

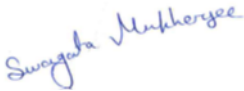





Environmental and Social Impact Assessment (ESIA) Report For WRSS XXI(A) Transco Limited

Adani Transmission Limited

October 2021



Quality information

Prepared by	Checked by	Verified by	Approved by
  			
Swagata Mukherjee Wanda Lamare-Socio Economic Sudin Pal- Ecology	Souvik Basu	Avijit Sarkar	Chetan Zaveri

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Prepared for:

Adani Transmission Limited

Adani Corporate House
Shantigram, S G Highway
Ahmedabad 382421
Gujarat India

Prepared by:

AECOM India Private Limited

19th Floor, Building No.5
Tower C, Cyber City
Gurgaon 122002
Haryana
India

CIN: U74210HR2008FTC038183

T: +91 124 4682700/800
aecom.com

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Executive Summary

Introduction

Adani Transmission Limited (herein after referred to as ATL) owns and operates various High voltage AC transmission lines and substations of 132kV, 220kV, 400kV, 765kV voltage level and also High Voltage DC transmission lines and substations of +/- 500kV voltage level. ATL has won the Western Region Strengthening Scheme – 21 (WRSS-21) Part A - Transmission System Strengthening Project on a Tariff-Based Competitive Bid. This report intends to assess the Environmental and Social Impact Assessment (ESIA) of the proposed transmission line.

Based on the environmental and social impact identified and mitigation discussed the project is categorized as Category B. Category B projects are those with “potentially limited adverse social or environmental impacts that are few in number, generally site-specific, largely reversible and readily addressed through mitigation measures”.

Route of Transmission line

Western Region Strengthening Scheme–21 (WRSS-XXI) which includes of Lakadiya - Bhuj 765kV D/C transmission line (Route length in 107.6 km) and LILO of Bhachau – EPGL 400kV D/c (triple) transmission line (Route length in 38.5 Kms) and proposed Lakadia 765/400 KV Pooling Substations (involving area of 168 Acres). The proposed project in being set up in Kutch district of Gujarat.

Need & Objective

The objective of the ESIA is

- To document various environmental and social impacts related to field activities that are being undertaken by ATL for laying of transmission line and
- To highlight the environmental and social management strategies, systems, and procedures being employed along the transmission line route and to meet the environmental and social requirements of the funding institutions.

Project Description

The WRSS XII transmission line alignments traverse through the 37 villages located in 4 Tehsil of Kutch district. Out of 37 villages, LILO line is passing through 8 villages of Bhachau Tehsil and Lakadia-Bhuj is passing through 29 villages. The proposed Pooling substation is located in Shivilakha villages of Bhachau Tehsil.

The National Highway 341 and NH 15 cut across all the two TL alignments. In addition, two TL alignments also crossing the railway line. The total number of towers in the Bhuj Lakadia 765 kV D/C line would be 280. Among them, A, B, C, D types tower would be 216, 17, 17, 30 respectively. In the case of LILO line, the total number of towers would be 119. Among them, A, B, D types of tower would be 52, 22, 45 respectively.

All construction activities would be carried out within the Right of Way for the safe operation of the transmission lines as per IS: 5613.

The design, fabrication, testing, erection procedures, and materials to be used for the erection of towers, line materials, construction foundations, etc. will conform to the Bureau of Indian Standards (BIS), as amended up to date and provisions of the Indian Electricity Act Electricity rules and related statutory approval.

The tower construction would start after the setting of the concrete is complete. It is estimated that in WRSS XXI(A) project total of 399 numbers of towers (280 towers in 765 kV line and 119 towers in 400 kV LILO line) would be constructed. Among them, 63 numbers of towers have been already erected and 173 numbers of foundation activity have been completed.

During the O&M stage of the project, ground patrolling would be carried out. The patrolling would monitor the growth of trees in violation of the minimum safety clearance, development of any house or settlement within the

RoW. Roads and bridges constructed within the ROW would also reduce the minimum safety clearance so these would also be monitored.

The foundation construction team would have around 15-20 labours while the tower erection teams which would follow would have 15-20 people. Finally, the stringing team would also have around 20-25 people involved in the job. During the foundation and tower construction, approximately 10-15 teams would be working in parallel. Thus approximately 200-300 labours would be working at any time in the project.

The project implementation has been planned over a period of 18 months, this would include the Detailed design Phase as well as Construction (Detailed Surveys, material supply, foundation, erection of tower, stringing, testing and commissioning). The date of commissioning is December 2020; however, the Ministry of Power vide order dated: 27.07.2020 had extended all projects up to 5 Month hence revised SCOD is March 2022

Pollution and control measures

The pollution expected from construction activities includes fugitive dust emission due to excavation and project-related vehicular movement and waste debris from the casting of foundations. There is potential for disturbance to habitations in the proximity of the towers due to construction activities.

Implementation of suggested measures will enable suppression of dust generation, disposal of waste debris, and other adverse impacts.

Baseline

The baseline studies have profiled the environmental and social conditions along the transmissions line, covering, in general, a buffer distance of 500m of both sides of the alignment where any significant environmental sensitivity is identified. The studies were designed to collect information from secondary sources and to obtain primary information through site visits and consultation with local communities and other related stakeholders. Overall this is reflective of the environmental and social landscape of the districts through which the alignment would pass. The transmission line is located in Kutch District in Gujarat. Bhuj is located on a "porous" sandstone which acts like a "sponge". The surface rain waters flow towards Hamirsar and the other city lakes. The shale layer, below the sandstone, is waterproof and makes sure that the water doesn't flow out of Bhuj Area underground. The Kachchh-Kutch region has a unique climate influenced by the Arabian Sea in the South and the harsh climate of the Rann in the Northern and Eastern Boundary. The area has quite high temperatures during summer and moderate cold in winter. The average annual maximum temperature is 34.3°C while the average annual minimum temperature is 19.3°C. The Kutch area experiences very low rainfall with a total rainfall of about 276.4mm (as per IMD 30 year's average data) with 13.9 numbers rainy days. The annual average wind speed recorded at the IMD weather station at Rudramata Aerodrome, Bhuj indicates that the highest monthly wind speed is 5.0 m/s in June followed by 4.7 m/s in May. The lowest windspeed was recorded in December 0.3 m/s.

Existing sources of generation of particulate matter and gaseous air pollutants is primarily because of the transportation of vehicles through adjoining road. considering this context, the ambient quality is expected to be well within the National Air Quality Standards for all parameters. The soils found in Kutch district can broadly be grouped into four types, i.e., Shallow Black soils, Residual Sandy soils, Coastal Alluvial soils and Desert soils. The depth to water was monitored by the Central Groundwater Board and it was found that in the pre- monsoon period (2012) the depth to groundwater is 2-5 m bgl along the alignment between Adipur Jn and Anjar. In regions near Bhuj the water level was 5-10 m bgl (below ground level). However, in the post-monsoon (2012) groundwater levels indicate that they are 5-10 m bgl across the entire alignment.

Details Forest Along the Alignment within AOI

Forest of Kutch district classified under the Type 6B- Northern Tropical Thorn Forest, as per the forest classification of Champion and Seth (1968). These forests are also known as Open scrub thorn forests due to poor canopy formation. This can be further divided into 5/D-Dry deciduous Scrub, 6/E4 -Salvadora scrub, 6B/C-Desert Thorn Forest, 6B/DS2-Tropical Euphorbia scrub, 6B/ DS1- Zizyphus sp. scrub, and Capparis sp. association 5/E3 -Babul (Acacia nilotica) forest, 5/DS5-Dry Savannah type vegetation (Acacia nilotica- Salvadora sp. association, 6/E2-Gorad (Acacia Senegal). However, the invasion of Prosopis juliflora in these forests, has changed the floral composition and vegetation structure. The transmission line-wise protected/reserve/social forest area are given below:

1. 765 KV D/C Bhuj to Lakadia Transmission Line: Within this segment of the transmission line 3.0916ha forest land is present under Kutch-East Division and Kutch SF Division, in Kutch District. Within three villages namely Meghpar (Kunjisar) - 0.1406ha, Lodai - 2.6666ha and Loriya 0.2844ha, the forest land is present.

2. 400 KV D/C LILO Transmission Line 1 & 2: Within this segment, the transmission line is crossing through the social forest area (road site) of Kutch district. and. Total 0.7507ha forest land is present under Kutch SF Division, in Kutch District. Within two villages namely Lakadiaya - 0.3821ha and Shamkhiyali- 0.3686ha, the forest land is present.

Both transmission lines have been passed through social forest area and Stage I forest clearance for these social forest segments has already been granted by MoEF&CC.

Wild Ass Sanctuary IBA (IBA Code IN097):

The east portion of 765 KV D/C Bhuj to Lakadia Transmission Line, i.e. Shivilakha (Substation area) is situated approximately 24km east-southeast away from the Wild Ass Sanctuary.

The southern portion (Jangi) of 400 KV D/C LILO Transmission Line, is situated approximately 8km North-northwest away from the Wild Ass Sanctuary.

Flora

Sixty-five (65) floristic species were recorded collectively at the sampling sites. The study area comprises of 18 tree species belonging to 9 families, 10 shrubs species belonging to 8 families and 35 herbs species belonging to 14 families. Most common species were *Azadirachta indica*, *Prosopis cineraria*, *Prosopis juliflora*, *Salvadora oleoides*, *Ziziphus nummularia*, *Blumea* sp., *Aristida* sp.

Mammals

At least thirty-five (35) species of mammals have reported ranges that include the Study Area. With respect to the IUCN Red List, one (01) of these species is designated as endangered and two near threatened. With respect to the WPA Schedules, eight (08) of these species are listed under Schedule I. Six (06) species of mammals were observed and six (06) recorded from consultation as part of the primary data.

Birds

One hundred sixty-two (162) species of birds have reported ranges that include the Study Area. These include seventy-nine (79) species that are resident with respect to the Study Area and Eighty-three (83) species, which are migratory with respect to the Study Area. With respect to the IUCN Red List, out of 79 resident bird species, one vulnerable (Sarus Crane) and one near-threatened birds (Black-necked Stork) have reported ranges in the study area. Out of 83 migratory birds' species one endangered, three vulnerable and five near-threatened birds' species have reported ranges along the study area

Reptiles

At least twenty-three (22) species of reptiles have reported ranges that include the Study Area. With respect to the IUCN Red List, one (01) of these species is designated as vulnerable. With respect to the WPA Schedules, one (01) of these species is listed under Schedule I. Two (02) species of reptiles were observed and five (05) recorded from consultation as part of the primary data.

Amphibians

At least six (06) species of amphibians have reported ranges that include the Study Area. With respect to the IUCN Red List, none of these species are designated as globally threatened. With respect to the WPA Schedules, none of these species are listed under Schedule I. No species of amphibians were observed as part of the primary data and, two (02) recorded from primary consultation.

Social Issues and Management

The community had raised concern on issues with regards to health and safety and potential exposure to electromagnetic fields during operation, especially during the rainy season. Besides, the community also had raised concern for adequate compensation for land use along with the tower footprint since the current government circle rate was reported to be much lower than the prevailing market rates. In lieu of the MoP guidelines, the project has addressed the situation and land valuation was carried out through a committee formed by the District Magistrate in consultation with the affected landowners. The land value was reported to be 15 times higher than the prevailing government rate. The Project has completed payment compensation to about 100 affected landowners for restriction on land use and still ongoing. No issues and objection were reported on the project regarding the project activities, the local community were positive of the project and are willing to support the project.

Embedded measure maintaining minimum ground clearance is mandatory as per guidelines, Electrical inspectorate from Central Electricity Authority would visit the line before charging and after certification, only the line shall be

charged. Further, line will be strictly monitored during the operational stage to avoid any risk of exposure to any kind of safety hazards. A site engineer will be appointed by the project who will undertake a regular inspection of all lines from time to time.

Impact Assessment

Potential impacts of proposed transmission line during:

The construction phase for casting of foundation, tower erection and stringing activities will be mainly disturbance to fauna and flora, traffic hazards, noise, safety issues and waste disposal. Socio-economic issues will be due to restricted use of land and loss of crop.

The operational phase involves disturbances to vegetation and noise etc. The social impacts will be from movement along the corridor, expectation management and perception about the generation of the electromagnetic field. Mitigation to counter adverse impacts are discussed in the Environmental and social management plan.

Environmental and Social Management Plan

The ESMP provides a delivery mechanism to address potential adverse impacts, instruct contractors and introduce standards of good practice to be adopted for project activities taken up during construction and operation phases of the project. Inspection and monitoring of the environmental and social components phase activities will increase the effectiveness of suggested mitigations.

Through the process of inspection, audit and monitoring ATL will ensure that all the contractors comply with the requirements of conditions of forest clearance, and other permits including suggested action plans.

The inspection and audits will be done by trained team ATL's Environment, Health and Safety (EHS) department as well subject to be reviewed and conducted by external agencies/experts. The entire process of inspections and audits is being documented. The inspection and audit findings are to be implemented by the contractors in their respective areas.

Conclusion

The ESIA has assessed the overall acceptability of environmental and social impacts likely to arise as a result of the construction and operation of the transmission line for WRSS project. The proposed project is categorized as category B as the social or environmental impacts are assessed as limited, few in number, site-specific, largely reversible, and readily addressed through mitigation measures.

The project is likely to generate some environmental and social impacts both during construction and operation. During the construction phase, the environmental impacts expected from the project include disturbance to fauna and flora, construction waste of disposal, increase of noise level, and social impacts mainly from the engagement of land and loss of crop. During the operation phase, the impacts include disturbance to vegetation, noise generation and social impacts of restricted activities within the corridor.

The environmental and social management plan describes implementation mechanism for recommended mitigation measures during construction and operation phase to verify overall project performance.

1. Introduction

1.1 Background

Adani Transmission Limited headquartered in Ahmedabad, Gujarat is the largest private sector power transmission company in northern, western and central India. ATL owns and operates various High voltage AC transmission lines and substations of 132kV, 220kV, 400kV, 765kV voltage level and also High Voltage DC transmission lines and substations of +/- 500kV voltage level. Today, ATL has a portfolio of more than 14,000 ckt km of transmission lines and around 27,000 MVA of power transformation capacity.

ATL primarily aims at addressing the vast potential in India's transmission sector and has set an ambitious target to set up 20,000 circuit km of transmission lines by 2022. ATL has invested in the latest technologies resulting in the highest network availability of over 99.76% in the country, which corresponds to the best global standards.

ATL has won the Western Region Strengthening Scheme – 21 (WRSS-21) Part A - Transmission System Strengthening Project on a Tariff-Based Competitive Bid. The transmission line would connect the Bhuj Pooling substation to the Lakadia Pooling Substation where would be connected by the 765 KV D/C line. The Scheduled Commercial Operation Date is Dec 2020 (Revised SCOD March 2022) and the concession terms is 35 years.

The WRSS XXI(A) SPV is formed to strengthen the transmission system for relieving over loadings observed in Gujarat intra-state system due to renewable energy injections in Bhuj pooling station. The project is part of Green Energy corridor and will help in the evacuation of renewable power projects in Gujarat. Adani Transmission Limited has won the project in Tariff Based Competitive Bidding (TBCB) and a Letter of Intent to this effect was issued on 31 July 2019.

AECOM India Private Limited has been commissioned by Adani Transmission Limited (ATL), a subsidiary of the Adani Group to undertake an Environmental and Social Impact Assessment (ESIA) study for the establishment of a transmission system for WESTERN REGION STRENGTHENING SCHEME–21 (WRSS-XXI) which includes of Lakadia - Bhuj 765kV D/C(Route length in 107.6km)and LILO of Bhachau – EPGL 400kV D/c (triple) line (Route length in 38.5 km) , 2 Nos 765kV Bays for 765kV Bhuj-Lakadia Line at Bhuj PG Substation and proposed Lakadia 765/400 KV Pooling Substation.

This report discusses the environmental and social baseline within which the proposed transmission power project is commissioned and assesses the potential adverse and beneficial impacts that the project could have, along with suitable mitigation measures and an Environmental and Social Management Plan (ESMP) for the project

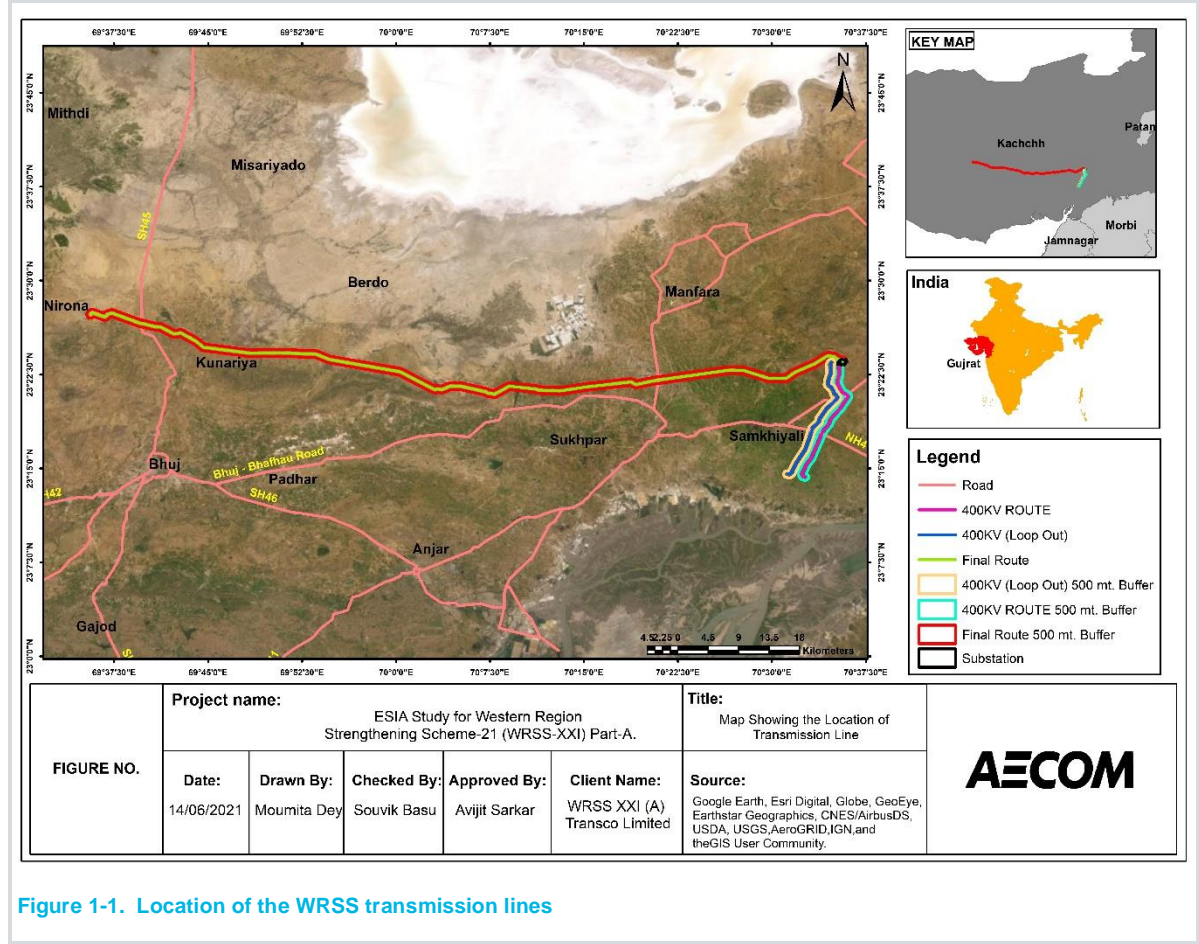


Figure 1-1. Location of the WRSS transmission lines

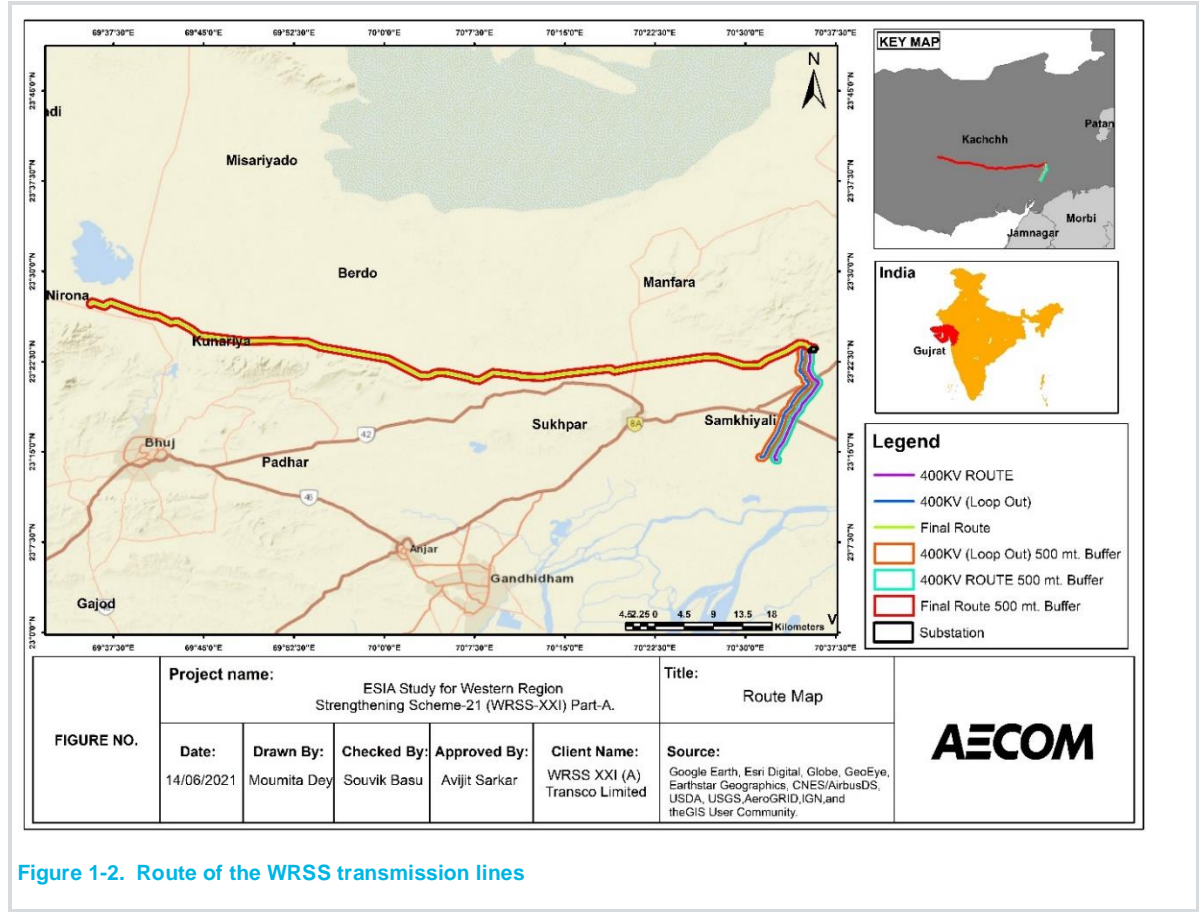


Figure 1-2. Route of the WRSS transmission lines

1.2 Objective of the Report

Adani Transmission Limited (ATL) is currently exploring funds from international lenders, and this ESIA is prepared to help meet the requirement in terms of providing the lenders, an assessment of the project against international standards. In this context, the project requires evaluating the environmental and social risks associated with the project and to implement mitigation measures to avoid adverse impacts for the remainder of the project's lifecycle.

This report discusses the environmental and social baseline within which the proposed transmission line project is commissioned and assesses the potential adverse and beneficial impacts that the project could have, along with suitable mitigation measures and an Environmental and Social Management Plan (ESMP) for the project. The following sections provide an understanding of the scope of work and the applicable reference framework for the ESIA.

1.3 Scope of the Report

The scope of work for ESIA included the following:

- I. Identification of applicable local and national environmental and social regulations and relevant international E&S standards for transmission power projects;
- II. Categorization of the projects based on IFC Performance Standards.
- III. Summary of the approach adopted by ATL for design of the transmission line and assessment of alternatives available for the project together with an overview of the outcome of the key decisions already taken up by the company for the transmission line route.
- IV. Description of the environmental and social baseline of the project in terms of the key sensitivities and potential constraints on the construction and operation and maintenance of the transmission line.
- V. Identification of the potential adverse environmental and social impacts during erection and operation of the transmission line and mitigation measures to be adopted by ATL

1.4 Project Proponent

The Adani Group's journey in the transmission sector started in 2006, well before Adani Transmission Limited (ATL) was formally established. This was necessitated by the need to evacuate power from Adani's Mundra Thermal Power Plant. The dedicated lines, commissioned for evacuation of power spanned more than 3800 ckt km connecting Mundra – Dehgam, Mundra – Mohindergarh, and Tirora – Warora.

