visual markers shall be provided on any guy wires used to support towers to enhance visibility of towers for bird. Visibility enhancement objects such as marker balls, bird deterrents, or diverters shall also be installed along the transmission line to avoid avian collision;
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- Use of reflectors and bird flappers to be used at suitable intervals to avoid easy visibility of transmission wires and the risk of electrocution.
- Additionally, installation of insulator capacitors (Jumpers) at the cut point will reduce the risk of electrocution.
- The tip of blades of WTGs should be painted to increase visibility and avoid collision. This is also done for established aircraft navigation path
- Any dead animals/carcass shall be removed in time from the site so that it does not attract movement of raptors near to the WTGs
- While planning project transmission lines, feasibility should be checked for avoiding water bodies crossings. This can be considered for water bodies that could be important when they turn into suitable habitats.
- Native vegetation must be planted or allowed to grow around the wind-turbines, such that their canopy screens potential prey on the ground from raptors flying overhead.
- Appropriate storm-water management measure shall be implemented to avoid creating ponds which can attract birds and bats for feeding or nesting in the windfarm area
- Training of local staff and security guards for spotting of bird carcass and reporting the same. This will help to ensure the strategic actions when the species are spotted in the region.
- Towers be regularly checked to avoid any nesting in any suitable gaps or platforms.

Decommissioning Phase:

- Decommissioning consists of the removal of facility components, the management of excess materials and waste and the restoration of Project Location lands and waters, as applicable to facilitate the anticipated future use of the land.
- This Decommissioning Plan should be done to assist the project proponent in fulfilling regulatory requirements as mandated by government agencies for the decommissioning of the Project.
- The project proponent will adhere to the decommissioning requirements provided in their decommissioning report and will ensure that the project location is restored to a condition appropriate for its future use.
- Decommissioning of the project and any ancillary equipment can be conducted in such a manner as to ensure that there will be no significant negative environmental effects.

Conclusion and Recommendation

The project site for 9500 MW Hybrid power project lies between Allah Bund and low hills of Nagar Parkar ridge near India-Pakistan border. The project site almost has a flat topography with elevation 3 to 4 m above MSL with presence of slightly raised patches of land in west and south direction of the project site having elevation between 4 to 6 m above MSL. The shallow areas of the project site which comprise of vast expanse of saline wasteland remains under water during the monsoon season and becomes dry again due to evaporation during the long dry season.

A total of 19,000 Ha revenue land has been allotted to AGEL in accordance with the Gujarat Government policy "Allocation policy of Government waste land for Wind /solar /wind -solar hybrid Park" dated 25.01.2019. The term of lease agreement to allotted land is for 40 years.

The entire stretch of land is flat and free from encumbrances. There are no major undulations and site is suitable for setting up solar and wind projects. However, specific geology of the region such as very loose soil strata, Seismic Conditions / Liquefaction, corrosion, water logging etc. poses certain challenges for park design and its implementation.

There is no economic and physical displacement envisaged due to the procurement of land for the hybrid power project. Since the project land was not accessible to civilians or local

people hence no agriculture or livelihood activities are carried out on this land. This project will not involve any resettlement as per applicable national/ state legislation. No community property Resources (CPR) and private or government structures have been identified on the project land. The project does not involve any restriction on access to land or use of other resources including communal property and natural resources.

The infrastructure mainly consists of the roads, Power evacuation facilities, Boundary security, Drainage system of complete area, Water Treatment plant, Desalination plant, water supply, batching plant, STP, Labour camp and other facilities and Office setup with basic health and safety facility.

The proposed project site is approachable through National Highway (NH-45). Apart from this, a suitable approach road from nearest public road to park entry and site office is under construction.

One of the impacts identified as anticipated impact is on water resources due to construction and operation of the project. The freshwater resource in the area is very scarce. Module cleaning work through water may put extra pressure in already stressed water resource during operation phase of the project. To mitigate this, Adani will be implementing the robotic cleaning to avoid water stress in the area.

The other major significant impact associated with location of the project is falling in an area which comes under Central Asian Flyway. According to E-bird, 193 species of birds are recorded in Greater Rann of Kutch, 268 species in Chhari-Dhand and 265 species in Banni Grassland, while 44 species are recorded in Dhordo Road near Khavda village. Out of all these recorded species there are around 5 Critically Endangered species including historical record of 3 vulture species and Great Indian Bustard and Sociable Lapwing. Furthermore 9 Species belong to Vulnerable category, 3 Species belong to Endangered category and 17 species belong to Near Threatened Category. Considering this, possibility of collision and electrocution of these birds with WTG and transmission line cannot be ruled out. To mitigate this, a number of measures have been suggested: adequate conductor to conductor distance, bird diverters & host of other measures to minimise the risk.

The impact on avifauna population due to the solar panels is not anticipated since, there is no threat of direct collision between the birds and the stationary solar panels; the mere presence of the panels may not directly harm the species.

It is envisaged to have some impact due to issues related to air and noise environment, labour accommodation facility, operation of DG set, batching plant, water requirement, waste generation, impact on soil due to storage and spillage of DG oil (land environment), community safety and occupational health and safety during the construction period, and some minor impact on agriculture and domestic animals due to change of land use and social issues regarding RoW and such matter, conflict with common property resource utilization. The impacts anticipated during the operation phase is fugitive emissions from movement of project vehicles within the site (air environment), as well as use of water resources during operation phase, which can be mitigated by adopting suggested mitigation measures.

Complaints received through Grievance Redressal Mechanism (GRM) procedures shall be addressed by AGEL in line with the procedure formulated in ESMS. This will overcome public inconvenience during the proposed project activities. Based on the environmental and social assessment and surveys conducted for the project, the potential adverse environmental and social impacts can be mitigated to an acceptable level by implementing adequate mitigation measures identified in the ESMP, whereas project will improve the socio-economic conditions of the surrounding areas.

Based on the conclusion drawn from the ESIA study with respect to the intensity of impacts due to project activities on environment, resources, biodiversity, labour and community, the project can be categorized as “**Category B**” (as per IFCs categorization of projects), which specifies that this project is expected to have limited adverse environment and social impacts, which can be mitigated by adopting suitable mitigating measures.