Another line spanning more than 1200 ckt km was commissioned in 2014 for evacuation of power from Adani's Tiroda power plant. Subsequently, in 2015, looking at the enormous business potential in the transmission sector, Adani Transmission Limited (ATL) was carved out of Adani Enterprises Limited (AEL) for a focused pursuit of opportunities in the transmission sector. ATL has also tapped various inorganic avenues for growth and acquired GMR's transmission assets in Rajasthan (2016), Reliance Infrastructure's transmission assets in Gujarat, Madhya Pradesh and Maharashtra (2017) and KEC's Bikaner Sikar transmission asset in Rajasthan (2019)

In 2018, ATL forayed into the distribution space with the acquisition of Reliance Infrastructure's Power Generation, Transmission & Distribution Business in Mumbai. Today, Adani Electricity Mumbai Limited (AEML) caters to the electricity needs of over 3 million customers in Mumbai suburbs and Mira-Bhayender Municipal Corporation in Thane district with a distribution network spanning over 400 sq. km.

Today, ATL is the largest private transmission company and operates more than 11,000 ckt km of transmission lines and around 18,000 MVA of power transformation capacity. ATL has further set an ambitious target to set up 20,000 circuit km of transmission lines by 2022 by leveraging both organic and inorganic growth opportunities.

1.5 Limitation of the Report

This ESIA report is based on scientific principles and professional judgment applied to facts with resultant subjective interpretations. Professional judgments expressed herein are based on the analysis of available data and information. The ESIA report was prepared with the following limitations;

- I. The assessment of the environment and social risks is limited to project information available at this stage of the project, discussion with stakeholders, secondary data collected, consultation with local community and observations made during site survey. Professional judgment and interpretation of facts has been applied for presenting inference from the collected information;
- II. The consultations undertaken as part of the ESIA were limited to the stakeholders, who were available for consultation during the site visit; which included landowners, local community, and Project site Team;
- III. Consultation with the local community was limited to those villages only where the project has already obtained the land as recommended by ATL as it apprehends that locations where land uptake is in process, consultations may cause some hindrances.
- IV. As rapid site assessment was undertaken for a short duration, the report does not address the seasonal variability of the data.
- V. Due to the prevailing pandemic situation in India i.e. COVID-19, limited consultation with local communities has been conducted with all safety provision

1.6 Report Structure

The structure of the ESIA report is given below in **Table 1.1**

Table 1-1: Structure of the Report

Chapter	Particulars	Description
Chapter 1	Introduction	Introduction to the Project
Chapter 2	Project Description	Technical description of the Project & related infrastructure and activities
Chapter 3	Policy Legal and Administrative framework	Discussion of the applicable environmental and social regulatory framework and its relevance for the Project.
Chapter 4	Description of Environment	An outline of the Environmental, Ecological and Social Baseline status within the study area of the Project.
Chapter 5	Anticipated impacts and mitigation measures	This section includes details of identified environmental, ecological and social impacts and associated risks due to project activities, assessment of the significance of impacts, and presents mitigation measures for minimizing and /or offsetting potential impacts identified.
Chapter 6	Environmental and Social Management Plan (ESMP)	Outline of the Environmental and Social Management Plan (ESMP) taking into account identified impacts, proposed mitigation measures, and monitoring requirement
Chapter 7	Stakeholder Assessment and Disclosure	An outline of the engagement with the stakeholder groups undertaken as part of the assessment process and the key issues identified from the same
Chapter 8	Grievance Redressal /mechanism	Discuss the Grievance redressal process of the employee and local community
Chapter 9	Conclusion and Recommendation	Short description of the project background

2. Description of the Project

ATL has been selected as a successful bidder by Bid Process Coordinator (REC Transmission projects Company Limited) as Transmission Service Provider (TSP) on build, own, operate and maintain basis for WESTERN REGION STRENGTHENING SCHEME-21 (WRSS-XXI) Part-A which includes Lakadia - Bhuj 765kV D/C (Route length in 107.6km) and LILO of Bhachau – EPGL 400kV D/c (triple) line (Route length in 38.5) and proposed 765/400 KV Pooling Substation at Lakadiya.

2.1 Need of The Project

Renewable power in Gujarat is a fast-developing industry given that the large state is mostly arid. Gujarat was one of the first states to develop solar generation capacity in India. The total installed capacity of solar and wind power plant in Gujarat as on 30.07.2020 is 3127.88 MW¹ and 7523.452 MW. Large plants have also been set up in Kutch district of Gujarat. The transmission line project has been set up with an aim to strengthen the transmission system for relieving over loadings observed in Gujarat intra-state system due to renewable energy injections in Bhuj pooling substation. The project is part of Green Energy corridor and will help in the evacuation of renewable power projects in Gujarat.

2.2 Project Proposal

The WRSS- XXI (A) would include the following:

- Establishment of 2x1500MVA, 765/400kV Lakadia Pooling Substation
- LILO of Bhachau – EPGL 400kV D/c (triple) line at Lakadia PS.
- Bhuj PS - Lakadia PS 765kV D/c line which will connect existing Power Grid Pooling Substation at Bhuj and proposed Lakadia Pooling Substation
- 2 nos of 765kV bays at Bhuj PS for Bhuj PS – Lakadia PS 765kV D/c line

2.3 Regional Setting

The WRSS XXI transmission line alignments traverse through the 76 villages located in 4 Tehsil of Kutch district. Out of 76 villages 6 villages are common for both the transmission line. Lilo line is passing through 13 villages of Bhachau Tehsil and Lakadia-Bhuj is passing through 69 villages. The proposed Pooling substation is located in Shivilakha villages of Bhachau Tehsil. Details of tehsil wise villages list are provided in the table below.

Table 2. List of Tehsil wise village List

Project Component	District	Tehsil	Villages
LILO of Bhachau – EPGL 400kV D/c (triple) line	Kutch	Bhachau	Wastava, Shivilakha, Lakadia, Gharana, Pipra Talav, Rajansar, Samakhiali, Laliana, Gorasar Talav, Nava Katana, Lakhdhirgarh, Jangi, Bhimasar Talav
Lakadiya - Bhuj 765kV D/C Line		Bhachau	Lakadia, Shivilakha, Shivilakha RS, Pipra Talav, Rajansar, Balasari, Wastava, Gharana, Adhoi, Udaipur, Lakhat, Vijpasar, Rampar Halra, Karmana, Vondhada, Kunjisar, Meghpar, Lakhavat, Bandhadi, Sikra, Kageshwar Mahadev, Kumbhardi, Bhaveshwar Mahadev, Kabrau, Shri Krishna Nagar, Amardi, Desalpur (Kothawala), Morgar, Baniari,
		Anjar	Fatehpur, Budharmora, Chakarmora, Dhamadka, Amrapar, Indraprastha (New Dudhai), Dudhai, Devisar, Lakhara Velara, Velara Talav, Khirsara (Rahim Wandh), Khirsara (Haleputra Wandh), Khirsara (Mor Wandh), Kirsara (Miyana), Khirsara(Umar Wandh), Yamunagar, Khirsara
		Bhuj	Jawaharnagar, Lothia, Khengarpar (Dharampur), Wanthra, Khengarpar, Lodai, Umedpar, Keshavnagar, Dhrang, Fulai, Kotai, Lakhara Talav, Kunaria, Dhori, Sumrasar, Amibag, Loria, Jatwandh, Mithaniwadi, Vakilwadi, Jhura,

¹ https://geda.gujarat.gov.in/Gallery/Media_Gallery/Monthly_Solar_31072020.pdf

² https://geda.gujarat.gov.in/Gallery/Media_Gallery/Wind_Power_Capacity_Addition_in_Gujarat_as_on_31.07.2020.pdf

Project Component	District	Tehsil	Villages
Lakadia Pooling Substation		Nakhtarana	Wadi, Palanpur
		Bhachau	Shivlakha

2.4 Accessibility

SH 41 (Bhuj- Bhachau Road) is the main access road for Lakadia- Bhuj 765 kV line proposed transmission line. During the construction phase, the project team will access the entire alignment through this road. There are different villages which are connecting SH 41 and respective tower locations and will be used as approach road during project execution.

For LILO of Bhachau – EPGL 400kV D/c (triple) line, NH 15, and NH 41 will be the main access road for the entire alignment. village road along this will be served as an approach road to access the respective tower location.

The proposed substation will be located in Shivlakha village, Bhachau Tehsils, Kutchh District. The NH 15 is located on the southeastern direction of the project site and will be the main access during the construction and operation of the substation. One stream flows adjacent to the proposed substation. This shallow water body i.e. canal flows acts as minor irrigation works.

2.5 Crossing of Road and Rail

The National Highway 341 and NH 15 cuts across two TL alignments. In addition, two TL alignments also crossing the railway line. For the approval of NHA has been in the final stage. In principal approval received from the Ministry of Railway, a demand draft against demand note has been submitted. Railway permission for the same is expected by April'21. Power Line crossing approval has been obtained for 29 out of 33 Transmission Line. The remaining approval for the 4 Transmission Line is expected to be obtained by April'21.

The details of the locations where the highway cut the alignment are presented in Table 2.1

Table 2-3 : Accessibility of the Project site

SL no	Line	Highway	Approx. segment (Angle point (AP) from -to)
1.	765kV D/C Bhuj (PS) -Lakadia (PS) transmission line	Village road 2nos, Adhoi nandi	AP 12-AP 13
2.		Village road 2nos	AP 15-AP 18, AP-34-35
3.		Village Road	20/1- AP 21, AP22-AP23, AP 24-25, AP35-AP6, AP38-AP39, AP41-AP42
4.		NH-341	AP 45- AP-46,
5.	LLIO IN of Bhachau-EPGL 400 kv D/C line at Lakadia		
6.		Railway	AP10-AP11, AP20-AP21
7.		NH-15	AP18-AP19
8.		Village road	AP5-AP6, AP15-AP16, AP21-AP22, AP25-AP26

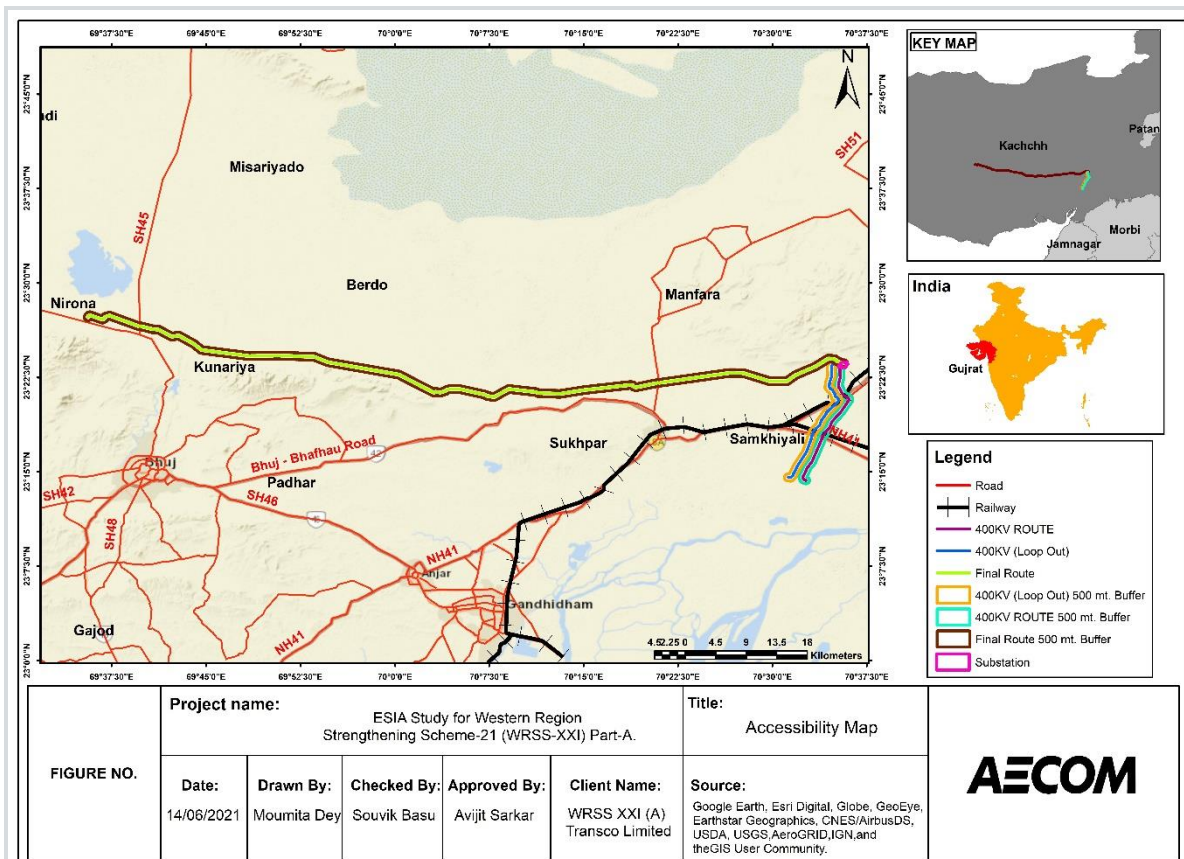


Figure 2-1. Accessibility map for WRSS Line

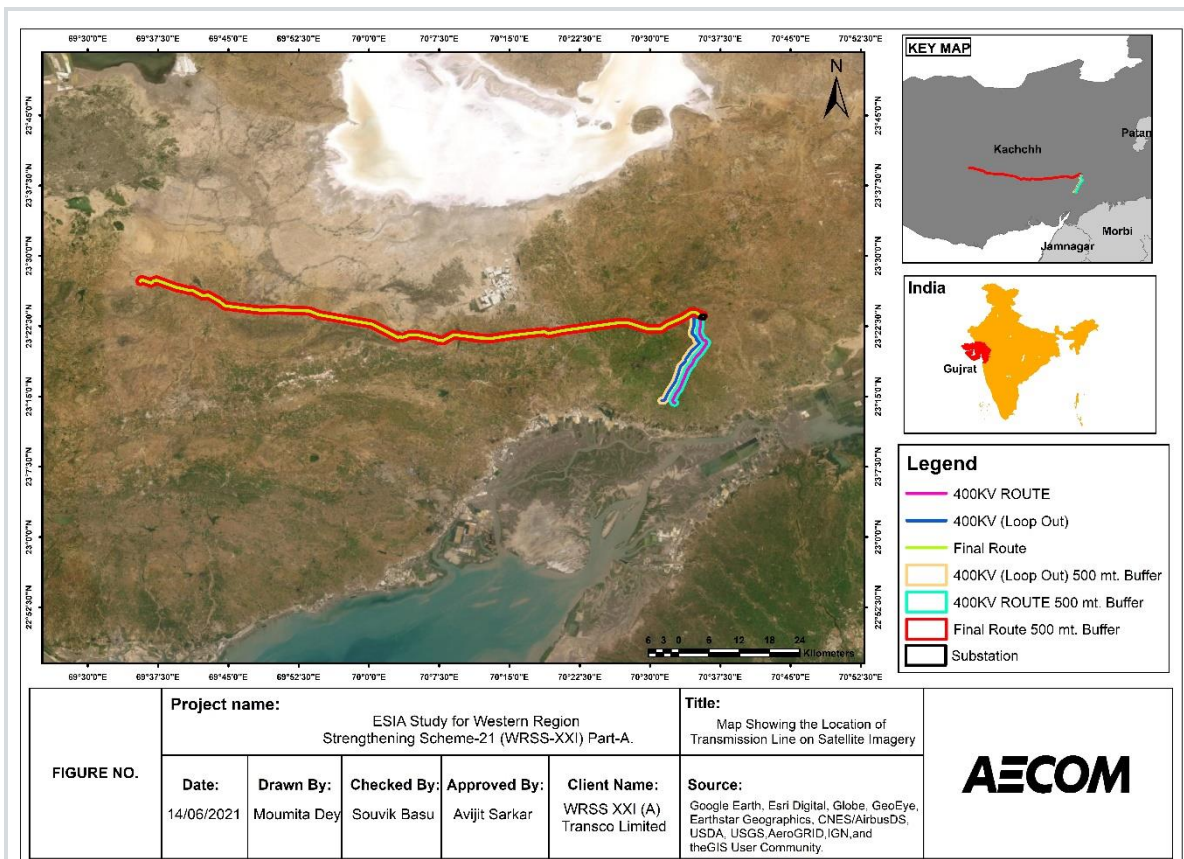


Figure 2-2. Alignment of the project site on satellite image

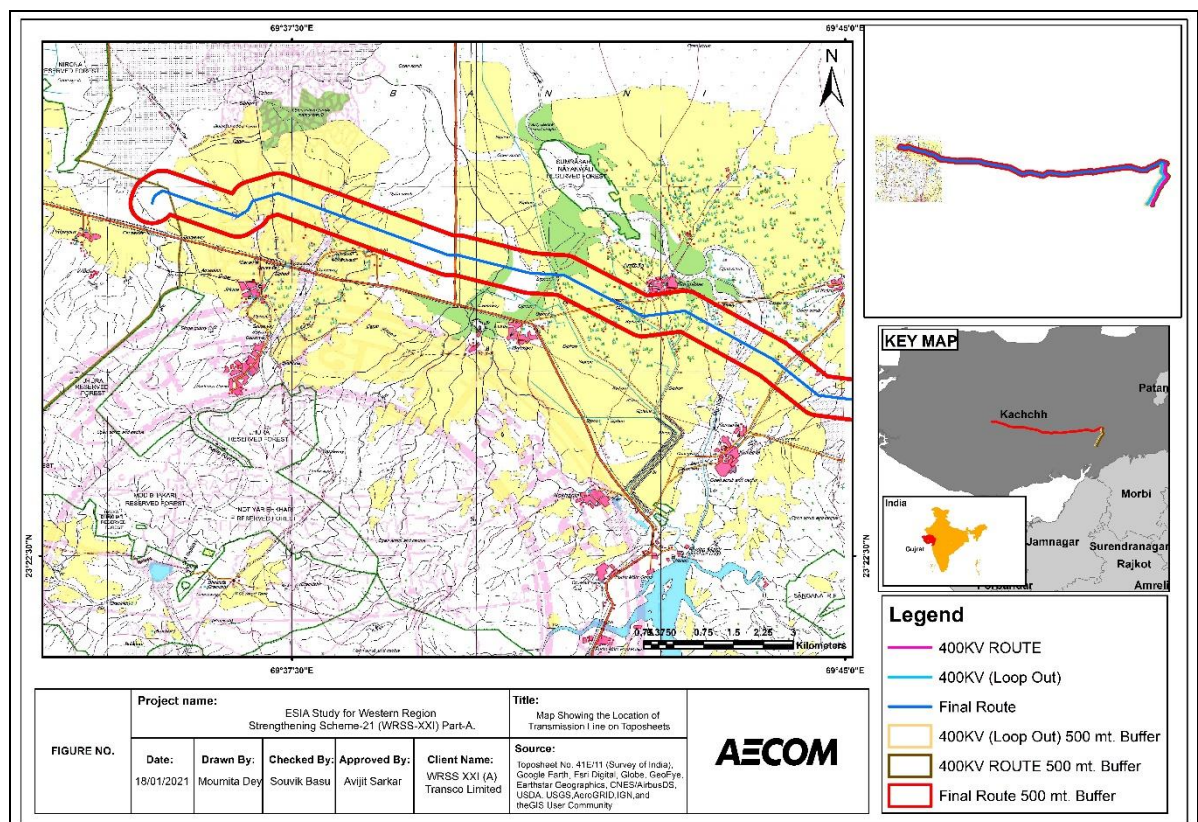


Figure 2-3. Alignment of the project site (1)

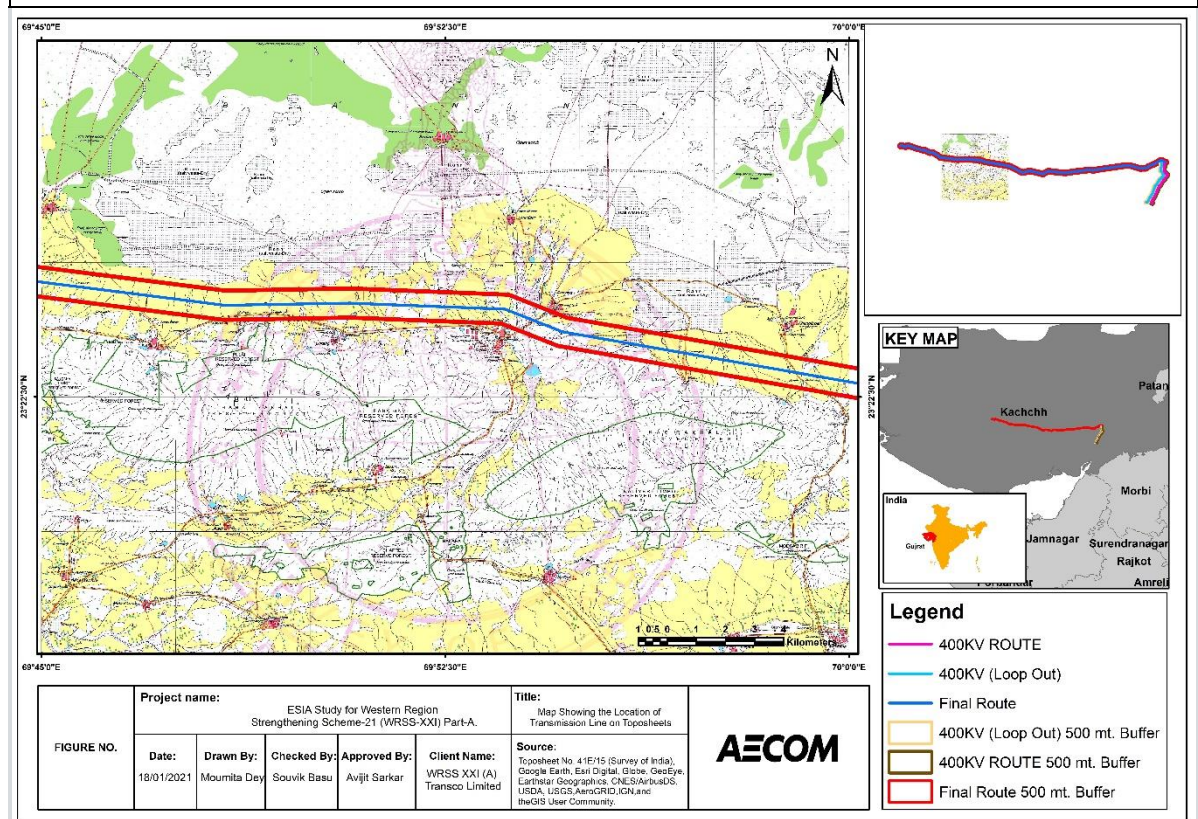


Figure 2-4. Alignment of the project (2)

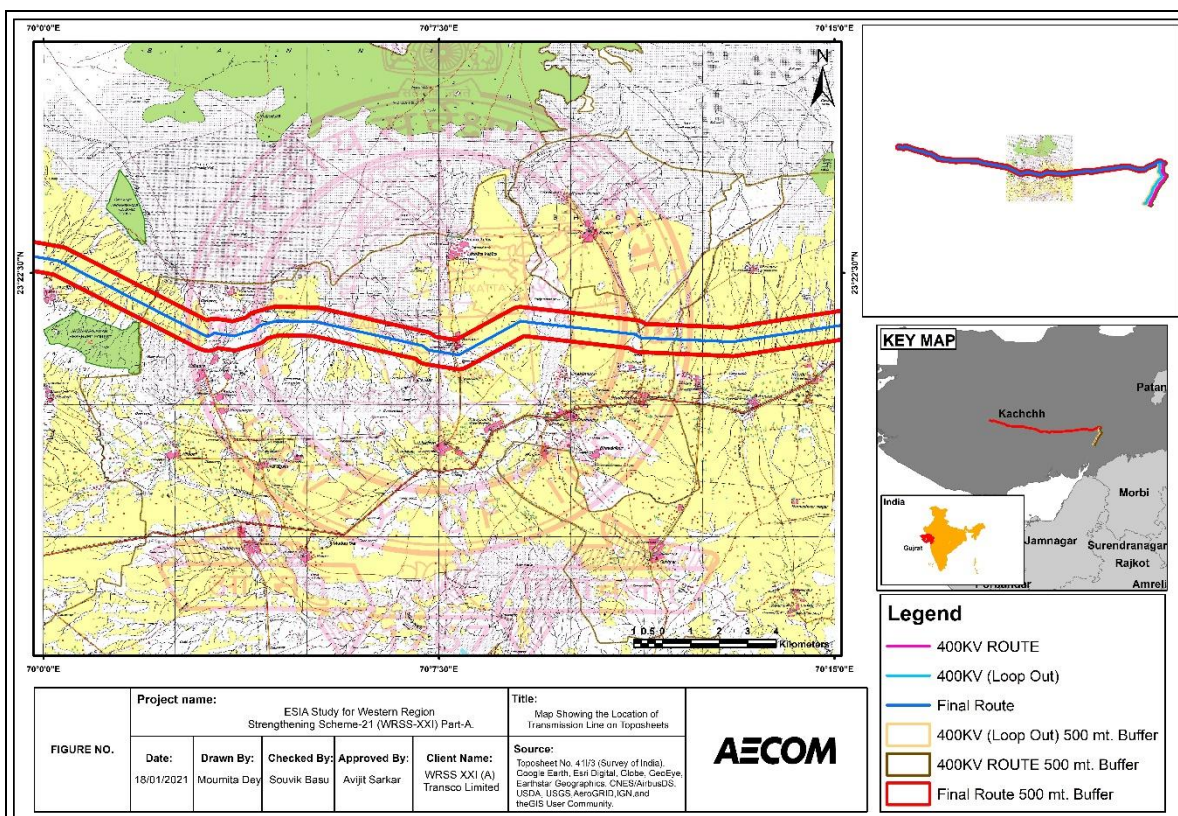


Figure 2-5. Alignment of the project (3)

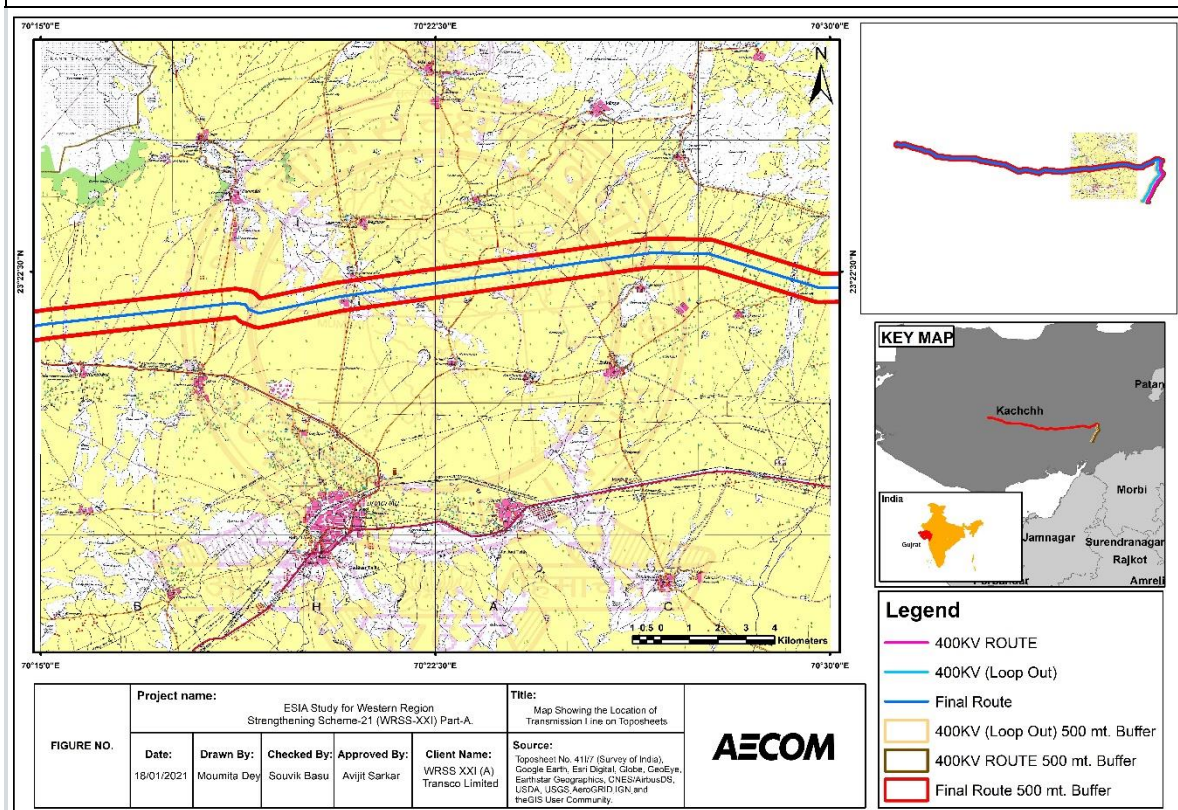


Figure 2-6. Alignment of the project (4)

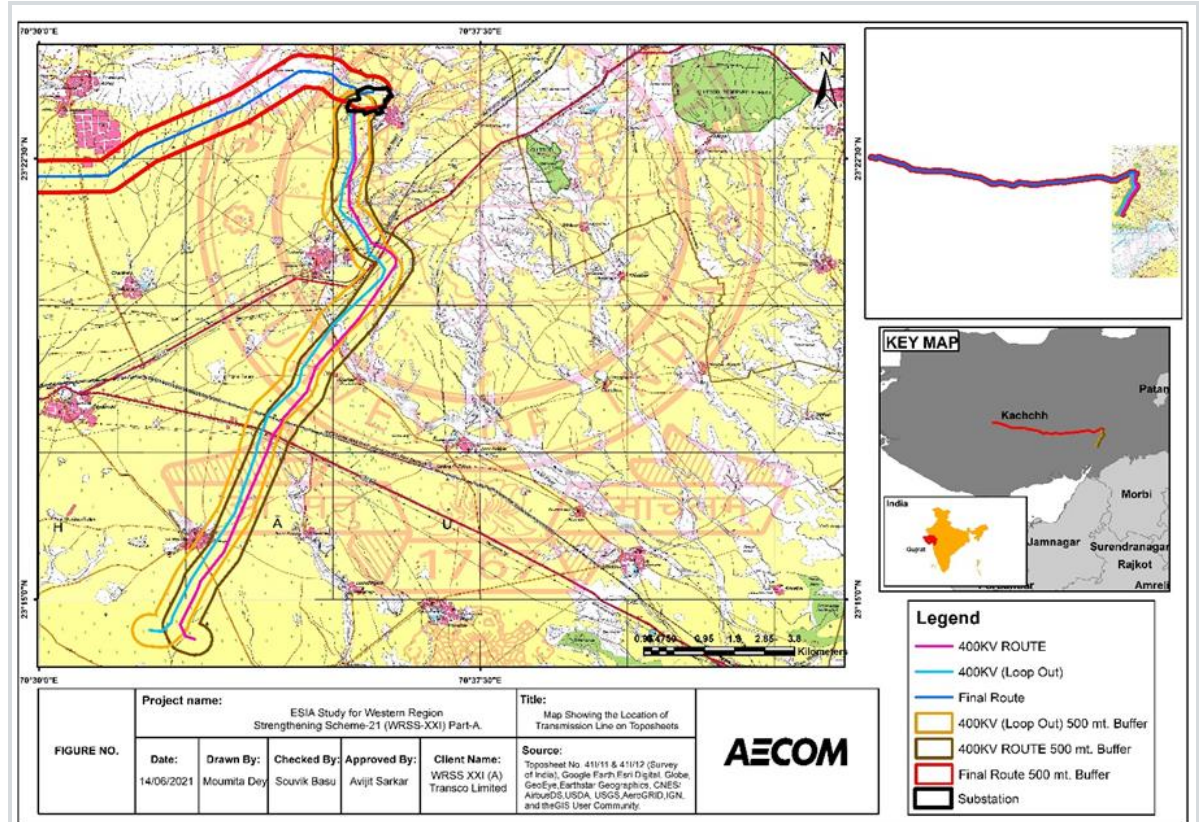


Figure 2-7. Alignment of the project (5)

2.6 Analysis of Alternative Transmission Line Alignment

Alternative analysis has been carried out by project team during preparation of detailed project report of the project and based on that present alignment has been selected.

Forest approval for diversion of 0.7507 ha of forest land for LILO line has been granted by MOEF. As a part of forest proposal 3 alternative routes had been analyzed. All three routes were positioned on either side of BEE line. After initial inspection over survey of India maps and satellite image, all three routes were explored for best and optimal route. Special attention has been given to forest, tree cover, power line crossings, habitation, Right of Way (RoW) issues and accessibility.

Though all three routes involve diversion of 0.7507 ha of Social forest for road crossing, however, Route 1 is having less line length, less ROW issues and well connectivity by road network for construction/O&M purpose in comparison to Route 2 & 3, hence Route1 is more feasible, economical, environment friendly and hence selected.

Analysis of alternative route for WRSS projects are given below table 2-4

Route 1 has been chosen basis on the forest area.

Table 2-4: Comparative Statement of Alternative Route for 765KV Transmission line

S.R	Description	Route I	Route II	Route III
1	Route particulars			
	1)Bee line (KM)	102.040	102.040	102.040
	2)Length (KM)	107.47	114.50	118.87
	3) Angel Point	55	56	75
	4) Terrain	Plain Terrain -100% Hilly/Undulation Terrain-00%	Plain Terrain100% Hilly/Undulation Terrain-00%	Plain Terrain -100% Hilly/Undulation Terrain-00%
2	Environmental and Social Sensitivity			
	Houses within R.O.W	No house falls within ROW corridor	No house falls within ROW corridor	No house falls within ROW corridor
	Forest Involvement			
	a) Length of forest Area	1.664 KM	4.036K.M	6.421K.M
	i)Reserve Forest	1.064K.M	4.016K.M	6.281K.M
	ii) Social Forrest	0.6 K.M	0.020 K.M	0.140 K.M
	Historical /Cultural monuments	NIL	NIL	NIL
	National park	NIL	NIL	NIL
	Tribal area	NIL	NIL	NIL

S.R	Description	Route I	Route II	Route III
	Compensation cost	Corp compensation is required to be paid during cultivation Season. Compensation is also required where tree cutting is Envisaged.	Corp compensation is required to be paid during cultivation Season. Compensation is also required where tree cutting is Envisaged.	Corp compensation is required to be paid during cultivation Season. Compensation is also required where tree cutting is Envisaged.
	Construction problems	Right way problems are less due to less forest area, minimum undulation area, less Damage of tree/corps easy accessibility to move location	Right way problems are more than route1, due to more damage of trees/garden	Right way problems are more than route1 and route 2, due to more number of Angel Point
	Approaching along route	Good	Moderately good	Not good
	Recommendations	This alternative route having least forest area, Also it is passing through Where villages are far away from our line. Hence this alternative route is feasible and being recommended for approval.	This alternative route is more difficult due to More right of way along the route As it involves cutting of more trees due to garden, are coming under right of way and also forest area is much greater as compared to route – 1. Also, it Involves dismantling of 33KV Line. O & m Perspective; this route is more difficult.	This alternative route is more Difficult due to more right of way Problems along the route as it is passing through habitant area i.e. near the village. It also involves the cutting of more trees due to garden are coming under the right of way, Forest area, and power line crossing are much greater as compared to route - 1&2. It involves dismantling of 33 KV Line. O&M presentative; this is more difficult.

Table 2-5 : Comparative Statement of Alternative Route for 400kV D/C LILO line (Line-IN)

S.R	Description	Route I	Route II	Route III
1	Route particulars			
	1)Bee line (KM)	17.310	17.310	17.310
	2)Length (KM)	18.92	19.43	23.73
	3) Angel Point	32	34	44
	4) Terrain	Plain Terrain -100% Hilly/Undulation Terrain-00%	Plain Terrain100% Hilly/Undulation Terrain-00%	Plain Terrain -100% Hilly/Undulation Terrain-00%
2	Environmental and Social Sensitivity	N/A	N/A	N/A
	Houses within R.O.W	No house falls within ROW corridor	No house falls within ROW corridor	No house falls within ROW corridor
	Forest Involvement			
	a) Length of forest Area	0.08 K.M	0.08 K.M	0.08 K.M
	i)Reserve Forest	0 K.M	0 K.M	0 K.M
	ii) Social Forrest	0.08 K.M	0.8 K.M	0.08 K.M
	Historical /Cultural monuments	NIL	NIL	NIL
	National park	NIL	NIL	NIL
	Tribal area	NIL	NIL	NIL
	Compensation cost	Corp compensation is required to be paid during cultivation	Corp compensation is required to be paid during cultivation	Corp compensation is required to be paid during cultivation

	Season. The compensation is also required where tree cutting is Envisaged.	Season. The compensation is also required where tree cutting is Envisaged.	Season. The compensation is also required where tree cutting is Envisaged.
Construction problems	Right way problems are less due to less forest area, minimum undulation area, less Damage of tree/corps easy accessibility to move location	Right way problems are more than route1, due to more damage of trees/garden	Right way problems are more than route1 and route 2, due to more number of Angel Point
Approaching along route	Good	Moderately good	Not good
Recommendations	This alternative route having least forest area, Also it is passing through Where villages are far away from our line. Hence this alternative route Is feasible and being recommended for approval.	This alternative route is more difficult due to More right of way along route As it involves cutting of more trees due to garden, are coming under right of way and also forest area is much greater as compared to route – 1. Also it Involves dismantling of 33KV Line. O&M Perspective; this route is more difficult.	This alternative route is more Difficult due to more right of way Problems along route as it is passing through habitant area i.e. near village. It is also involves cutting of more trees due to garden are coming under right of way, Forest area, and power line crossing are much greater as compared to route -1&2. It involves dismantling of 33 KV Line. O&M presentative; this is more difficult.

2.7 GHG emission estimation for the proposed project

Quantification of greenhouse gas

Quantification of greenhouse gas was estimated for the Lakadiya - Bhuj transmission line and LILO of Bhachau - FGCL transmission line.

Screening of the scopes

For the proposed activity of the establishment of transmission line, screening of the activity was done, in line with the goal to achieve the prominent activities, which could be the major contributor to the green house gas emission. After the detailed analysis some activities have been highlighted, as followed:

- Construction of the sub station in Bharchau.
- Technical loss of energy in the transmission line.
- Land clearing due to erection of tower.
- Vehicular emission due to transportation of equipment to the tower site.
- Emission due to SF6.

Construction of the sub station

During the construction activity of the sub station, several construction equipment would be engaged. It has been assumed that excavator, Dump truck, Crawler, crane, Payloader and Rig would be present in a single number and two transit concrete mixers would be present in the site.

Methodology for assessing the GHG emission from construction equipment

The emission from the construction equipment would be considered as a stationary combustion source. The greenhouse gases CO₂, CH₄, and N₂O are emitted during the combustion of fuels. CO₂ accounts for the majority of the GHG emissions from stationary combustion sources. CH₄ and N₂O emissions together represent less than one percent of the total CO₂-equivalent emissions from the same sources. In the proposed project emission from DG sets, some construction equipments, and emission from heat recovery system could be considered as stationary combustion sources, and as per EPA, the amount of greenhouse gas could be calculated by this equation below:

$$\text{Emissions} = \text{Fuel} \times \text{HHV} \times \text{EF2}$$

Where:

Emissions = Mass of CO₂, CH₄, or N₂O emitted

Fuel = Mass or volume of fuel combusted

HHV = Fuel heat content (higher heating value), in units of energy per mass or volume of fuel

EF2 = CO₂, CH₄, or N₂O emission factor per energy unit.

Emission factor and heat content are collected from the "Greenhouse gas inventories, 2018" by EPA. To represent the CH₄ and N₂O emission in terms of an equivalent amount of CO₂, the emission from CH₄ and N₂O, would be multiplied by the global warming potential of CH₄ and N₂O.

It has been assumed that the total construction period would be for 6 months, and by using this equation total greenhouse gas emission for the total period would be 1133 tons.

For the construction purpose, total 7200 tons of cement would be required to prepare M20 and M10 grade concrete. Approximately, 900 kg of CO₂ is emitted to prepare 1 tons of cement, by calculating the above factor with the total quantity of cement, it has been estimated that 7142 tonnes of CO₂ would be emitted in the atmosphere. But this would consider as, indirect emission of GHG for the proposed project, as the project proponent was not directly involved in the cement preparation procedure.

It has been assumed that each transmission tower would consist of almost 12 tonnes of steel, in both lines total 399 towers are scheduled to be set up. So, it can be assumed that approximately 4788 tonnes of steel is required for the project.

According to a report of the World Steel Association, to make one ton of steel almost 1.9 tonnes of CO₂ emitted in the atmosphere. So, by calculating the total amount of steel with the said factor, it can be predicted that total of 9097 tonnes of CO₂ have been emitted in the atmosphere, which is indirectly associated with the project.

For the substation, it can be assumed that total 6000 tonnes of steel would be involved, as most of the equipments in the sub station are made of galvanized steel. So, as an indirect emission, total 11400 tonnes of CO₂ has been emitted for the proposed substation.

Technical Loss in transmission line

According to the information from the project proponent, Lakadiya - Bhuj line equipped with a power flow of 1340 MWh and incurred a loss of 4.5 MWh. Whereas LILO of Bhachau - EPGL line having a power flow of 740 MWh, with an estimated loss of 3.7 MWh.

Methodology

According to the user guide of the CO₂ database for the Indian power sector, published by Central Electricity Authority, the weighted average of the grid emission is 0.82 tonnes of CO₂ per megawatt per hour. Using the grid emission factor total emitted co₂ for the Lakadiya -Bhuj line was estimated as 32324.40 tonn and total emitted CO₂ for the LILO of Bharchau - EPGL line was estimated as 26577.84 tonnes of CO₂. Accounting both the emission, the total GHG emission would be 58902.24 tonnes of CO₂ from technical loss annually from the transmission lines.

Land clearing due to erection of tower

New construction of long-distance lines, or even of distribution lines and substations, may affect carbon stored in biomass and soil. Depending on the circumstances, land clearing could account for the largest fraction of total gross emissions within the project boundaries. An obvious example would be clearing a forest for a long-distance transmission line, which would result in a one-time release of the carbon stored in the vegetation. According to the study of the urban forest network, 1 acre of forest can sequester 2.5 tonnes of carbon annually, so inversely, if 1 acre of forest land would be cleared, it could release 2.5 tonnes of CO₂ in the atmosphere. But considering the forest type in the region, which is mainly shrubs and medium tree, it can be concluded that these forests are not capable of sequester that much of CO₂ from the atmosphere. So, this scope could be ruled out from the GHG emission.

Vehicular emission due to transportation of equipments to the tower site

Vehicular emission would be considered as mobile emission source for the proposed project. According to the information from the project proponent, only one truck would be needed for erection of one tower. So, it has been predicted that daily 2 truck would be needed, to transfer the tower erection equipment at two different sites. Considering the tower numbers for both the lines, it can be predicted this activity will continue for at least one year. Considering the time frame, total distance and vehicle type (heavy duty truck), total predicted co₂ emission would be 68.91 tonnes annually.

Emission due to SF₆

SF₆ is used in insulation and current interruption applications in T&D systems.⁸ SF₆ is used in gas-insulated switch-gear and substations, gas circuit breakers, and (less frequently) in high-voltage, gas-insulated lines. SF₆ may escape as fugitive emissions during the manufacturing, installation, use, maintenance, and disposal of this equipment. Sealed distribution equipment may not emit any SF₆ during use, but transmission equipment often requires periodic refilling and hence has higher fugitive emissions during use. The amount of SF₆ emitted during operation and decommissioning is related to the number and type of equipment used, as well as the maintenance and recycling procedures. SF₆ is used in insulation and current interruption applications in T&D systems.⁸ SF₆ is used in gas-insulated switch-gear and substations, gas circuit breakers, and (less frequently) in high-voltage, gas-insulated lines. SF₆ may escape as fugitive emissions during the manufacturing, installation, use, maintenance, and disposal of this equipment. Sealed distribution equipment may not emit any SF₆ during use, but transmission equipment often requires periodic refilling and hence has higher fugitive emissions during use. The amount of SF₆ emitted during operation and decommissioning is related to the number and type of equipment used, as well as the maintenance and recycling procedures.

Methodology

Emissions from Operation and refilling = $C \times (x/100) \times T$

where:

C = refrigerant capacity of the piece of equipment

x = annual leak rate in percent of capacity

T = time in years used during the reporting period (e.g., 0.5 if used only during half of the reporting period and then disposed of).

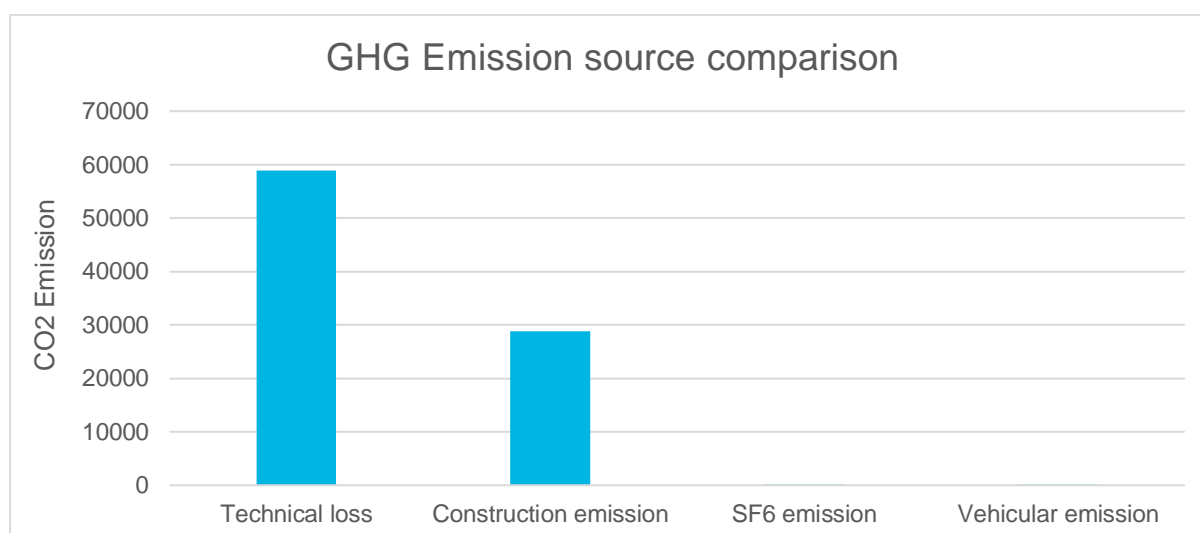
According to the study of Mr. Shigeru Maruyama, it has been predicted that 0.1 percent of the total SF6 volume would be leaked during refuelling or operation. Total 1004.8 kg of SF6 would be used in Bhachau substation, and approximately 1.0048 kg of SF6 would be leaked during the process.

Considering all the factors it can be calculated that approximately 22.91 tonn of CO2 equivalent would be releases annually.

Conclusion

By considering all the probable emissions it could be predicted that most of the emissions would end in a definite time frame, except the technical loss and SFF6 emission. So, at the initial period of the project the CO2 emission would be high, but at a later stage, the emission of GHG would be minimum. Though in the later stage the SF6 emission could be avoided by the installation of SF6 recovering unit. Comparison of CO emission sources are presented graphically in figure below.

Emission sources	Co2 (tonn)
Technical loss	58902.24
Construction emission	28772
SF6 emission	22.91
Vehicular emission	68.91



2.8 Proposed Components of Transmission Lines

The WRSS 21 Transmission line will be laid overhead using lattice structures fabricated with MS angles and galvanized. Lines are strung with aluminium conductorsteel reinforced conductor (ACSR) supported on the towers by porcelain disc/ Silicon Polymer insulator strings. Total number of towers in Bhuj Lakadia 765 kV D/C line would be 280. Among them A, B, C, D types tower would be 216, 17, 17, 30 respectively. In case of LILO line total number of towers would be 119. Among them A, B, D types of tower would be 52, 22, 45 respectively. Foundation cost approx. from Rs. 1.54 Lac to Rs. 13.37 Lac per location depending on type of towers

Towers will be self-supporting lattice towers. There are four types of towers which can be used in the project. These include:

- **Tangent tower (A type Tower):-** This is a suspension tower designed to support power conductor and ground wire(s) for extending the power line alignment in a straight line.
- **15° Small Angle Tower (B Type Tower):** - Fitted with two stacks of insulators per each phase duly connected by a jumper. This tower will facilitate deviation of line alignment up to 15°.
- **30°Medium Angle Tower (C Type Towers):** - This is similar to above-angle tower but designed to take line deviation up to 30°.

- **Large Angle Dead end Tower (D Type Tower):** - This tower is designed for use as terminal tower as well as an angle support capable of taking deviation up to 60°. All angle towers are used at cut point (Tension towers). In addition to the above towers, special structures may be used for river crossings and hill slopes.

Type of tower at each location is decided and selected from the standard tower types/ designs adopted for various voltage classes and wind zones. Special type of towers required for a specific location to suit a specific purpose may also be designed. The design of Transmission line towers is governed by the stipulations of IS 802 (Part-I - Section 1 & 2) of 1995/92 use of structural steel in overhead transmission line towers and wind load referenced in IS 875-(Part-3) - 1987 "Code of practice for design loads for buildings and structures (second revision)", terrain and topographic characteristics of the ground.

The various members of the tower are i) foundation, ii) main leg members including ground wire peak, (iii) Lattice member (iv) Horizontal and longitudinal belt members situated and (v) Cross arm members and (v) redundant members and hip bracings.

Tower Foundations: The foundation of the tower is based on soil type, tangent/angle locations, normal/extended towers, narrow based towers, river crossings etc) & wind zones. Standard designs for various types of foundations for normal soil are readily available. However, proper type of foundations are selected from the standard designs available based on the soil investigation result or if needed specially designed for a specific application. In case of 765 KV lines the tower footing would be approximately 20.78 m X20.78 m. For the foundation, an excavation of 4 m X4 m X2 m would be carried out and for casting of tower footing in open pits. Since the transmission line passes through a creek region or aggressive soil region Concrete of M30/ M20/ M10 Grade design Mix conforming to IS 456 and epoxy-coated reinforcement as per IS 13620 shall be used. However, these would vary on the technical parameters e.g. load, angle of the conductor, soil characteristics, wind speed etc. Once the concrete is allowed to set the earth is backfilled and compacted.

Tower Structure: The Tower shall be fully galvanized using mild steel or/and high tensile steel sections. Bolts and nuts with spring washer are to be used for the connection. Each tower shall be earthed such that tower footing resistance does not exceed 10 ohms. Pipe type or Counterpoise type earthing shall be provided in accordance with relevant IS. Additional earthing shall be provided on every 7 to 8 kms distance at tension tower for direct earthing of both shield wires. Since the transmission lines are passing through coastal/ creek regions, the fabricated tower parts and stubs shall have a minimum overall zinc coating of 900 gms / sq m of surface area except for plates and sections below 5mm which shall have a minimum overall zinc coating. These components would be fabricated at the factory and delivered to the site and stored in the Construction Camp/Laydown area.

Insulators: Porcelain/ Glass disc insulators/ Silicon Polymer or Porcelain Long rod insulators having specific minimum creepage distance shall be used. The creepage would be dependant on a number of technical factors

Conductors: The transmission lines shall have to be designed for a maximum operating conductor temperature of 85 deg C for both ACSR as well as AAAC. In case of the 765kV D/C transmission lines Hexa Zebra ACSR Conductor shall be used. While in case of 400 kV D/C, triple snowbird ACSR conductor shall be used.

2.9 Project Component of Substation

The project components of the 765/400 KV Pooling Sub- station are presented in the Table 2-6.

Table 2-6 : Project Components in the 760/400 KV Pooling Substation at Lakadia

Sl. No	Component	Description	Remarks
A. Core Infrastructure			
1.	Transformer	2 nos 1500 MVA Oil Cooled Transformer (2nos of transformer bays would be for future expansion)	A bund would be placed around the transformer and the all the runoff and oil from the surrounding areas would be collected in an Underground RCC Bund Oil Tank. The oil water mixture would be collected and sent to authorized recyclers at regular interval
2a.	Bays (incoming)	nos of 400KV bays (6nos for future Expansion)	-
2b.	Bays (outgoing)	4 Nos of 765KV bays (8nos for future Expansion)	-
3	Transformer Oil	Would be as per the Regulation of Polychlorinated Biphenyls Order, 2016	

4. Circuit Breakers The circuit breakers and accessories shall conform to IEC: 62271-100, IEC: 62271-1 and shall be of SF6 Type

B. Associated Infrastructure			
4	Control Room	One number with control panel	It would have station level control (SAS) along with its peripheral and recording equipment, AC & DC distribution boards, DC batteries & associated battery chargers, Fire Protection panels, Telecommunication panels & other panels as per requirements. Air conditioning requirement
5	Toilet Facility	2 (1for Male & 1 for Female) nos of Toilet	The toilet units would be provided septic tank and soak pits for discharge of wastewater.
6	Pump House	1nos of submersible pump	This water would be used for supply to substations to meet drinking water and sanitary requirement.
7.	Fire Fighting	Fire-fighting system in general conforms to fire insurance regulations of India	AC motor & diesel engine driven pumps housed in a fire fighting pump house building along with water storage tank of adequate capacity. Automatic heat actuated emulsifying system is proposed for transformers & reactors.

Source: DPR WRSS

2.10 Description of Project Phases

2.10.1 Detailed Design

During the stage the route planning for the transmission line takes place. At the planning stage three alternatives are identified avoiding the major settlements, forests and other technical considerations. An analysis is carried out to identify the best alternative.

The typical activities which would be carried out during the project conceptualisation phases include:

- Walkover surveys of the three alignment: These have already been carried out and the finding have been used in the analysis of alternative section presented below;
- A detailed survey of the final alignment. The inputs from this study has also been used in the ESIA report e.g. number of trees to be felled. number of structures etc;
- Soil investigation of the tower locations at regular interval to ascertain the type of foundation;

2.10.2 Construction Phase

The construction of the transmission line route includes carrying out check surveys, site clearing and access road establishment through to foundation construction and structure installation to energising. This phase is expected to take between 15 months to complete. The Construction is projected to be over by December 2020.

In additions, the contractor would carry out i) Check Surveys, ii) Site Clearance and vegetation removal (including felling trees if required) iii) Excavation for tower foundation, construction of the concrete bases for the transmission line towers, iv) transportation in of the tower components and other raw materials; v) assembly and erection of the towers; vi) stringing of the transmission line; and vii) site rehabilitation.

2.10.2.1 Check Surveys

Check surveys are carried out by the contractor at the initiation for fixing the tower locations. At this point of time the once the tower locations are known the ownership of the land is identified by the Contractor with the help of the Revenue Department. The right of use for land for the tower footing and the RoW would be primarily procured through negotiated settlement. All construction activities would be carried out within the Right of Way for the safe operation of the transmission lines as per IS 5613. Check survey has been completed for both the line.

2.10.2.2 Clearing of Sites

At the tower site, all vegetation in the footprint of the tower base and the working area of approximately 2 m on each side of the base (20.78m x 20.78 m) would be cleared of vegetation

2.10.2.3 Excavations

Excavators would be used to excavate the foundation for tower footing. Foundation sizes would be as described above depends on the soil conditions and tower type. Excavated soil will be dumped around the excavation and excess dump rock will be uplifted and removed as required. Each excavation will be inspected and tested to confirm its suitability. The foundations would be filled with concrete.

The formwork, reinforcing bars, embedded of the tower and any earthing elements would be placed in the pits. A 50 mm thick pre-stressed concrete cement pad is laid at the base of the foundation. Concrete will be sourced from a 'ready-mix' truck that will access the site or concrete will be mixed on-site using a portable concrete mixer. Approximately, 30-86 m³ of concrete is required per tower. The casting of the foundation would take approximately 15- 30 days and would involve 15- 20 labours depending on the terrain and soil conditions. Once the excavations have been filled, the concrete requires 28 days for curing. The excavated soil would be backfilled and compacted as per good engineering practices.

2.10.2.4 Erection of Tower

The material for the construction of the tower would be brought by tractor-trailer or manually depending on the accessibility and site condition and delivered directly from the storage yard/lay down area to the tower construction site. Transposition is to be done for all transmission lines whose length is greater than 100 km. Transposition should be carried out at 1/3 and 2/3 of line length tower positions. The tower construction would start after the setting of the concrete is complete. It is estimated that in WRSS XXI(A), 399 nos of towers (280 towers in 765 kV line and 119 towers in 400 kV LILO line) would be constructed. The prefabricated component of the lattice structure would be first assembled on the ground. The erection of the tower is done manually. The components are also hoisted manually by using a pulley system.

2.10.2.5 Stringing of Conductors

The stringing of the conductors will be done by tension method using a winching machine. The tension methods are generally used for stringing as this method keeps the conductor surface safe during the stringing process. As part of the stringing process using the tension method, the conductor is kept under tension during the stringing process. This helps it to keep the conductor clear of the ground. For pulling the conductor a pulling line is installed on travellers affixed temporarily to the arms of the tower. A pulling line is pulled which are then used to pull the conductor from the reel stands using specially designed tensioners and pullers. Two types of pulling machines used in the construction of transmission lines being strung under tension. These are defined as bull wheel and drum/reel-type. Pullers would be equipped with load-indicating and load-limiting devices. Tensioners would be equipped with tension indicating devices. The capacities of the puller and tensioner would be based on the conductor, span length, terrain and clearances required above obstructions. Sag tensions can never exceed during stringing. The capacity for both puller and tensioner is calculated as per IEEE 524. Positive braking systems will be required for pullers and tensioners to maintain conductor tension when pulling is stopped.

2.10.3 Operation and Maintenance

During the O&M stage of the project ground patrolling would be carried out. The patrolling would monitor the growth of tress in violation of the minimum safety clearance., development of any house or settlement within the RoW. Roads and bridges constructed within the ROW would also reduce the minimum safety clearance so these would also be monitored.

Further to ensure safety to adjoining properties; development of oil and gas pipelines, development of industry and plants, like cement, chemicals, dumping yard etc would be monitored appropriated measures taken to prevent such activities would might reduce the efficiency of the transmission lines. For this monitoring exercise ground patrolling would be organised preferably on a monthly basis.

2.10.4 Details of ROW

The Right of Way of the transmission line has been defined as per as per IS 5613. In case of 765 KV lines 65 m is considered as the ROW while in case of 400 KV line the ROW is stipulated to be 46 m. This is also the horizontal clearance required for transmission line of these capacities. The minimum ground clearance for 765 kV transmission lines shall be 15 m and for 400kV D/C transmission lines shall be 8.84m, so that the maximum electric field does not exceed 10kV/m within the ROW and does not exceed 5kV/m at the edge of the ROW as per

international guidelines. Approval under Section 164 of Electricity Act.2003 has been received. Further, under section 164, DC orders have been received for most of the villages. All required clearances are obtained / to be obtained progressively for RoW / construction of TL. As stated in section 2.5, other requirement like NHAI, Power line crossing has been obtained by April 2021(expected).

2.10.5 Details of Tree Enumeration and Cuttings

During site visit, discussion with project team reveals that tree enumeration activity along the ROW has been already completed. Total 400 number (Exact numbers can be ascertained after completion of foundation) of trees need to trimming/cutting during stringing activity. However, Tree feeling permission from Govt. of Gujarat has not been obtained. it will be obtained by the project team before stringing activity. 400 kV LILO line & 765 kV Bhuj Lakadiya line has been granted Stage- II (final approval) & Stage I forest approval respectively by RMOEF. As per Part -2 information recommended by DFO and Forest Approval granted by RMOEF for the Projects, no trees are required to be felled on diverted forest land during execution of the project. The tree cutting in private land will be carried out in supervision of local administrative department and compensation towards tree cutting will be paid to landowner.

2.11 Project Duration and Schedule

The project implementation has been planned over a period of 18 months, this would include the Detailed design Phase as well as Construction (Detailed Surveys, material supply, foundation, erection of tower, stringing, testing and commissioning). The date of commissioning is March 2022.

Environmental and Social Impact Assessment (ESIA) Report For WRSS XXI(A) Transco Limited

Sr.No	Activity	2019						2020											
		Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
		M0	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17
A	Overall Project Implementation schedule																		
1	Receipt of LOI from BPC		★																
2	SPV Takeover (Signing of SPA, TSA & obtaining of U/s. 68)																		
2a	Actual SPV Takeover																		
3	Application & Issuance of Transmission License by CEA																		
4	Issuance of Transmission License by CEA																		
5	Application for Tariff Adoption																		
4	Tariff Adoption by CEA																		
5	Project Financial Closure / Financial Tie-up																		
8	Application/Submission of Under section 164 to CEA																		
6	Approval Under section 164 from CEA																		
7	Statutory Registrations (GST/IEC/PE Registration, etc.)																		
8	Forest Clearance																		
11.1	Forest Clearance LILO of Bhachau – EPGL 400kV D/C (triple) line at Lakadia PS																		
11.1.1	Proposal Preparation & Online upload																		
11.1.2	Proposal Acceptance																		
11.1.3	Stage-I Clearance																		
11.1.4	Stage-II Clearance																		
11.2	Forest Clearance Bhuj PS – Lakadia PS 765kV D/c line																		
11.2.1	Proposal Preparation & Online upload																		
11.2.2	Proposal Acceptance																		
11.2.3	Stage-I Clearance																		
11.2.4	Stage-II Clearance																		
9	Statutory Clearances (Application & Approval)																		
12.1	Powerline crossings																		
	Application Submission																		
	NOC/Approval																		
12.2	Railway Crossing																		
	Application Submission																		
	NOC/Approval																		
12.3	National Highway (NH)																		
	Application Submission																		
	NOC/Approval																		
12.4	Aviation Clearance(Civil/Defence)																		
	Application Submission																		
	NOC/Approval																		
12.6	PTCC Clearances																		
	Application Submission																		
	NOC/Approval																		
10	Award of Contract																		
13.1	Award of Contract (Transmission Line)																		
13.2	2 Nos Bay Extensions & Sub Station Package																		

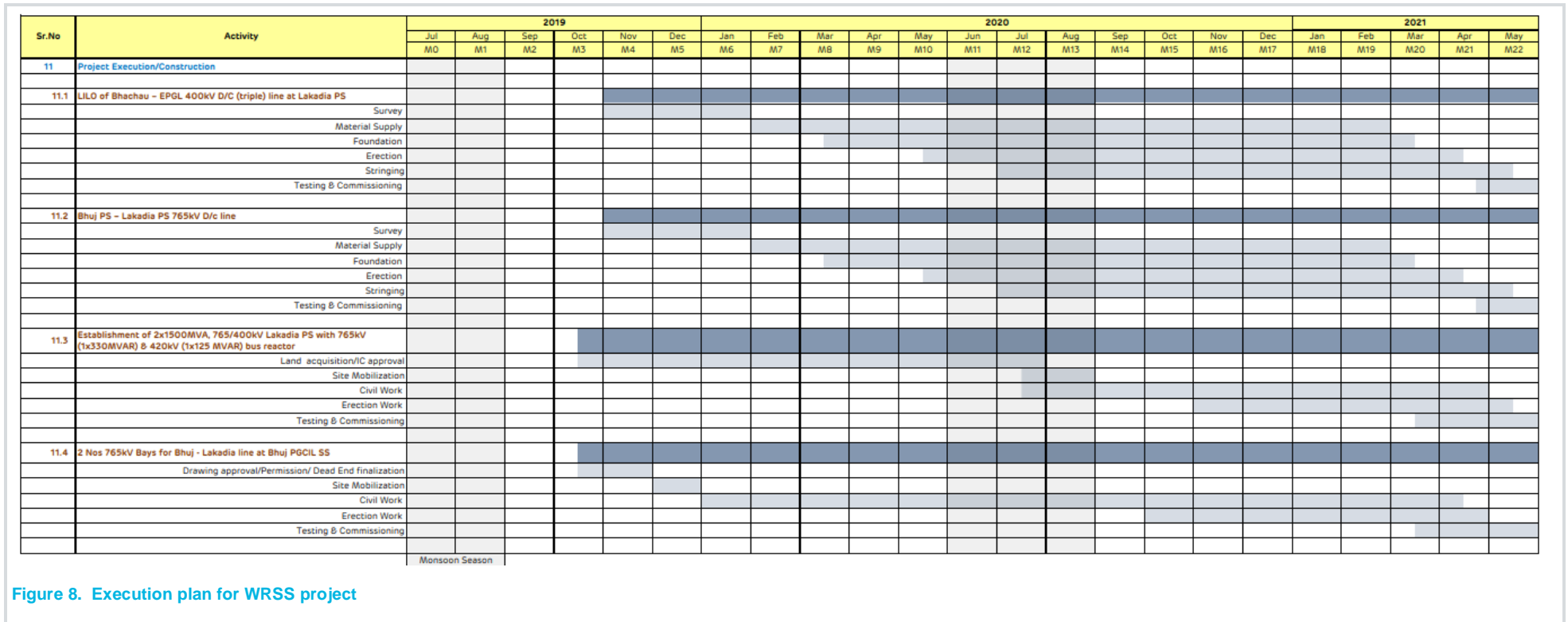


Figure 8. Execution plan for WRSS project

2.12 Raw Materials Requirement

2.12.1 Raw material

The raw material required for the construction of the transmission line and substation has been estimated. These are presented in Table 2-7. ATL has been provided the service order of EPC contractor to AECOM (Reference number S.O number 5700280267 dated 13.12.2019). As per ATL, EPC contractor has been awarded based on a turnkey basis.

Table 2-7 : Raw Material Requirement for WRSS Transmission line

Material	Bhuj PS – Lakhadiya PS
Cement (MT)	7200
Sand (m ³)	8367
Aggregate (m ³)	15805
Water (Concrete Only) (KL)	550

2.12.2 Land Requirement

Land Requirement for Transmission Line

Land requirement for ABCD type of tower varies from 400 sqm to 1200 sqm. However, since the number of suspension towers is more as such the average land requirement for tower footing would be 550 sqmt. For 765 kV line, total of 280 towers will be erected, among them type A, B, C, D types tower would be 216, 17, 17, 30 respectively. The 765 kV of length 107.47 km would require 14.0502 hectares (140502 sq m) of land for tower erection impacting 350 landowners.

In case of LILO line 400 kV total number of towers would be 119 of which type A, B, D types of tower would be 52, 22, 45 respectively. The 400 kV LILO line of length 18.92 km would require land of 3.2976 hectares (32976 sq mt) for tower erection impacting 200 landowners. As reported during consultation majority of the tower footing would be on private agricultural land.

For ROW approximate land requirement for the entire ROW would be 7046624 sqm (reduced area under foundation) (17.41 hectare). Reportedly, 808 (67% of the total transmission length)) landowners along the ROW have been identified of which (573 for 765 kV and 235 for LILO line). Details of the affected landowner for the remaining 33% ROW corridor is still under process which is expected to be completed by June 2021.

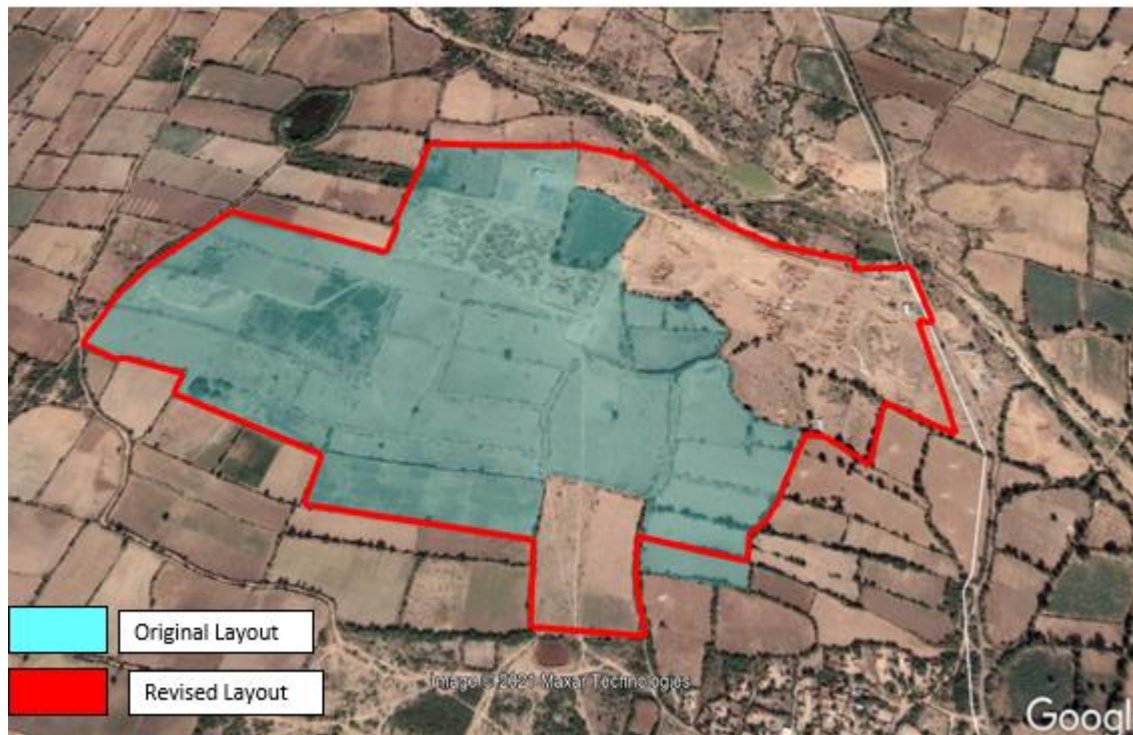
Land requirement details for tower footing is provided below.

TL Lines	Types of Tower	Area Required for each Tower Type (in sq mt)	Total number of Towers to be erected	Total Area Required in sq.mt
765 kV	Type A+0	461	216	99576
	Type B+0	583	17	9911
	Type C+0	635	17	10795
	Type D+0	674	30	20220
	Total		280	140502
400 kV	Type DA	214	52	11128
	Type DB	269	22	5918
	Type DD	354	45	15930
	Total		119	32976

Land Requirement for Substation

Land will be required for the Pooling Substation at Lakadiya. As per information provided by the project team, the land required for the establishment of 2x1500MVA, 765/400kV Lakadia PS with 765kV (1x330MVAR) & 420kV (1x125 MVAR) bus reactor is initially 126 acres. However, as per the existing scope of work for 765/400kV Lakadia substation; WRSS XXI(A) Transco Limited (WTL) and detailed engineering, a revision took place in the layout to meet the electrical clearance, hence the initial land requirement was found insufficient and the revised land requirement for the substation is 168 acres. The land for the substation is located in Shivilakha, Bhachau Tehsils, Kutch District. The land procurement for the substation has been undertaken directly by ATL land purchase

department through in 6 local land aggregator from approximately 41 private landowners based on the willing buyer and willing sellers' process. The land is recorded as agricultural land use. Based on the visual observation during the site visit, the land is partially under cultivation by the affected landowner. As reported by the project team, the land under cultivation has already been procured by the WRSS XXI(A) however, the project site had permitted the landowner to harvest the produce from the land. On the northern side of the land parcel, one structure was observed within the land parcel. Reportedly the structure was used as a storage house for storing grains and agriculture equipments. The land area identification is provided below.



Land Requirement for Stockyard/Laydown and Labour Camp

The project will require 15.6 acres of stockyard area for construction materials during the construction period. For this, the EPC contractor (Larsen and Turbo) has taken land on lease on a yearly basis. The land belongs to a single landowner and the agreement was signed between the EPC contractor and the landowner. The 15.6 acres of land comprises the laydown area and labour camps for workers. As informed during site visit, the land was reported to be barren and no cultivation was undertaken prior to land lease. Apart from this, temporary land will be required for setting up a canvass camp for labour during foundation and tower erection. The details of the land procurement process are discussed below.

2.12.2.1 Land Procurement Process for Substation

The total land for the substation is 168 acres of which the land procurement has completed for 135 acres and sale deed for the same has been executed. The land procurement for 33.31 acres is still under process. As indicated earlier, the land has been procured through willing buyer willing sellers through 6 local land aggregators from approximately 41 landowners. Reportedly, the purchase price for the 135 acres was made in keeping with the prevailing market price based on an understanding of the trends in private transactions. All expenses and transaction costs of the signing of the sale agreement, payment of taxes and mutation were directly borne by the project and were not imposed on the landowners. The private land procurement procedure involves title clearance followed by fixing of land prices, and executing of sale deed.

During site visit, none of the landowners were present on-site hence Similarly, AECOM study team could not ascertain the land value received by the affected landowners for the land procured through the local land aggregator. Similarly, the study team could not ascertain the presence of any land dependency. Land procurement of the **168** acres for the substation **is** indicated in the following table:

Table 8. Land Procurement Status

Phase	Land (in acres)	Status	Sale deed
Phase 1	135	Procurement completed	Sale Deed Executed
Phase 2	33.31	Procurement under process	Pending
Total	168.32		

Source: Data shared by ATL, dated 9th June 2021

Reportedly, the land prices are paid as per the market value. A review of the sale deed executed for parcel number 1309/2 indicated that the aggregator received INR 8,59,332 for land admeasuring 1.31 acres (0.5261 hectare). A review of the circle rate of the study area reveals that the land purchase is twice the government circle rate.

Table 9. Government Circle Rate in the Study Area

District/Block	Village Name	Agriculture land (in acre)	Fallow Land (in acre)	Schrub Land(in acre)
Kutchh/Bhachau	Shivlakha	44520	-	-

Source: https://revenue department.gujarat.gov.in/downloads/kachchh_rural_agri.pdf

Note: 11/- per sq.mts

As the land procurement process for the remaining land parcel for the substation is still underway, it is suggested that ATL undertake an independent review to ensure all land procurement has completed before taking possession of land and that land purchase is carried out without coercion and that private landowners received the fair prices of the land value as per current market value.

2.12.2.2 Process for obtaining easement rights for Transmission Line ROW

Land for the transmission line is required for obtaining easement right of the land for tower footing and ROW corridor. No permanent land take is required for the transmission line. As per the provisions of the Electricity Act 2003 and Telegraph Act (1885), the project will not permanently procure the land under the tower footprints or RoW. Easement rights for the tower and right of way will be procured as per Ministry of Power (MoP) Guidelines for Payment of Compensation Towards damages in regard to RoW, October 2015. Prior to start of construction, the project has obtained the following permission for ROW and Tower

- Approval under Section 68 of the Electricity Act 2003
- Approval under Section 164 of the Electricity Act 2003:
- Consent from affected landowner

The project WRSS does not require land procurement for transmission line. Project proponent has obtained easement rights for tower footing from the original landowner by providing 85% land value for tower footing and 15% for ROW corridor due to land use restrictions. The land value was paid as per the govt land schedule rate to the landowner. Ownership of the land would still remain with original landowner however some restriction e.g. construction of permanent structure would impose on the landowner on use of land.

The process of land procurement starts with a Detailed survey carried out by WRSS. During this process, the location of tower and transmission line was determined, and a list of the villages where the line will pass through was identified. The Headman/Sarpanch of the villages impacted by the ROW was informed of the project. Land details and landowner were identified and discussed with the landowner was undertaken for assessing their willingness/consent for easement rights of use of land for tower and ROW. The District administration issued a notification under section 164 of the Electricity Act. The notification was issued not for any forceful acquisition of land but notification and public disclosure. Post this stage, personnel from WRSS team approach the landowner for obtaining land for tower footing. As reported, primarily landowners are reluctant to provide the right of use of the land to the company as govt land schedule rate was not revised since 2011 and was reported to be very low in comparison with the present land value of this area. Then WRSS team approach to the District Authority for revising the land schedule rate. Representatives of landowners are also approached for the same to district authority. Then based on a tripartite meeting between district authority, land owner and WRSS company was organised where collective decision was taken that 900 per sqmt land price for unirrigated land and 950 per sqmt land price for irrigated land would be provided by the company to the land owner for obtaining Right of Use for tower footing and ROW. Based on that WRSS providing 85% of land value for Tower footing and 15% of land value for ROW. It was reported by WRSSXXI(A) that this amount is paid to the landowner in three instalments i.e. i) 33% at Foundation, ii) 33% at time of tower construction and iii) 34% at time of stringing.

Land Use Restriction

Land ownership of these parcels will not undergo any change and use of land under the right of way can continue. Based on the Electricity Act 2003; it is understood that there are no specific restrictions under the right of way other than the construction of buildings above a certain height basis the height clearance of the transmission line and its sag. For this, one-time compensation for one-time compensation amount has been provided to the affected landowners.

2.12.2.3 Project Affected People for Tower Footing and Substation

As reported by the WRSS total 550((765kV line- 350 Nos and 400kV Line – 200 Nos) the number of projects affected people for Tower Footing, 808 for ROW corridor (67% of the total TL length) and approx. 41 private landowners procured through 6 local land aggregators for substation. As per the limited consultation with landowner and as reported by WRSS land personnel majority of the landowner are farmers. Majority of the land under tower footing is double-cropped agricultural land and the agricultural produce are Maize, Wheat, Bajra, Sorghum, Cotton, castor, groundnut etc. During consultation, landowner along the ROW reported that they do not have any grievance towards the project.

2.12.3 Manpower Requirement during Construction

Transmission Line

The construction activity would be carried out by primarily three teams i) foundation ii) Tower erection iii) stringing. The foundation construction team would have around 15-20 labours while the tower erection teams which would follow would have 15-20 people. Finally, the stringing team would also have around 20-25 people involved in the job. During the foundation and tower construction approximately 10-15 teams would be working in parallel. Thus approximately 100-120 labours would be working at any time in the project. However, these number can increase, and 300 people may be employed at a maximum at any point of time in the project. However, the main- contractor might sublet a part of the work, especially the labour-intensive part of the development of foundation to the sub-contractors. The development of the substation and bays would be carried out by a separate team specialized in these activities. This team would comprise of 30-50 people.

Most of the labour required for the foundation, especially unskilled labour would be sourced from the local area. Only, skilled, and semi-skilled labour required for tower erection, stringing, operation of equipment and machinery would be migrant labour from other states. For housing of the skilled and semi-skilled labour temporary construction camps would be setup. The construction camps have to be provided with amenities and facilities so that there is no competition between the labour and the local community over resources or conflicts between them over the disposal of solid and liquid waste or other social resources. During operation phase approximately 15 people would be required and working in 3 shifts.

Substation and LILO Line

For civil work peak period labour requirement is 150 labour per day and average labour requirement is 70-80 per day. Among this labour majority would be sourced from local area. In case of electrical work, peak period labour requirement is 90 and average labour requirement is 40 to 50 labour per day.

2.12.4 Equipment and machinery used in Construction

The construction of the transmission line and the substation would require the following machinery i.e. front-end loader, backhoe, concrete mixer, crane, poker vibrator. This equipment would be mainly located at the site of the construction activity. A temporary staging shall be in the Construction Camp. The maintenance and repairs of the equipment would also be carried out at the camp. The operating noise levels of the equipment is presented in table 2-6.

Table 2-10 :Reference Noise levels of various equipment to be used in the construction activity

Equipment	Noise Level	Equipment	Noise Levels
Front End Loader	85-91	Crane	90-96
Backhoe	79-89	Concrete Mixer	<85
Poker Vibrator	87-98	Electric Drill	102

2.12.5 Power requirement during Construction

Power required at the construction activities would be drawn from the grid where it is available, else diesel generator DG sets would be used to supply the power. 2 nos. of 100 KVA DG set would be used for the supply of power. 1(One) DG would be in running condition and another one (1) on standby. In addition, one 50 KVA DG set would be used for domestic purpose. All the DG sets would conform to the Central Pollution Control Board (CPCB) standards for DG sets.

2.12.6 Water requirement during Construction

Water would be required for both construction activities and domestic purpose during the construction period. The operations period of the project would also have water requirement, but the quantities required would be much lesser in quantities. The water requirement for construction depends on the climatic conditions, type of equipment, type of material available, mix design, type of construction. Considering the above factors and the total duration of the execution of the project it is estimated that the average water requirement for domestic consumption and construction would be approximately 15 KLD and 03 KLD respectively. However, there would be variation in the daily water requirement depending on the construction activities. During the operation phase considering the activities which have been considered the quantity of water required would be negligible.

2.13 Pollution Sources & Characteristics during Construction

Operation of Heavy Vehicle and Machinery: The operations of construction vehicles, diesel generators and machineries engaged in the construction would contribute to Suspended Particulate Matter (SPM), Sulphur and Nitrogen dioxides (SO₂ and NO_x), Carbon monoxide (CO) and other hydrocarbons (HC). In addition, fugitive emissions are envisaged from plying of vehicles, storage, handling and transportation of materials during the construction phase. Dust will be mainly emitted during material transport, loading-unloading activities. Also, during construction phase, noise will be generated from operating heavy machineries, vehicular movement etc. All the generator sets will be equipped with exhaust mufflers and acoustic enclosures and subjected to periodic preventive maintenance to reduce noise and shall conform the CPCB requirement for generators.

2.14 Waste Management during Construction

Generation of waste from construction activities: Due to the construction of the transmission line the excavated soil will be refilled after foundation as such waste will be negligible. and substation approximately m3 of construction waste would be generated. This would be primarily from concreting activities and can easily be used as a backfill material. This construction and demolition waste can be used for raising the sites for substation and strengthening of approach road.

Discharges from Campsite and Construction areas: Sewage effluent will be generated during the construction. The campsite would be provided with septic tank and soak pit / bio-toilets to treat the sewage. Since the camp would primarily cater to the requirement of the skilled and semi-skilled labour, who are migrant from outside the area, the number of people staying at the camp would be limited, thus the waste generated would be minimal. Also, mitigation measures e.g. septic tanks and soak pits or bio-toilet will be constructed at the construction camps. These measures are embedded included in the project design to prevent the discharge of untreated sewage or wastewater. It is estimated that on an average 15.0 kg of municipal solid waste (MSW) would be generated per day during the construction phase from the camps. This would comprise of food waste and recyclables viz. packaging material. The MSW would have to be handled by the Contractor so that the adjoining areas are not contaminated.

Hazardous Waste: The used oil and lubricant, oil-soaked rags, empty drums from transformer oils would be considered as Hazardous Waste. In addition, paints, solvents, and oil used would also be considered as hazardous waste. These would be disposed of by the Contractor as per the provisions of the Hazardous and Other Waste (Management and Transboundary) Movement Rules 2016.

2.15 Waste Management During Operations

E-waste: During operations e-waste would be the main type of waste which would be generated. The e-waste is likely to be generated primarily from the maintenance of the substation equipment. These must be disposed as per the E-Waste Management Rules 2016.

Hazardous Waste: The waste transformer oil (which would be generated after 5 years of the commissioning) would qualify as a Hazardous waste would have to be disposed as a Hazardous and Other Wastes (Management and Transboundary Movement) Rules 2016.

Battery Waste: The substation would have DC battery which would be required to supply power to some of the equipment in case of emergency. The battery waste would be disposed of as per the Battery Management and Handling Rule, 2001

2.16 Present Status of the Project

As already, the proposed project involves construction of 146.1km of transmission line and a 3000 MVA substation located at Village: Shivilakha, Kachh District of Gujarat. As on date, out of the total of 399 towers, construction of 173 towers have been completed and 11 towers are under construction. Stringing activities have not been initiated yet. A lay down area has been set up at Lodai, which is about 30 km from Bhuj. This area covers an area of 7 acres and comprises of pre-fabrication yard, casting area, machinery & vehicle maintenance area, administrative area, labour camps and general service area. This Lay-down area provides support to the whole transmission line alignment.

The construction of the sub-station spread over an area of 168 acres is also in progress. Presently activities such as excavation, foundation are in progress. The target date for completion of the sub-station is May'21.



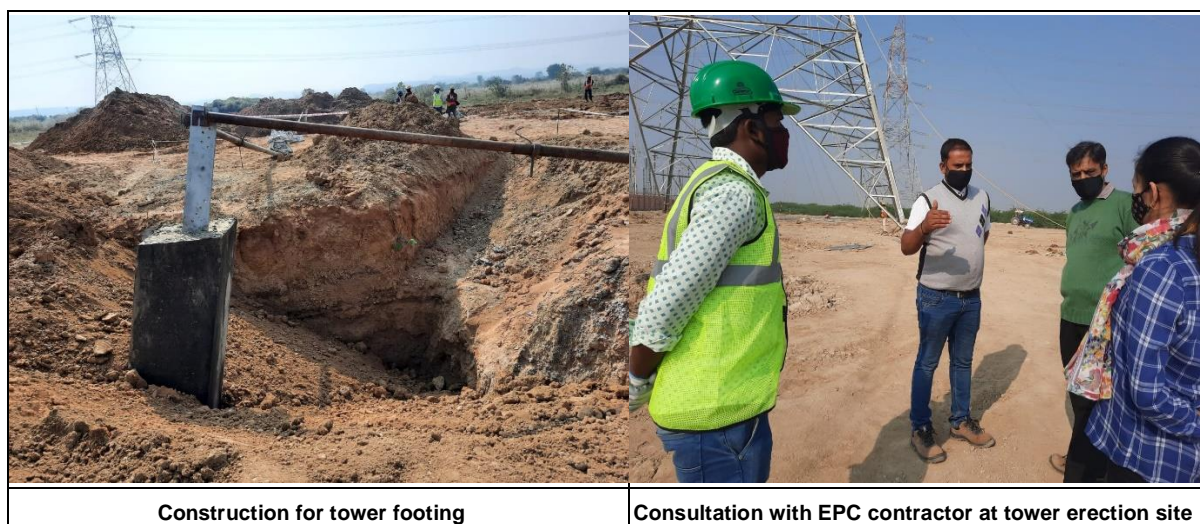
Tower erection activity

Construction material for tower footing



Consultation with EPC contractor for substation

Construction at substation



Construction for tower footing

Consultation with EPC contractor at tower erection site

2.17 Labour and Working Condition

The project has already in a construction stage, at the time of ESIA, L&T has been contracted as the EPC contractor for construction. The EPC contractor had been completed and labour had already mobilised on site. A total of 20-30 worker on site mobilised for tower foundation and erection work. A total of 10-15 workers were engaged for tower foundation and 10-15 workers for tower erection. Local labour is engaged for foundation work and migrant labour from Bihar and Jharkhand are mobilised for erection work.

Substation and LILO line

For civil work peak period labour requirement is 150 labour per day and average labour requirement is 70-80 per day. Among this labour majority has been sourced from local area. In case of electrical work, peak period labour requirement is 90 and average labour requirement is 40 to 50 labour per day.

Unskilled labour sourced from local area and majority of the skilled labour are migrant and stayed in rented house arranged by themselves.

2.17.1 Labour Accommodation:

The labour accommodation for the project is required during construction stage. In keeping up with IFC guidelines following are the key provisions

- Provision of potable water for drinking
- Labours shall be provided with at least one toilet/urinal/washing facility shall be available per 15 construction workers;
- Arrangement for separate cooking area and supply of cooking fuel- LPG gas or kerosene oil;
- Provision of waste collection and segregation (biodegradable and non-biodegradable)
- Sleeping or resting area (as in a temporary arrangement) should be adequate in size and appropriate to protect its occupiers from harsh weather conditions and keep their personal belongings safe.;
- The EPC contractor to consult with the relevant Gram Panchayat before selecting the location of the labour camp;

During the operation phase, the total work force expected to be deployed is 10-15 individuals for maintenance and for regular patrolling. This regular patrolling will be undertaken at least twice in a fortnight along the entire route. This team will primarily comprise of technicians, electricians and skilled and semi-skilled workmen.

3. Policy Legal and Administrative Framework

This section highlights the relevant environmental and social policies and regulations, IFC and World Bank Group guidelines applicable for transmission projects especially transmission projects in Gujarat. The regulatory framework is based on a) applicable national and state level environmental and social regulations for the project; b) International Standards and Conventions; and c) Applicable Environmental and Social Guidelines. The institutional framework for implementation of the regulatory framework has also been taken into consideration

3.1 National and State Laws

Constitution of India under Article 21 assures that “The State shall endeavour to protect and improve the environment and to safeguard the forests and wildlife of the country.” Similarly, Article 51 (A) also make say that “It shall be the duty of every citizen of India to protect and improve the natural environment including forests, lakes, rivers and wildlife and to have compassion for living creatures.” Considering the direction from the constitution, the Government of India has laid out various policy guidelines, acts and regulations pertaining to protection of environment. Consequently, the individual states have also framed rules to further the cause of environment protection.

The Environment (Protection) Act, 1986 provides umbrella legislation for the protection of environment. As per this Act, the responsibility to administer the legislation has been jointly entrusted to the Central Ministry of Environment Forests and Climate Change (MoEF & CC) and the CPCB / State Pollution Control Board (SPCB)

The implementation of the subprojects will be governed by Government of India and State of Gujarat and other applicable environmental acts, rules, regulations, and standards. These regulations impose restrictions on the activities to minimize or mitigate likely impacts on the environment. It is the responsibility of the project executing and implementing agencies to ensure subprojects are consistent with the legal framework, whether applicable international, national, state or municipal or local. Key standards include those related to air quality, and protected areas are included. Compliance is required in all stages of the project including design, construction, and operation and maintenance of Transmission lines. The specific regulatory compliance requirements of for the WRSS Project are shown in **Table 3.1**

Table 3-1 :Applicable Environmental Legislations and Specific Requirements for the Project

Sl. No.	Acts/Rule/Policy	Description	Applicability & Action Required	Responsibility
Environment related regulations				
1.	National Environment Policy, 2006.	NEP is a comprehensive guiding document in India for all environmental conservation programs and legislations by central, state and local government. The dominant theme of this policy is to promote betterment of livelihoods without compromising or degrading the environmental resources. The policy also advocates collaboration method of different stakeholders to harness potential resources and strengthen environmental management.	The WRSS Project should adhere to NEP principle of “enhancing and conservation of environmental resources and abatement of pollution”.	Project Company
2.	Environment (Protection) Act, 1986 and Environmental Standards.	The Environment (Protection) Act is an umbrella legislation seeking to supplement the existing laws on the control of pollution (the Water Act and the Air Act) by enacting a general legislation for environment protection and to fill the gaps in regulation of major environmental hazards.	The Railway electrification project and all activities under the same should adhere to the regulations and standards under the Environment (Protection) Act, 1986 and Environmental Standards.	Project company and the contractors / subcontractors and other supply chain contractor should adhere to the rules and standards specified under the Environment Protection acts

Sl. No.	Acts/Rule/Policy	Description	Applicability & Action Required	Responsibility
3	EIA Notification of 2006 and the later amendments	The EIA Notification set out the requirement for environmental assessment in India. This states that Environmental Clearance is required for certain defined activities/projects, and this must be obtained before any construction work or land preparation (except land acquisition) may commence. The Schedule I of the notification defines threshold of activities which require to undertake an environmental assessment and obtain an environmental clearance from statutory bodies. Projects are categorized as A3 or B4	The transmission projects are not included in the Schedule I of the EIA notification. Thus, there is no requirement for Project Company to undertake environmental clearance.	Not applicable
4.	Water (Prevention and Control of Pollution) Act of 1974, Rules of 1975, and amendments	Control of water pollution is achieved through administering conditions imposed in consent issued under provision of the Water (Prevention and Control of Pollution) Act of 1974. These conditions regulate the quality and quantity of effluent, the location of discharge and the frequency of monitoring of effluents. Any component of the Project having the potential to generate sewage or trade effluent will come under the purview of this Act, its rules and amendments. Such projects must obtain Consent to Establish (CTE) under Section 25 of the Act from Gujarat Pollution Control Board (GPCB) before starting implementation and Consent to Operate (CTO) before commissioning. The Water Act also requires the occupier of such subprojects to take measures for abating the possible pollution of receiving water bodies.	The transmission line project does not require any permission under the Water Act 1974. However, the Contractor has to obtain a Consent to Operate (CTO) under the said Act. The Consent has to be regularly renewed during the tenure of the project.	Contractor
5.	Air (Prevention and Control of Pollution) Act of 1981, Rules of 1982 and amendments.	The subprojects having potential to emit air pollutants into the atmosphere must obtain CTE under Section 21 of the Air (Prevention and Control of Pollution) Act of 1981 from GPCB before starting implementation and CTO before commissioning the project. The occupier of the project/facility has the responsibility to adopt necessary air pollution control measures for abating air pollution.	For the subproject, the CTE and CTO from GPCB is required for (i) diesel generators; and (ii) cement concrete batching plants, stone crushers, etc. if installed for construction.	Contractor
6.	The Motor Vehicles Act, 1988 (59 Of 1988) (14 Oct. 1988)	The equipment and vehicles used in the sub-projects will emit air pollutants. Enforcement of air pollution norms and other	Rule no 115. Emission of smoke, vapor, etc. from motor vehicles and Rule 115 (A) sub-rule (8) also provides	Contractor

³**Category A** projects require EC from the central Ministry of Environment, Forests and Climate Change (MoEF&CC). The proponent is required to provide preliminary details of the project in the prescribed manner with all requisite details, after which an Expert Appraisal Committee (EAC) of the MoEF&CC prepares comprehensive Terms of Reference (ToR) for the EIA study. On completion of the study and review of the report by the EAC, MoEF&CC considers the recommendation of the EAC and provides the EC if appropriate.

⁴**Category B** projects require environmental clearance from the State Environment Impact Assessment Authority (SEIAA). The State level EAC categorizes the project as either B1 (requiring EIA study) or B2 (no EIA study) and prepares ToR for B1 projects within 60 days. On completion of the study and review of the report by the EAC, the SEIAA issues the EC based on the EAC recommendation. The Notification also provides that any project or activity classified as category B will be treated as category A if it is located in whole or in part within 10 km from the boundary of protected areas, notified areas or inter-state or international boundaries.

Sl. No.	Acts/Rule/Policy	Description	Applicability & Action Required	Responsibility
		applicable rules as per the motor vehicle act	standards for construction equipment	
7.	Noise Pollution (Regulation and Control) Rules, 2002 amended up to 2010.	This provides for standards for noise for day and night for various land uses and specifies special standards in and around sensitive receptors of noise such as schools and hospitals. Contractors will need to ensure compliance to the applicable standards and install and operate all required noise control devices as may be required for all plants and work processes.	The project during the construction and operation has to adhere to the noise limits for various land use	Contractor during the Construction and Operation and maintenance
8.	National Institute of Occupational Safety and Health (NIOSH) Publication No. 98-126	NIOSH has laid down criteria for a recommended standard: occupational noise exposure. The standard is a combination of noise exposure levels and duration that no worker exposure shall equal or exceed.	Internationally recognized environmental standards have to be adhered to during the construction and operation of the railway electrification Project	Project Company and Contractor
9.	Solid Wastes Management Rules, 2016	Rules to manage municipal solid waste generated; provides rules for segregation, storage, collection, processing and disposal.	During the construction municipal waste generated has to be managed according to the rules	Construction
10.	E-Waste (Management) Rules, 2016	Bulk consumer of electrical and electronic equipment will ensure that e-waste generated is channelized through collection centre or dealer of authorized producer or dismantler or recycler or through the designated take back service provider of the producer to authorized dismantler or recycler.	The project would qualify as a bulk consumer and that the e-waste generated from the project has to comply with the provisions of the rules and disposed through the prescribed channels only	Project Company
11	Construction and Demolition Waste Management Rules, 2016	Rules to manage construction and to waste resulting from construction, remodelling, repair and demolition of any civil structure. Rules define C and D waste as waste comprising of building materials, debris resulting from construction, re-modelling, repair and demolition of any civil structure.	All debris generated during the construction would be handled in accordance to the provisions of the Construction and Demolition Waste Management Rules, 2016	Contractor
12.	Hazardous and Other Wastes (Management and Trans boundary Movement) Rules, 2016	According to the Rules, hazardous wastes are wastes having constituents specified in Schedule II of the Rules if their concentration is equal to or more than the limit indicated in the said schedule.	The hazardous waste generated from the construction e.g. waste oils, lubricants, and rags would have to comply with the provisions of the rules with regards to storage and disposal. The rules also make it mandatory for maintaining records and reporting the same to the GPCB.	Contractor
13.	Battery (Management & Handling) Rules 2001	It is the responsibility of the bulk consumer to ensure that the used batteries are deposited with the dealer, manufacturer, or registered recycler for handling and disposal. A half-yearly return (Form-1) is to be filed as per the rule to GSPCB.	The batteries need to be disposed off as per the provision of the notification	Project Company
14.	Ozone Depleting Substances (Regulation and Control) Rules, 2000	The project would reduce the use of ozone depleting substances	WRSS shall follow the provisions of the notification and shall phase out all	Project Company

Sl. No.	Acts/Rule/Policy	Description	Applicability & Action Required	Responsibility
			equipment, which uses these substances. In case of substation no equipment would be procured which contain CFC's.	
15.	Forest (Conservation) Act, 1980 and Forest Conservation Rules, 2003 as amended	As per Rule 6, every user agency, who wants to use any forest land for non-forest purposes, shall seek approval of the Central Government.	400 kV LILO line & 765 kV Bhuj Lakadiya line has already been granted Stage- II (final approval) & Stage I forest approval respectively by RMOEF.	Project Company
16.	Saurashtra Felling of Trees (Infliction of Punishment) Act, 1951. and rules thereunder	Permission is required for felling of Teak, Black wood, Sandal wood, Khair, Mahuda, Timru, Simla, Sadad, Kanaj, Kanaji, Seven, Bio, Rohan, Ebony, Kadao, Kalam, Baldervo, Harde, Dhavada, Mango, Palmyra palm, Date tree and Jamun. The State has relaxed felling of some species Neem, Kasia, Kanji, Khijdo, Mango and Amla under the Act.	In case of felling of the tree species mentioned above permission for felling has to be obtained.	Contractor
17.	The Ancient Monument and Archaeological Sites and Remains (Amendment and Validation) Act 2010	The Rules designate areas within a radius of 100 m and 200 m from the "protected property/ monument/ area" as "prohibited area" and "regulated area" respectively.	The Ancient Monument and Archaeological Sites and Remains (Amendment and Validation) Act 2010	Contractor
18.	Draft ESZ Notification-Kutch Desert Wildlife sanctuary	The ESZ area for Kutch Desert Wildlife Sanctuary not notified till date. However, as a general principle the width of the ESZ could be go up to 10km around a protected area as provide in the Wildlife Conservation Strategy-2002.	WRSS need to be obtain NOC form Forest department if ROW of the line pass through the ESZ area.	Project Company
19.	The National Green Tribunal (NGT) Act, 2010	NGT provides an effective and expeditious disposal of cases relating to environmental protection and conservation of forests and other natural resources including enforcement of any legal right relating to environment and giving relief and compensation for damages to persons and property and for matters connected therewith. NGT has jurisdiction over matters related to Water Act, 1974; Water Cess Act, 1977; Forest (Conservation) Act, 1980; Air Act, 1981; Environment (Protection) Act, 1986; Public Liability Insurance Act, 1991; and Biodiversity Act, 2002. Consequently, no other court will have jurisdiction over the matters related to environment falling under the above referred Acts. Being a dedicated tribunal for environmental matters with the necessary expertise to handle environmental disputes.	Stakeholders / affected persons may approach NGT to resolve project induced environmental issues	Project Company
Electricity Related Rules and Regulations				
20.	Electricity Act 2003	Under the provisions of Section 68(1): -prior approval of the Govt. of Gujarat (GoG) is a mandatory requirement to undertake any new transmission project to plan and	The permission under Section 68(1) has already been obtained	Project Company

Sl. No.	Acts/Rule/Policy	Description	Applicability & Action Required	Responsibility
		coordinate activities to commission a new Transmission project.		
21.		Under Section 164: - (Government of Gujarat) GoG, may by order in writing, authorize ATL for the placing of electric line for the transmission of electricity confer upon licensee (i.e. WRSS) in the business of supplying electricity under this act subject to such conditions and restrictions, if any, as GoG may think fit to impose and to the provisions of the Indian Telegraph Act, 1885, any of the power which the Telegraph authority possesses.		Project Company
Labour Related regulations				
22.	The Child Labour (Prohibition and Regulation) Amendment Act, 2016 The Child Labour (Prohibition and Regulation) Act, 1986	No child below 14 years of age will be employed or permitted to work in any of the occupations set forth in the Act's Part A of the Schedule or in any workshop wherein any of the processes set forth in Part B of the Schedule. Child can help his family or family enterprise, which is other than any hazardous occupations or processes set forth in the Schedule, after his school hours or during vacations	No children between the age of 14 to 18 years will be engaged in hazardous working conditions.	Project Company and Contractor
23.	Contract Labour (Regulation and Abolition) Act, 1970	The Act provides for certain welfare measures to be provided by the Contractor to contract labour and in case the Contractor fails to provide, the same are required to be provided by the Principal Employer by Law. The principal employer is required to take Certificate of Registration and the Contractor is required to take a License from the designated Officer. The Act is applicable to the establishments or Contractor of principal employer if they employ 20 or more contract labour.	Applicable to all construction works under Railway Electrification	Project Company and Contractor
24.	The Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996 and the Cess Act of 1996.	All the establishments who carry on any building or other construction work and employ 10 or more workers are covered under this Act. All such establishments are required to pay Cess at rate not exceeding 2% of the cost of construction as may be notified by the Government. The employer of the establishment is required to provide safety measures at the building or construction work and other welfare measures, such as canteens, first-aid facilities, ambulance, housing accommodation for workers near the workplace etc. The employer to whom the Act applies has to obtain a registration certificate from the Registering Officer appointed by the Government - Cess should be paid at a notified rate. -The employer must obtain a registration certificate from the Registering Officer	Applicable to any building or other construction work employing 10 or more workers. provide safety measures at the construction work and other welfare measures, such as canteens, first-aid facilities, ambulance, housing accommodation for workers near the workplace etc.,	Project Company and Contractor

Sl. No.	Acts/Rule/Policy	Description	Applicability & Action Required	Responsibility
25.	The Inter-State Migrant Workmen (Regulation of Employment and Conditions of Service) Act, 1979	The Act is applicable to an establishment which employs 5 or more inter-state migrant workmen through an intermediary (who has recruited workmen in one state for employment in the establishment situated in another state). The inter-state migrant workmen, in an establishment to which this Act becomes applicable, are required to be provided certain facilities such as housing, medical aid, traveling expenses from home up to the establishment and back, etc.,	Contractor shall register with Labour Department if Inter-state migrant workmen are engaged. Adequate and appropriate amenities and facilities to be provided to workers - housing, medical aid, traveling expenses	Project Company and Contractor
26.	Minimum Wages Act, 1948.	The employer is supposed to pay not less than the Minimum Wages fixed by appropriate Government as per provisions of the Act if the employment is a scheduled employment. Construction of Buildings, Roads, Railway, and Runways are scheduled employment.	All construction workers should be paid not less than the prescribed minimum wage.	Project Company and Contractor
27.	Workmen Compensation Act, 1923.	The Act provides for compensation in case of injury by accident arising out of and during employment.	Compensation for workers in case of injury by accident.	Project Company and Contractor
28.	Equal Remuneration Act, 1979.	The Act provides for payment of equal wages for work of equal nature to Male and Female workers and not for making discrimination against Female employees in the matters of transfers, training and promotions etc.	Equal wages for work of equal nature to male and female workers.	Project Company and Contractor
29.	The Public Liability Insurance Act, 1991 and	These provide for public liability insurance for providing immediate relief to the persons affected by accident occurring while handling hazardous substances and for matters connected herewith or incidental thereto. Hazardous substance means any substance or preparation which is defined as hazardous substance under the Environment (Protection) Act 1986, and exceeding such quantity as may be specified by notification by the Central Government	The Contractor needs to obtain an insurance under this act to compensate any liability arising out of environmental degradation caused wilfully or unwilfully by him.	Project Company and Contractor

3.2 Clearance and Permission Required

Clearances / permissions to be obtained prior to start of construction are presented in. This list indicative and the ATL/ Contractor should ascertain the requirements of any additional permission required and obtain the same prior to start of the construction.

Table 3-2 :Permission and Clearance required in the Project

Sl. No.	Construction Activity	Regulatory Agency	Implementation	Supervision
1.	Railway crossing permission	Indian Railway	April'21.	
2.	NH crossing	NHAI	Approved	
3.	Power Line (PTCC)	CEA (Central Electricity Authority)	Obtained 29 out of 33. Balance by April'21.	
4.	Permission for Activities in ESZ	Wildlife Division, Forest Department, Government of Gujarat	PIU	PMU

Sl. No.	Construction Activity	Regulatory Agency	Implementation	Supervision
5.	Tree Cutting/pruning of Trees (if required ⁵)	State Forest Department	PIU	PIU and PMU
6.	Establishment of batching plant	Consent to establish and consent to operate under Air Act, 1981 from GPCB	Contractor	PIU
7.	Procurement of construction material (sand, aggregate)	Permission from District Collector/ State Department of Mining, under Gujarat Minor Minerals and Concession Rules	Contractor	PIU
8.	Temporary traffic diversion measures	District traffic police	Contractor	PIU

*All the approvals & clearances shall be taken within project schedule.

* The approval shall be obtained before SCOD (Schedule commercial operation date) (Revised SCOD March 2022)

3.3 Codes and Guidance

The transmission line for the codes which would be relevant from an environmental and social perspective include:

- IS 5613. Code of Practice for Design, Installation and Maintenance of Overhead power Lines
- IS-875. Code of Practice for Design of Loads (other than Earthquake) for Buildings and Structure

3.4 IFC Policy

The EPs, based on the IFC Performance Standards on social and environmental sustainability and on the World Bank Group Environmental, Health, and Safety Guidelines (EHS Guidelines), are intended to serve as a common baseline and framework for the implementation by Lending Agency/IFC. The applicability of EP to the project has been outlined in **Table 3.3**.

Table 3-3: Application of Equator Principles

Equator Principles	Requirements	Project Information/ Application
Principle 1 : Review and Categorization	As the project is seeking financing from Lending Agency/IFC, the project has to be categorized based on the magnitude of its potential impacts and risks in accordance with the environmental and social screening criteria of IFC.	Proposed transmission project is identified as a Category "B" project. The rationale is presented in Section 3.6 of this report
Principle 2: Social and Environmental Assessment	For each project assessed as being either Category A or Category B, the Lending Agency/IFC will require the borrower need to conduct an Environmental and Social Assessment process to address, to the Lending Agency/IFC's satisfaction, the relevant environmental and social risks and impacts of the proposed Project. The assessment should also propose measures to minimize, mitigate, and offset adverse impacts in a manner relevant and appropriate to the nature and scale of the proposed Project.	The social and environmental assessment as been carried out including a risk assessment.
Principle 3: Applicable Social and Environmental Standards	The principle requires the Environment and Social Assessment to refer to the applicable IFC performance standards and then applicable industry specific EHS guideline including the project's overall compliance with or justified deviation from, the respective Performance Standards and EHS Guidelines. The assessment process also needs to address compliance with relevant host country laws, regulation and permits that pertain to social and environmental matters.	The compliance to applicable Indian rules and regulations and IFC standards are reported in chapter 3.
Principle 4: Action Plan and Management System	For all Category A and B projects, an Action Plan (AP) need to be prepared which addresses relevant	In accordance with the provision of this Principle, an Environmental and Social

⁵ As described above in **Error! Reference source not found.**, there may be requirement for felling of certain trees , However, the requirement will be established ones the final designs are prepared during the construction.

Equator Principles	Requirements	Project Information/ Application
	findings and draws on the conclusions of the Assessment. The AP will describe and prioritize actions needed to implement mitigation measures, corrective actions and monitoring measures necessary to manage the impacts and risks identified in the Assessment. In this regard, the borrower /proponent needs to maintain or establish a Social and Environmental Management System that addresses the management of these impacts, risks and corrective actions required to comply with applicable host country social and environmental laws and regulations, and requirements of the applicable Performance Standards and EHS Guidelines, as defined in the AP.	Management Plan has been drawn up as part of the ESIA study for the proposed project specifying appropriate plans and procedures which requires to be implemented during various phases in order to prevent, control and mitigate any potential environmental and social risks. For further details please refer to Chapter 6 of this document.
Principle 5: Consultation and Disclosure	According to this Principle, for all Category A and (as appropriate), Category B projects, the Government, borrower or third-party expert to consult with project affected communities in a structured and culturally appropriate manner. For projects with significant adverse impacts on affected communities, the process will ensure their free, prior and informed consultation and facilitate their informed participation as a means to judge, vide IFC norms, whether a project has adequately addressed the concerns of the affected communities.	Given the proposed project is rated as "Category B", with no potential adverse impacts on communities. However, in congruence with the requirement of this Principle, the proponent, have undertaken social consultation with the affected persons and nearby village's representatives to establish the socio-economic condition of the area, at the same time trying to understand any community concern that might be associated with the proposed project, particularly related to loss of land, livelihood, resource requirement etc during the ESIA Preparation.
Principle 6: Grievance Mechanism	For all Category A and (as appropriate), Category B projects, it needs to be ensured by the proponent that consultation, disclosure and community engagement continues throughout construction and operation of the project and community concerns/grievances addressed through establishing a 'Grievance Redressal Mechanism'. In this regard, the proponent of the proposed solar PV project need to develop and implement a 'Grievance Redressal Mechanism (GRM)' to receive and facilitate resolution of any concern and grievance that may be raised by land loser groups and/or nearby village communities during both construction and operational phase of the project. As part of this Principle, it is also imperative that the proponent maintains regular dialogue with communities through implementation of focused CSR programmes/initiatives.	The EHS team of WRSS will take care of grievances raised verbally or in written manner. The details are given in chapter- 8
Principle 7: Independent Review	For all Category A projects and, as appropriate for Category B projects, an independent social or environmental expert not directly associated with the proponent will review the assessment, action plan and consultation process documentation in order to assist Lending Agency/IFC 's due diligence and assess Equator Principle Compliance.	As part of the loan approval for the project WRSS will appoint an independent social or environmental expert/organization for review of ESIA/ESMP report and its implementation.
Principle 8: Covenants	For Category A and B projects, the proponent will covenants in financing documentation: a) to comply with all relevant host country social and environmental laws, regulations and permits in all material respects; b) to comply with the action plans (where applicable) during the construction and operation of the project in all material respects; c) to provide periodic reports in a format agreed with Lending Agency/IFC (with the frequency of these reports proportionate to the severity of impacts, or as required by law, but not less than annually), prepared by in-house staff or third party experts, that) document compliance with the action plans (where applicable), and ii) provide representation of compliance with relevant local, State and host country social and environmental laws, regulations and permits (where applicable) d) to decommission the facilities, where applicable and appropriate, in accordance with an agreed decommissioning plan.	E&S Covenants shall be embedded within the contracts drawn between WRSS and the contractors hired for construction activities and technology providers and waste handlers. Periodic reporting to the project developers will have to be carried out by the contractors.

Equator Principles	Requirements	Project Information/ Application
Principle 9: Independent Monitoring and Reporting	To ensure ongoing monitoring and reporting over the life of loan, Lending Agency/IFC will, for all Category A projects and, as appropriate for Category B projects, require appointment of an independent environmental and/or social expert, or require that the proponent retain qualified and experienced external experts to verify its monitoring information which would be shared with Lending Agency/IFC	The project will fall under category B and the periodic reporting mechanism will be done as agreed between Lending Agency/IFC and Project Company.

Equator Principal IV

The Equator Principle IV has emphasized on addressing potential and adverse impacts on Human Rights and requires the Project complies with relevant host country laws, regulations and permits that pertain to environmental and social issues. For addressing compliance (in addition to national social applicable laws) the project has in place existing mechanism for policies adaptation for workers and affected communities. Table 3-4 provides an overview of the policies adaptation by the project.

Table 3-4: Labour and Human Rights Policies Requirements

Requirements	Aspects of Human Rights Issue	Adani Compliance to Requirements
EP IV requires to conduct risks and impacts on workers which includes employees and contractors. As per UNGP the project should consider avoid causing or contributing to adverse human rights impacts through their own activities, and address such impacts when they occur; (b) Seek to prevent or mitigate adverse human rights impacts that are directly linked to their operations, products or services by their business.	Child Labor: As per ILO standards prohibit engagement of children under 18 years in hazardous work. Moreover, it also prohibits engagement of Children for those under 15, with limited exceptions for developing countries.	The Business Responsibility Policies has strictly prohibited engagement of Child Labour in the operation. Principle 3 of the Business Responsibility Policy (BRP) prohibit use of child labour, forced labour or any form of involuntary labour, paid or unpaid in the business activities for Adani Transmission. The company existing human right principle is committed to upholding of fundamental human rights and compliance with applicable laws including internationally recognized human rights, as set out in the International Bill of Human Rights and the International Labour Organization's declaration on Fundamental Principles and Rights at Work. This policy applies to all direct employees, consultants (including fixed term appointees), associates, trainees, suppliers, vendors, etc. For ensuring contractors/vendors compliance to Human rights violations, General conditions of Contract is in place whereby contractors shall bound to comply to the labour and human rights requirements. The GCC forms parts of the contractor identification, screening and onboarding process.
	Collective Bargaining and Freedom of Association	As per Principle 2 and 3 of Adani's Business Responsibility Policies (BRP) is committed and respects the employees' right to freedom of association, participation and collective bargaining.
	Non-Discrimination and Forced Labour	Employees at all levels shall have freedom of association and be free to participate in collective bargaining. The company's Business Responsibility Policies is also committed to provision non-discrimination and equal opportunity to all employees irrespective of their caste, creed, gender, race, religion, and language. The discrimination policy is applicable for Employees, agency staff, vendors, customers and suppliers (<i>Principle 4 of Business Responsibility Policies</i>).

Requirements**Aspects of Human Rights Issue Adani Compliance to Requirements**

Working Conditions and Occupational Health and Safety	<p>Section 25.1 of the GCC mandates Contractor and Sub-Contractors to abide by all applicable laws including environmental laws and laws pertaining to health and safety. The Contractor shall take all necessary care that the Services are performed with the minimum possible impact on the environment and local community in respect of land and occupants affected by or adjacent to the Site.</p> <p>Section 25.2 of the BRP The Contractor shall comply with the specific rules and regulations (including safety regulations) and the same shall abide for Sub-Contractors, laborer's and personnel to comply with the said rules and regulations. Such rules and regulations shall include rules in respect of security, safety of the Services and people at the Site, gate control, sanitation, medical care and fire prevention.</p> <p>The Contractor shall also strictly comply with standard safety norms, rules and regulations prevalent in the industry while performing its obligations.</p> <p>At the company level, committed to provide workplace environment that is safe, hygienic and which upholds the dignity of the employee. Moreover, schemes and policies to address health, superannuation issues and welfare needs of employees and their families will be put in place to promote well-being of employees.</p>
Wages	<p>The Contractor shall be liable and responsible for all payments to its personnel, including salaries, wages, Taxes, allowances and other benefits in accordance with the laws.</p>
Women Rights	<p>The company besides the discrimination policy has put in place stringent policies (POSH- The Sexual Harassment of Women at Workplace (Prevention, Prohibition and Redressal) Act, 2013) to ensure that the employees especially female employees do not suffer harassment and create the environment where they feel safe and secure in discharging their responsibilities. This policy is applicable for employees, contractor workers etc.</p>
Social Security	<p>Section 20 subsection 20.1 of the General condition of Contract (GCC) mandates that Contractor shall, at its own cost, arrange, secure and maintain, all insurance policies workmen's compensation, employees' state insurance, public liability insurance and insurance for all its employees.</p> <p>Besides insurance, adequate training will be provided to employees to meet the challenges of a dynamic business environment and will also provide adequate grievance handling mechanisms.</p>
EP IV requires to conduct actual or potential adverse impacts to the communities.	<p>Potential Human right/risks issues such as right to health, right to participate in the cultural life of the community, right to natural resources.</p> <p>The project has in place policies for ensuring balance between economic social and environmental performance.</p> <p>As per the BRP, the company is committed to respect the rights of people in communities impacted by the business operations. Any potential adverse impact on human rights will be identified and take appropriate steps to avoid, minimize and/or mitigate them. The company will also</p>

Requirements

Aspects of Human Rights Adani Compliance to Requirements
Issue

undertake several initiatives to engage with and ensure sustainable development of the marginalized groups in the local communities around its sites of operations.

Principle 6 of BRP of the Company is committed to addressing the global environmental issues such as climate change and global warming through energy conservation, efficient natural resource utilization and adoption of cleaner energy.

The company has put in place a CSR plan for the affected communities for ensuring inclusive growth and equitable development by establishing competitive and sustainable value chains capable of generating sustainable livelihoods, especially among the poor in rural India. The inclusive development includes education, health care, natural resources management and rural infrastructure

Consultation must be undertaken with indigenous peoples potentially impacted by projects affecting lands or resources subject to traditional or customary use, requiring relocation or resettlement, or impacting cultural heritage. This includes evaluating whether the free, prior and informed consent (FPIC) of indigenous peoples has been obtained for projects with specific impacts on indigenous peoples.

Indigenous Peoples are afforded unique group rights under international law that permits them to give or withhold their consent to projects that may impact them under certain scenarios

The project does not fall under the schedule and transmission line does not involve any SC/ST land and no displacement of people (including indigenous people). The land has been leased from willing owners; hence this requirement is not applicable.

In case of substation in Lakadia no tribal land has been involved. Hence, this is not applicable for the proposed land for substation.

EP IV requires, to establish effective grievance mechanisms which are designed for use by Affected Communities and Workers, as appropriate, to receive and facilitate resolution of concerns and grievances about the Project's environmental and social performance.

All people have the right to remedy when their rights have been violated and identify that they have caused or contributed to adverse Human Rights impacts.

The company has in place the website which acts as a special window called 'Help-desk' which may be accessed by stakeholders of the Company for redressal of their grievances.

For WRSS project specific Grievance Redress Mechanism has been developed for the projects for stakeholders -workers and communities.

3.5 IFC PERFORMANCE STANDARDS

IFC Performance Standards (revised applicable from January 2012) define clients' roles and responsibilities for managing their projects and the requirements for receiving and retaining financing from EPFI's. The applicability of IFC Performance Standards to the project is outlined in table 3-4.

Table 3-4: Application of IFC Performance Standards to the Project

IFC Performance Standards	Requirements	Project Information/ Application
Performance Standard 1: Social & Environmental Assessment and Management System	The project should have a social and environmental management system that incorporates the following: (i) policy; (ii) identification of risks and impacts; (iii) management programs; (iv) organizational capacity and competency; (v) emergency preparedness and response; (vi) stakeholder engagement; and (vii) monitoring and review.	This Performance Standard is applicable to the Project. Corporate ESMS encompassing implementation for all transmission line projects has been developed and same has been applied for WRSS project.

IFC Performance Standards	Requirements	Project Information/ Application
Performance Standard 2: Labor and Working conditions	WRSS/ATL requires to follow requirements on (i) working conditions and management of worker relationship (human resource Conditions policy, working conditions, terms of employment, workers organizations, non-discrimination equal opportunity, retrenchment, grievance mechanism); (ii) protecting work force (not engaging child labour and forced labour); (iii) occupational health and safety; (iv) workers engaged by third parties; and (v) adverse impacts related to supply chain.	This Performance Standard is applicable to the Project and addressed in Table 3-1 as well as the Environment Management Plan in Chapter 6.
Performance Standard 3: Pollution Prevention and Abatement	WRSS/ATL requires to consider (i) sustainable resource utilization (water consumption); (ii) pollution prevention (wastes, hazardous materials management, pesticide use and management)	This Performance Standard is applicable to the Project and the relevant activities are presented in Environment Management Plan Chapter 6
Performance Standard 4: Community Health, Safety and Security	WRSS/ATL requires to follow requirements on i) infrastructure and equipment design and safety; (ii) hazardous materials management and safety; (iii) ecosystem services; (iv) community exposure to disease; (v) emergency preparedness and response; and (vi) security personnel.	This Performance Standard is applicable to the Project and is addressed in the management plan. Details are given in Chapter 6.
Performance Standard 5: Land Acquisition and Involuntary Resettlement	Specifies requirements on (i) project design to avoid or minimize physical and/or economic displacement; (ii) compensation and benefits for displaced persons; (iii) community engagement; (iv) grievance mechanism; (v) resettlement and livelihood restoration planning and implementation; (vi) physical and economic displacement; (vii) private sector responsibilities under government-managed resettlement	The project involves right of use of land for transmission line but for the substation land would be procured from the landowners. Thus this policy would be triggered.
Performance Standard 6: Biodiversity Conservation and Sustainable Natural Resource Management	Specifies requirements on (i) protection and conservation of biodiversity (modified, natural, critical habitat, legally protected and internationally recognized areas, invasive alien species); (ii) management of ecosystem services; (iii) sustainable management of natural resources; and (iv) supply chain	The site is located in close proximity of the Desert Wildlife Sanctuary. Thus, there are chances of impact on bio-diversity. Thus, this would be triggered.
Performance Standard 7: Indigenous Peoples	Specifies requirements on (i) avoidance of adverse impacts; (ii) participation and consent; (iii) circumstances requiring free, prior, and informed consent; (iv) mitigation and development benefits; and (v) private sector responsibilities where government is responsible for managing indigenous people's issues	The transmission line does not involve any SC/ST land and no displacement of people (including indigenous people). The land has been leased from willing owners; hence this performance standard is also met.
Performance Standard 8: Cultural Heritage	Specifies requirements on (i) protection of cultural heritage in project design and execution (chance find procedures, consultation, community access, removal of replicable cultural heritage, removal of non-replicable cultural heritage, critical cultural heritage); and (ii) project's use of cultural heritage	As such the project does not impact any cultural property or structure of archaeological importance.

3.6 Project Classification

An initial reconnaissance of the WRSS alignment indicates that the transmission lines does not pass through the or interfere with any natural habitat or sensitive environmental areas. Further the impacts are mostly during the construction activities and are predictable and thus mitigation measures can be clearly defined. The WRSS has been categorised as "Category B" project.

4. Description of Environment

The transmission line is located in Kutch District in Gujarat. In this section of the report, the present climatological, environmental and social conditions of the area have been described. The baseline data generation was supplemented with field observations, surveys and interactions with the community and project personnel. The details of the baseline conditions along the transmission line corridor falling in the districts of Kutch in Gujarat is presented in the following sections.

4.1 Study Area

Establishing baseline helps in understanding the prevailing environmental and socio-economic status of the study area. It provides the background environmental and social conditions for prediction of the future environmental & social characteristics of the area due to the construction and operation of the proposed project during its life cycle.

Considering the project activity described in Chapter 2 it is anticipated that scale and magnitude of project related impacts are likely to be perceived in an area within 500 m both side of the alignment and has been considered to be the study area for the ESIA. Site surveys were conducted in the study area to understand the environmental setting of the alignments and the study area, presence of physiographic features, location of the habitations with respect to the alignment etc. Ecological surveys and community consultations were also conducted to collect the information related to the local community and biological environmental conditions of the study area.

4.2 Physical Environment

A brief description of the existing physical environment within the project site is detailed in the sections below. The physical features map of the study area is showcased in Figure 4.1. The map displays the following features that are located within 5 km radius from the Project site:

- Villages and settlements within 2 km radius;
- Road network around the site, comprising of village roads and National Highway and railways
- Other features such as schools, shops, temples and water ponds.

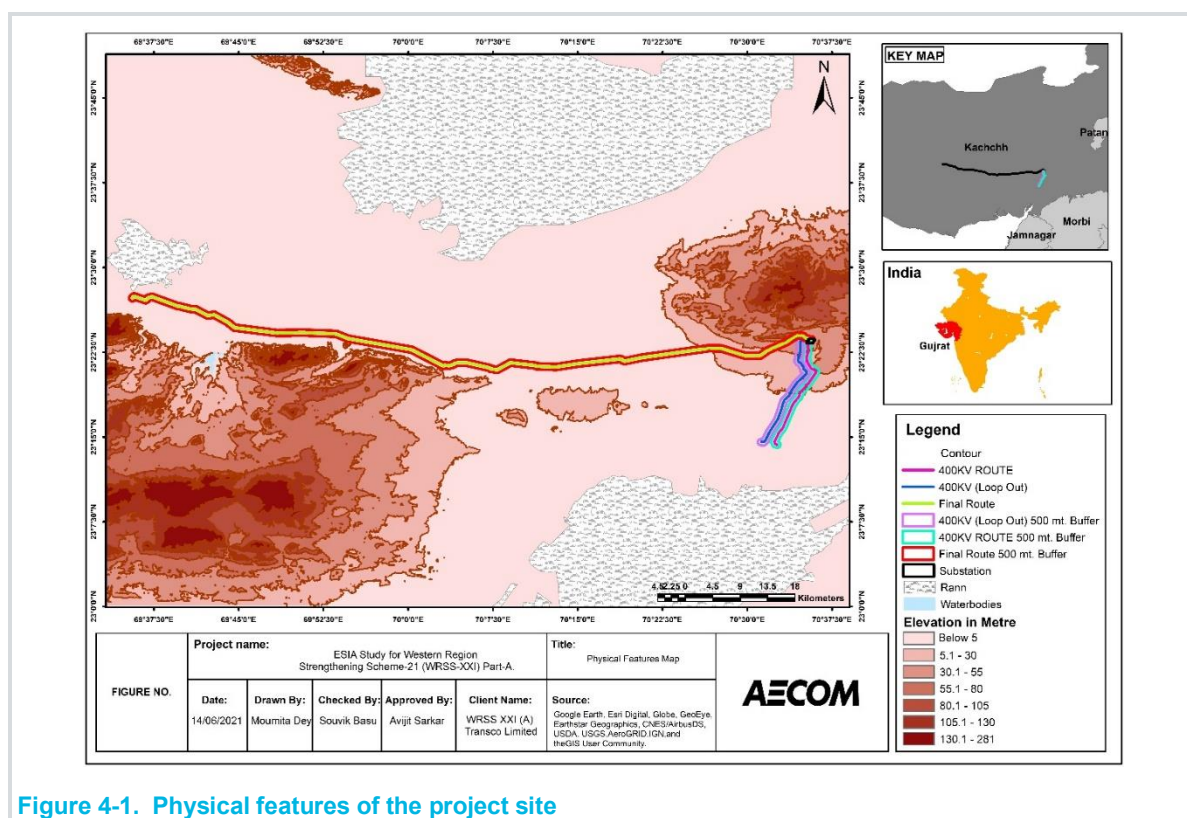


Figure 4-1. Physical features of the project site

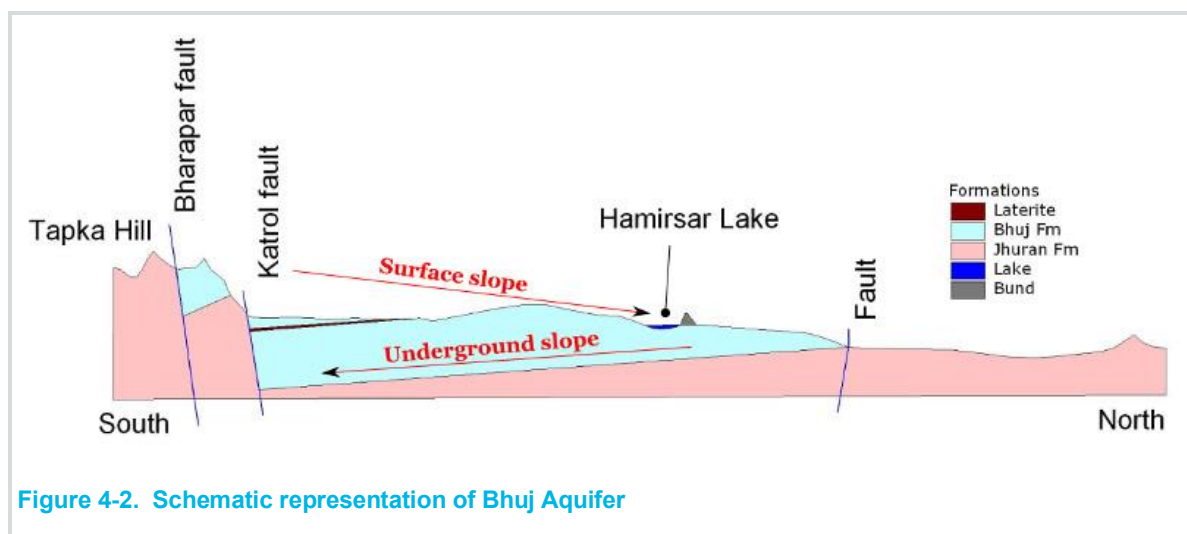
4.3 Topography

Topography of Gujarat shows a wide range of physical features ranging from physiology, drainage, soil to coastal and marine environment, etc. In terms of topography, Gujarat shows a wide variation.

Gujarat is located between 20°01' to 24°07' north latitudes and 68°04' to 74°04' east longitude and covers an area of 195,984 square kilometres. Thus, spread over a vast area, the topography of Gujarat is divided into 3 major regions, namely:

- The Peninsular - the region, which is also known as Saurashtra, is essentially a hilly tract.
- The Kutch - It is a barren and rocky area containing the great Rann. The Rann is further divided into the Greater Rann and the Lesser Rann.
- The mainland that extends from the Rann of Kutch and the Aravalli hills to the river Damanganga.

The general slope of the terrain is toward the north (from the hills towards Bhuj) whereas underground “waterproof layer” slopes the other way around.⁶



Bhuj is located on a “porous” sandstone which acts like a “sponge”. The surface rain waters flow towards Hamirsar and the other city lakes. It can then penetrate the ground and get “stored” in this enormous natural underground “tank”. The underground water could then be tapped through one of the 60 wells in the city. The shale layer, below the sandstone, is waterproof and makes sure that the water doesn't flow out of Bhuj Area underground.

All the “feeder dams”, in the upper part of the catchment, are directly in contact with the shale layer. The water doesn't go underground and is therefore a great surface water storage which can be used to “refill” Bhuj lakes when required.

⁶ <http://bhujbolechhe.org/en/infos/2-geology-and-topography-and-around-bhuj#:~:text=The%20general%20slope%20of%20the,slopes%20the%20other%20way%20around.&text=Bhuj%20is%20located%20on%20a.and%20the%20other%20city%20lakes.>

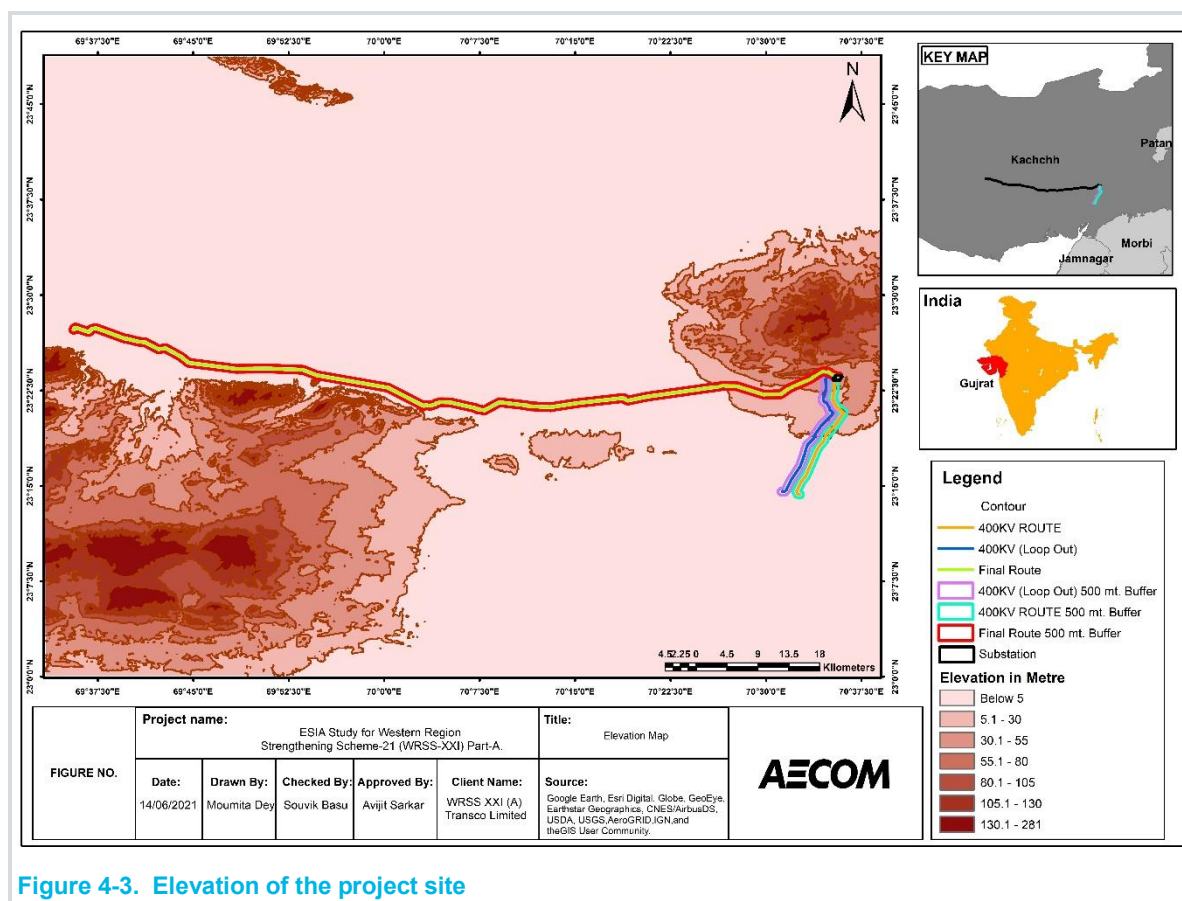


Figure 4-3. Elevation of the project site

4.3.1 Physiography

Kutch (Kutch) is a district of Gujarat state in western India covering an area of 45,612 km² surrounded by the Gulf of Kutch and the Arabian Sea in south and west, and by the Great and Small Rann in the northern and eastern parts. This region can be divided into four physiographic units namely, Rann (salt marsh), Banni Plains (grass land), Hilly tracts or highlands and Coastal plains or lowlands. The Rann is dissected by a few sandy and rocky mounds giving appearance of islands. The hilly tract comprises the island belt (Pachham, Khadir, Bela and Chorar) in the north, Wagad region in the northeast and the Kutch Mainland in the central part. Landscape of Kutch region is mostly structurally controlled. Katrol hill range, in the mainland, is the highest area forming E-W water divide for north and south flowing rivers. Rivers in the area are short and ephemeral. Catchment area of the rivers is small. These rivers are flowing radially following hump shaped topography of the region. Consistent flow of water is rarely observed in the rivers even during the monsoon period reflecting the present hyper-arid climate necessitating construction of many small and minor dams for the water storage.

4.4 Regional Profile

4.4.1 Climate

The Kutch region has a unique climate influenced by the Arabian Sea in the South and the harsh climate of the Rann in the Northern and Eastern Boundary. The high evaporation in the Rann area influences the microclimate of the mainland making it arid and the cool sea breeze makes it more comfortable weather in the coastal regions. The climate of this district is characterized by hot summer and dryness in the non-rainy season. The period from March to May is the hottest and the temperature rises to more than 40°C. The cold season is from December to February and experiences low temperature. Winds are light to moderate and follow the pattern of Indian sub-continent. The additional data used for the purpose are the 30 years' average IMD data from 1971 to 2000 taken from Meteorological Station, Bhuj

4.4.1.1 Secondary Data as per IMD, Bhuj

The summer begins in early March and lasts until June. April and May are the hottest months. Monsoon begins in late June. October and November see the retreat of the monsoon and a return of high temperatures until late

November. Winter starts in December and ends in late February. The summary of the 30 years' meteorological data of Bhuj (Rudramata) IMD Station from 1970-2000 is shown in Table 4-1.

Table 4-1: Climatology & Meteorology of Bhuj Observatory

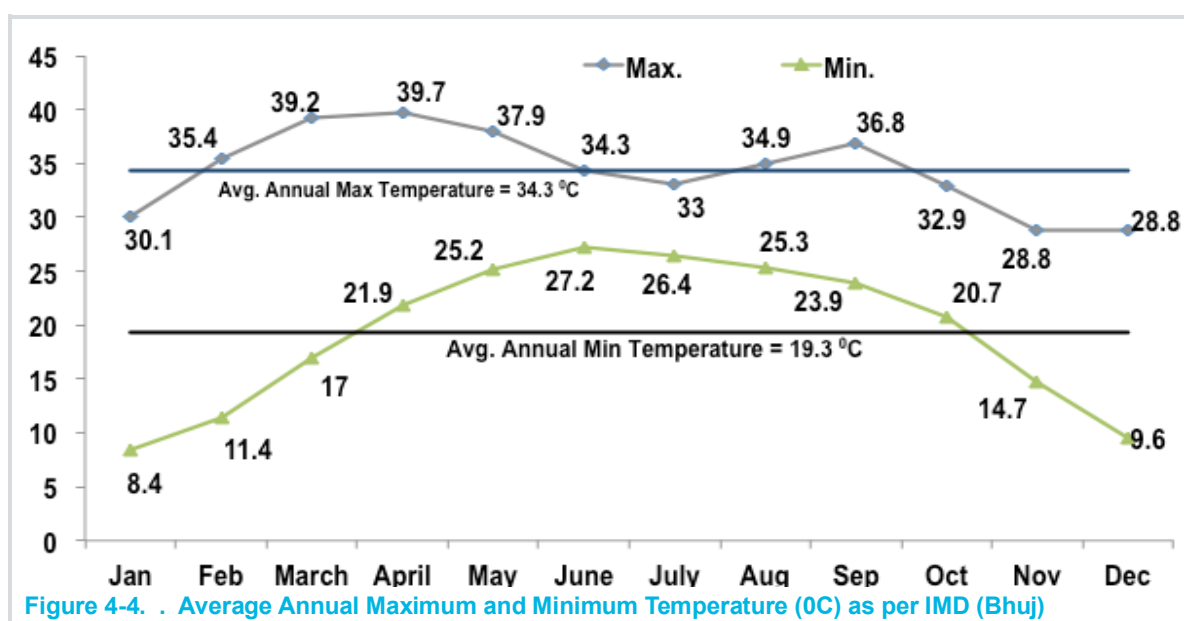
S. No.	Parameter	Season	Months	Monthly Total (mm)		Heaviest fall in 24 hours (mm)	No. of Rainy Days
i	Rainfall in mm	Winter (Dec to Feb)	Dec	0.2		36.8	0
			Jan	2.0		14.5	0.3
			Feb	0.6		61.5	0.1
			Total	2.8		112.8	0.4
		Summer (March to May)	March	1.2		42.2	0.2
			April	0.2		67.1	0.1
			May	2.6		186.9	0.4
			Total	4.0		296.2	0.7
		Monsoon (June to Sept)	June	34.7		178.5	1.4
			July	104.6		467.9	4.4
			Aug	74.4		241.4	3.5
			Sept	43.5		176.1	2.3
			Total	257.2		1063.9	11.6
		Post-Monsoon (Oct to Dec)	Oct	8.1		118.6	0.7
			Nov	4.3		102.4	0.5
			Dec	0.2		36.8	0
			Total	12.6		257.8	1.2
ii	Temperature (Mean daily temperature in °C)	Winter (Dec to Feb)	Months	Max.	Min.	Average	
			Dec	28.8	9.6	19.2	
			Jan	30.1	8.4	19.3	
			Feb	35.4	11.4	23.4	
			Average	31.4	9.8	20.6	
		Summer (Mar to May)	March	39.2	17.0	28.1	
			April	39.7	21.9	30.8	
			May	37.9	25.2	31.6	
			Average	38.9	21.4	30.2	
		Monsoon (June to Sept)	June	34.3	27.2	30.8	
			July	33.0	26.4	29.7	
			Aug	34.9	25.3	30.1	
			Sep	36.8	23.9	30.4	
			Average	34.8	25.7	30.3	
		Post-Monsoon (Oct to Dec)	Oct	32.9	20.7	26.8	
			Nov	28.8	14.7	21.8	
			Dec	28.8	9.6	19.2	
			Average	30.2	15.0	22.6	
iii	Relative Humidity in (RH) %	Winter (Dec to Feb)	Month	8.30 hrs	17.30 hrs		
			Dec	71	31		
			Jan	74	30		
			Feb	70	26		
			Average	71.7	29		
		Summer (Mar to May)	March	67	26		
			April	66	26		
			May	70	36		
			Average	67.7	29.3		
		Monsoon (June to Sept)	June	70	36		
			July	73	50		
			Aug	80	63		
			Sep	82	64		

S. No.	Parameter	Season	Months	Monthly Total (mm)	Heaviest fall in 24 hours (mm)	No. of Rainy Days
			Average	76.3	53.3	
		Post-Monsoon (Oct to Dec)	Oct	71	33	
			Nov	69	30	
			Dec	71	31	
			Average	70.3	31.3	
iv	Wind pattern	Winter (Dec to Feb)	Months	Wind speed kmph knots	Wind direction	
			Dec	5.8 3.1	NE, N	
			Jan	6.1 3.3	NE, N	
			Feb	6.9 3.7	N, NE	
			Average	6.3 3.4		
		Summer (Mar to May)	March	8.0 4.3	W, NW	
			April	11.0 5.9	W, SW	
			May	15.6 8.4	W, SW	
			Average	11.5 6.2		
		Monsoon (June to Sept)	June	17.2 9.3	SW, W	
			July	16.7 9.0	SW, W	
			Aug	14.6 7.9	SW, W	
			Sep	10.8 5.8	W, SW	
			Average	14.8 8.0		
		Post-Monsoon (Oct to Dec)	Oct	6.5 3.5	W, N, SW	
			Nov	5.6 3.0	NE, N	
			Dec	5.8 3.1	NE, N	
			Average	6.0 3.2		

Source: Climatological Table 1971–2000, Indian Meteorological Department, Gol, New Delhi (Bhuj- Rudramata Station)

4.4.1.2 Temperature

The area has quite high temperatures during summer and moderate cold in winter. The average annual maximum temperature is 34.3°C while the average annual minimum temperature is 19.3°C (Figure 4.4).



The analysis of the last 100 years (1891 to 1996) data on annual mean maximum and minimum temperature showed that the mean maximum temperature increased by 0.5°C, while the mean minimum temperature has declined by 0.5°C as is presented in Figure 4.5

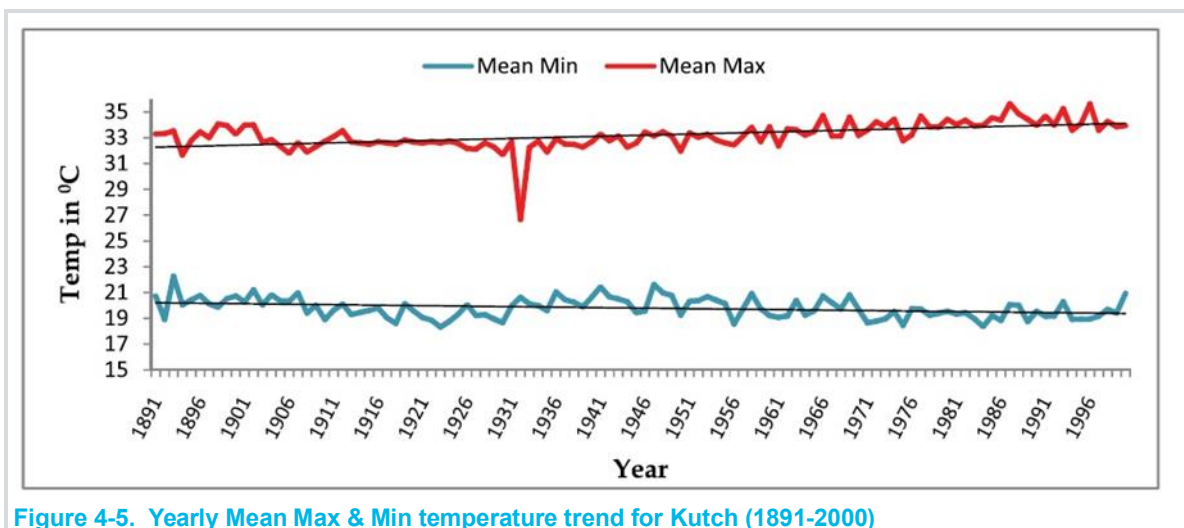


Figure 4-5. Yearly Mean Max & Min temperature trend for Kutch (1891-2000)

Source: Trends of Changing Climate and Effects on Eco-Environment of Kutch District, Gujarat: 2011

4.4.1.3 Rainfall

The Kutch area experiences very low rainfall with the total rainfall of about 276.4mm (as per IMD 30 year's average data) with 13.9 numbers of rainy days. The heaviest rainfall in 24 hours experienced was 467.9 mm on the 15th day of month of July 1959. Maximum rainfall is experienced in July and August (Figure 4.6).

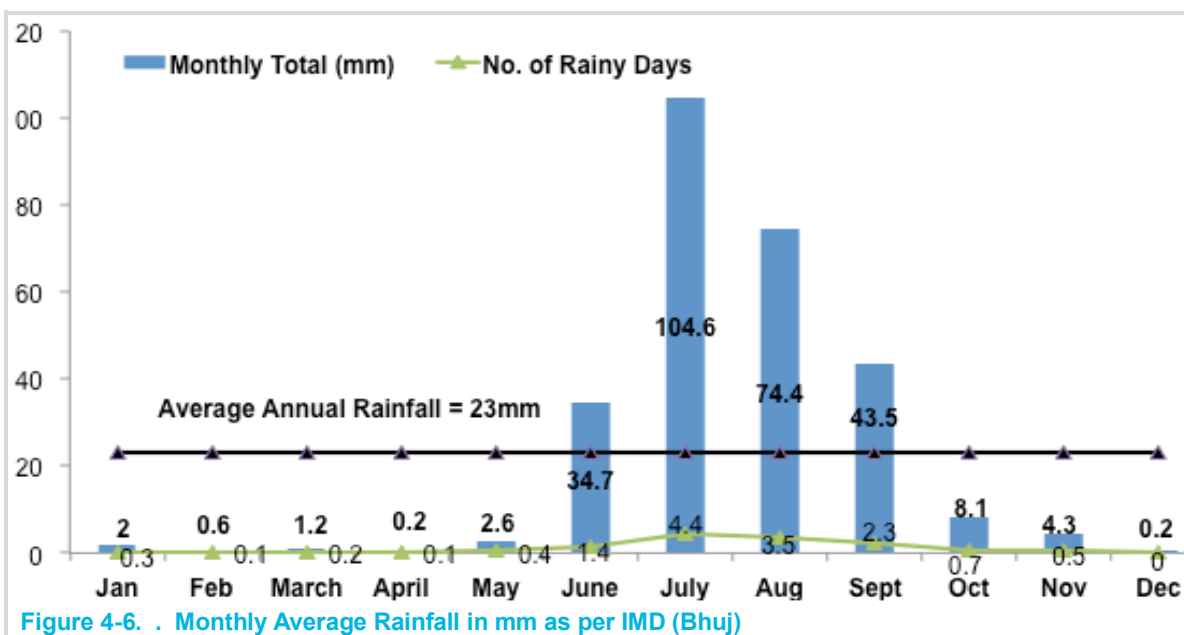


Figure 4-6. . Monthly Average Rainfall in mm as per IMD (Bhuj)

The isohyets of Kutch region (developed based on the rainfall data till 1986) show that there is decline in rainfall as one move towards the west. Lakhpat taluka at the western end of Kutch receives the least amount of rainfall in the district as is evident from Figure 4.7

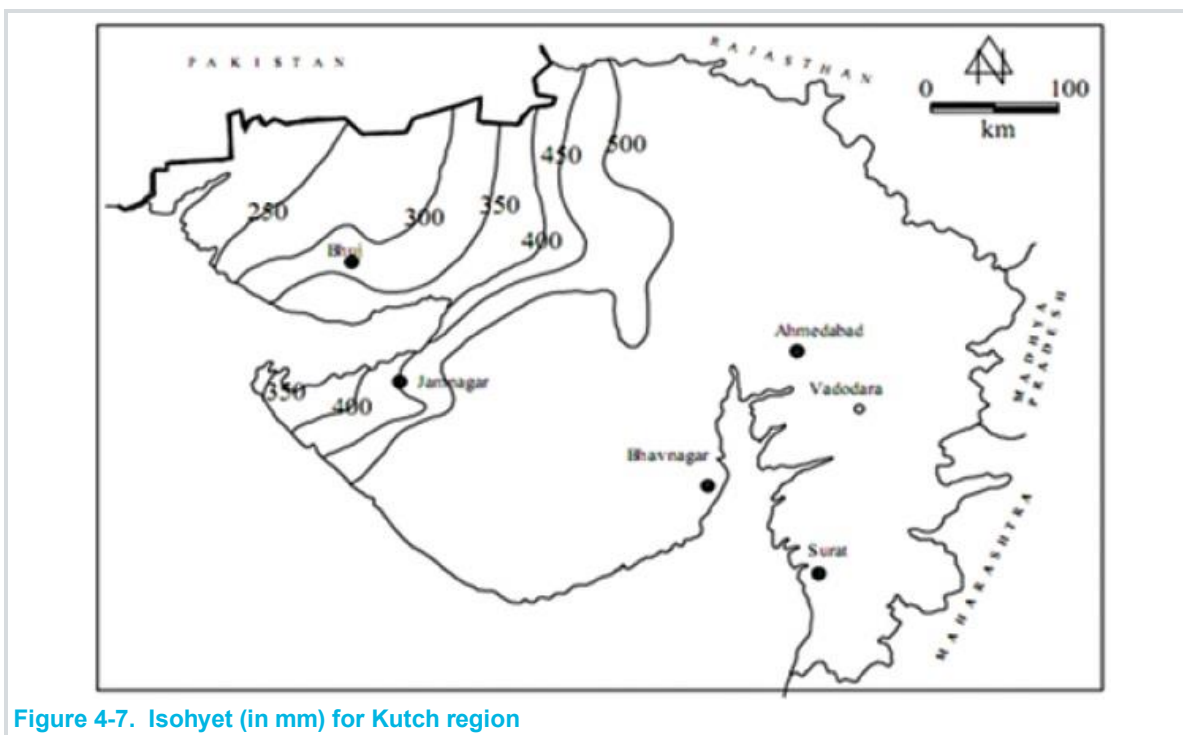


Figure 4-7. Isohyet (in mm) for Kutch region

Source: *Trends of Changing Climate and Effects on Eco-Environment of Kutch District, Gujarat: 2011*

Relative Humidity: The region has reasonably dry climate except during monsoon season when moisture levels are high in the surrounding air. The summer season is the driest part of the year when humidity levels go below 30% especially during March and April. July to September, being the rainiest months, experience humidity level of 73% to 82% respectively in the daytime (Figure 4.8).

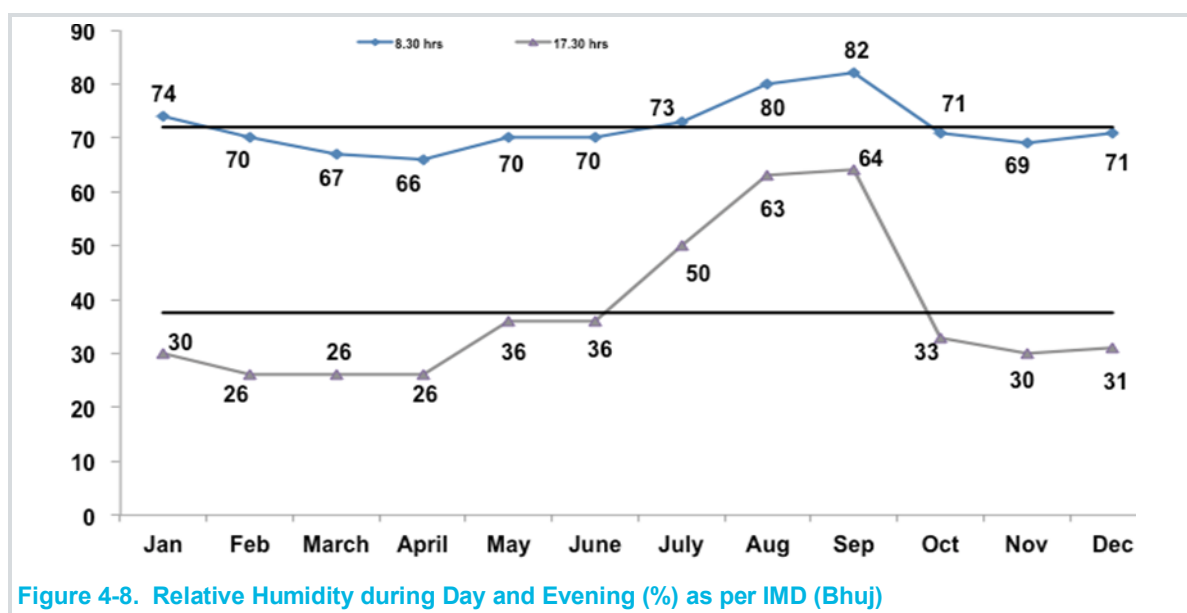
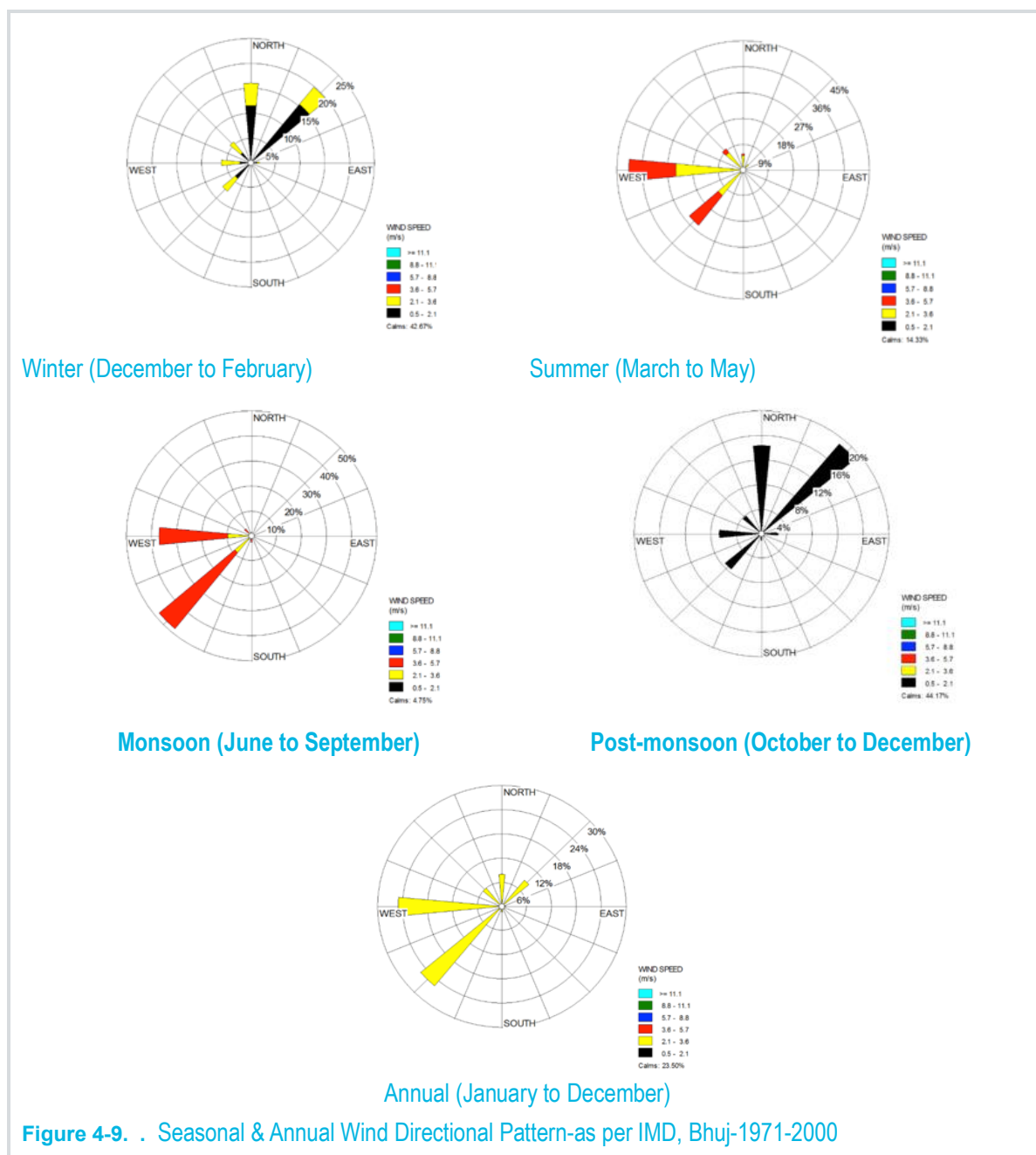


Figure 4-8. Relative Humidity during Day and Evening (%) as per IMD (Bhuj)

4.4.1.4 Wind

The annual average wind speed recorded at the IMD weather station at Rudramata Aerodrome, Bhuj indicate that the highest monthly wind speed is 5.0 m/s in June followed by 4.7 m/s in May. The lowest windspeed was recorded in December 0.3 m/s. The annual wind rose prepared from the surface wind data recorded at the IMD station at 08.00 hrs. indicate that the predominant wind direction was West – South west occurring during 47% of the year. The annual strongest wind, those more than 7 m/s come from west southwest. These high winds may be attributed to the cyclonic storm which originate over the Arabian Sea.



4.4.2 Ambient Air Quality

The study area can be characterized as a rural area comprising of habitation, agricultural lands and forests and no industrial setup was found to be present within 500m of the site. Existing sources of generation of particulate matter and gaseous air pollutants is primarily because of the transportation of vehicles through adjoining road. considering this context, the ambient quality is expected to be well within the National Air Quality Standards for all parameters.

A review of the historical data collected through the State and National Air Quality Monitoring Program over the period 2012- 2015 presented in table indicates that particulate levels (PM10 and PM2.5) are higher than the standards especially in the industrial areas of Baruch, Kandla. In residential localities the air quality is well within standards.

Table 4-2: Air Quality of Bhuj (2011-12, 2012-13, 2013-14 & 2014-15)

		NAMP & SAMP Observations combined for 2011-12					NAMP & SAMP Observations combined for 2012-13					NAMP & SAMP Observations combined for 2013-14					NAMP & SAMP Observations combined for 2014 - 15			
Area		PM10	PM2.5	SOx	NOx	CO	PM10	PM2.5	SOx	NOx	CO	PM10	PM2.5	SOx	NOx	CO	PM10	PM 2.5	SO2	NOx
Bhuj	Mundra																84	30	13.2	20.4
	Lunwa-Bhachau			12.56	28.0	1349		162	12.56	29.68	1360	104.0	29.0	14.0	19.0	3.0	96.0	33.0	14.6	19.8
	Gandhidham-Kandala Belt							52.0	9.14	17.4	1190									
	IFFCO Township			9.49	18.0	1104						71.0	26.0	11.0	16.0	1.0	81.0	29.0	13.8	19.8

Source: Trends of Changing Climate and Effects on Eco-Environment of Kutch District, Gujarat: 2011
 *PM10, PM2.5, Sox, NO2 Unit- µg/m3
 *CO-mg/m3

4.4.3 Ambient Noise Quality

The study area can be characterized as a rural area, since there are no industrial activities or major settlement along any of the alignments the source of noise is primarily from the transportation vehicles. Therefore, the ambient noise quality along the transmission corridor is representative of residential areas

4.4.4 Geomorphology

Geomorphologically, Kutch (Kutch) is categorized into four major E-W trending zones

- Coastal Zone - demarcating the southern fringe
- Kutch Mainland - divided into the central portion comprising rocky upland, northern hill range and coastal plains,
- Banni Plains (less than 5m MSL)-marked by raised fluviomarine sediments, mud flats and salt pans and
- the two Ranns Great Rann (~ 2m MSL) in the north and Little Rann in the east comprising vast saline wasteland.

The mainland of Kutch is an undulating country with rugged broken ground and broad plains and is marked by hill ranges and isolated peaks. There are three hill ranges in the mainland namely Dhinodhar, Jura and Vavar, which rise to 387m and 274m amsl. The other uplands in the main land area are in Wagad area in the east forming part of Bhachau and Rapar Talukas. The Pachham, Khadir and Bela islands in the Great Rann in the north also form highlands with maximum elevation of 458 m amsl. All the hill ranges follow a general east-west trend. Kutch district has about 350 km long coastline and its coastal plain is about 35-45 km wide and attains the elevation up to 80 m amsl. The coast is generally flat and broken by small and big creeks, viz., Kori, Boacha and Godia. The Rann forms a unique and conspicuous landform and has been divided into the Great Rann in the north and Little Rann in the east. The Rann mainly comprises marshy land, salt/mud flats and is devoid of vegetation and habitation and has a very hostile environment. The total area of Rann is about 25000 sq. km. The extensive low-lying area south west of Pachchhamisland resembles Rann except for some patches of scanty vegetation. It is known as Banni plain and covers an area of about 2000 sq. km. About 777 sq. km of Banni plain is reported to be superior grassland.

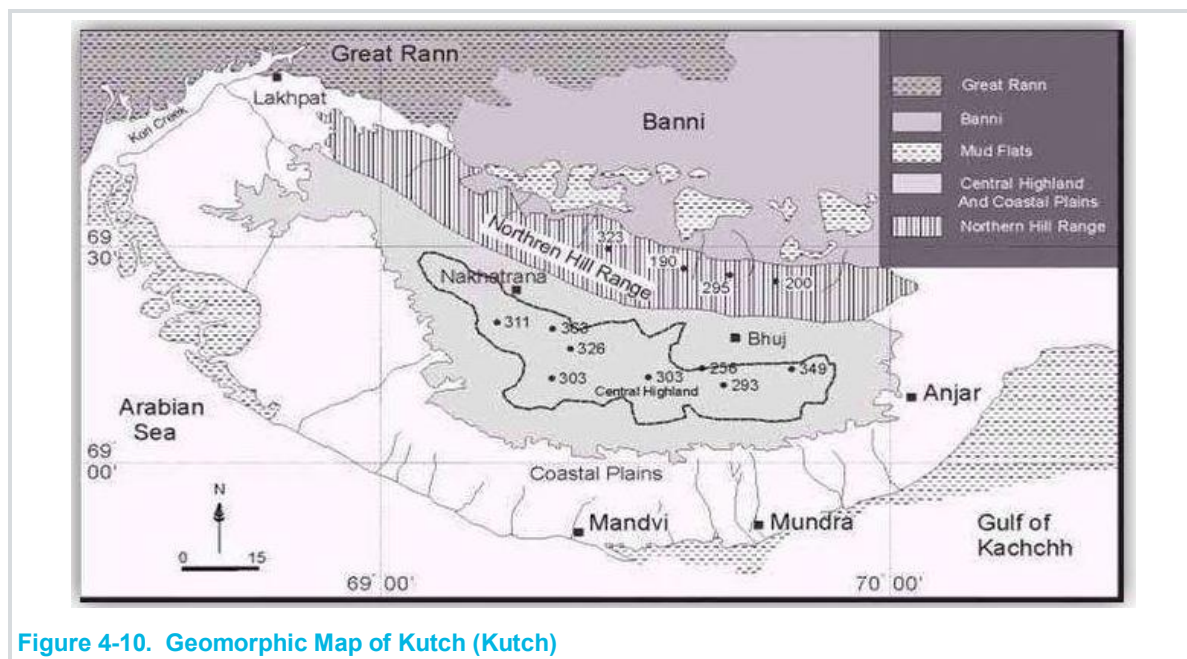


Figure 4-10. Geomorphic Map of Kutch (Kutch)

Source-GROUNDWATER BROCHURE KUTCH DISTRICT

<http://www.isce.or.jp/report/12/indian/report/pdf/indo2.pdf>

4.4.5 Soil⁷

The soils found in Kutch district can broadly be grouped into four types, i.e., Shallow Black soils, Residual Sandy soils, Coastal Alluvial soils and Desert soils. Desert soil is generally found in the little and greater desert of Kutch. The soil is deep and light grey in colour with no definite structure. It is sandy to sandy loam with silt clay loam in structure. This type of soil has high salt content and sufficient amount of gypsum in the soil profile. The Kutch region, Banaskantha and Mehsana of North Gujarat show medium fertility status (below 1.67) of N in their soils. Fertilizer consumption data also shows a lower intake of N fertilizers in these districts. The Kutch district has shown low deficiency of zinc. The soil reaction varies with situation ranging from neutral to highly alkaline. These soils are normally medium in fertility. At places, these soils are saline in nature. Towards the central parts of the district i.e. between Anjar and Bhuj residual sandy soil is found. The Residual Sandy soils have developed in-situ from the parent material originated from red sandstone and shale and are found over the areas underlain by Bhuj Sandstone. All these residual soils are shallow in depth. They are reddish brown in colour with fine weak granular structure to poorly developed one. These soils are sandy to loamy sand in texture dominated by coarse sand. These are non-calcareous, neutral to alkaline in reaction with poor base saturation.

⁷ <http://www.gujenviis.nic.in/PDF/soil.pdf>

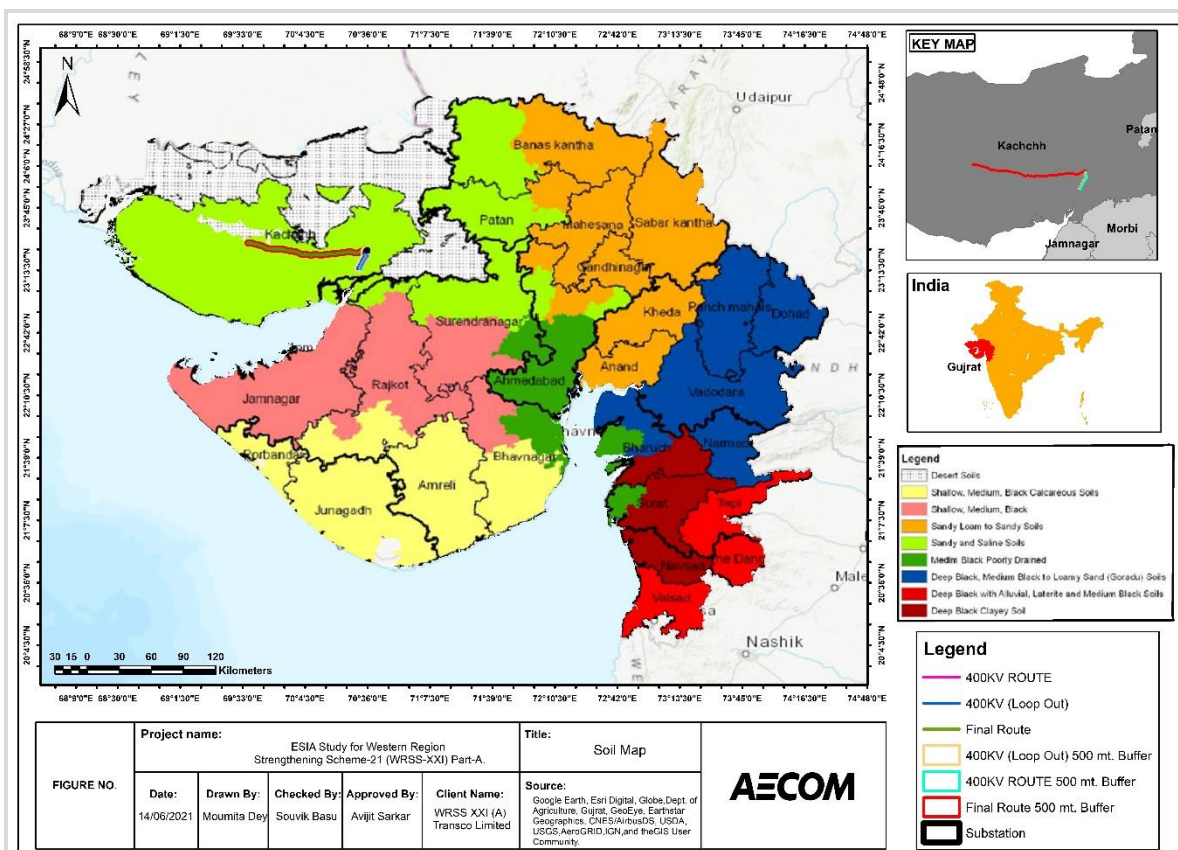


Figure 4-11. . Soil type of Gujarat

4.4.6 Land Use

The land use study has been conducted through analysis of satellite imagery and ground trothing during site visit. The land use/land cover pattern shows that a large part of the land use stretches of Bhuj to Lakadia line passes through Agricultural land followed by scrub land. A very small percentage of the transmission line passes through settlement/built up area.

The land use/land cover of the substation is largely agriculture and scrub land. One stream flow adjacent to proposed substation. The shallow water body act as minor irrigation and a check dam is constructed across it. As per onsite inspection by the technical team from WRSS, it is gathered that top of check dam is RL 88m. Time series analysis through satellite imagery, it has been observed that the flow of the shallow water body/nalla has gradually changed the land vegetation pattern. The land use of the study area is shown in Table 4.12

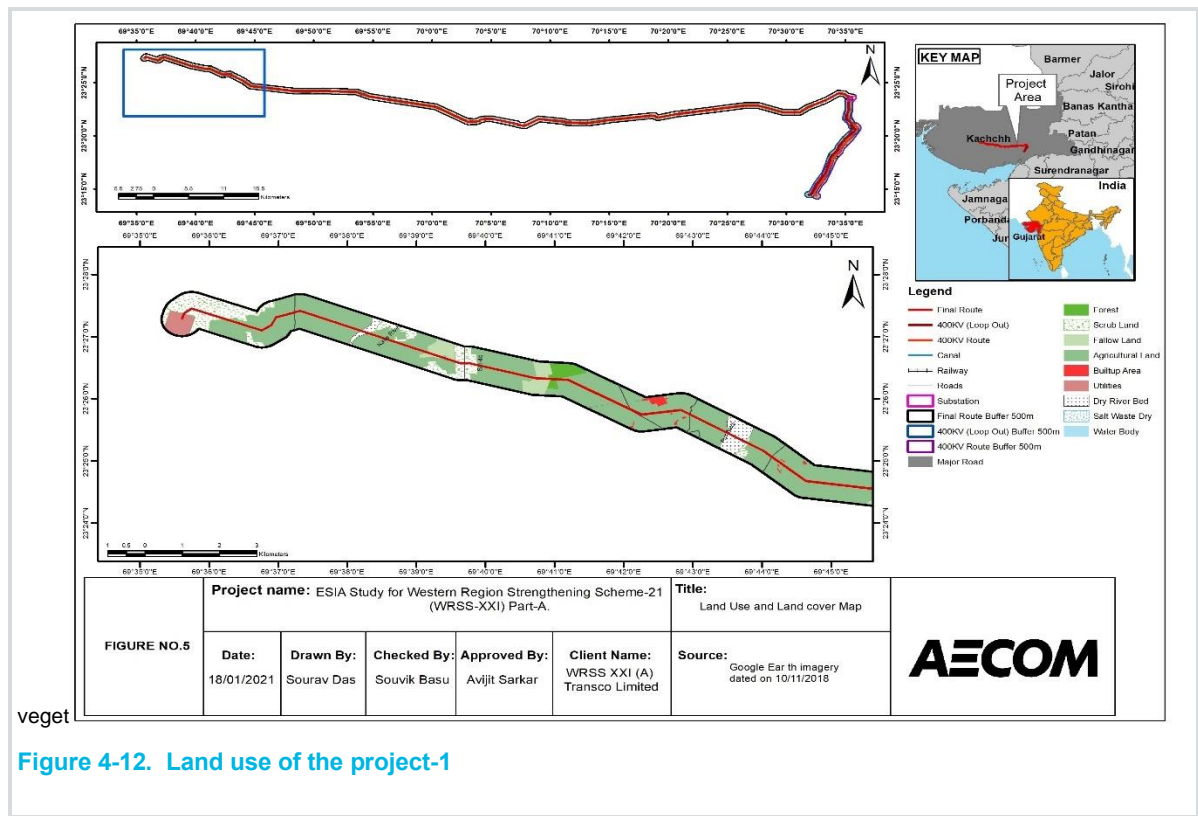


Figure 4-12. Land use of the project-1

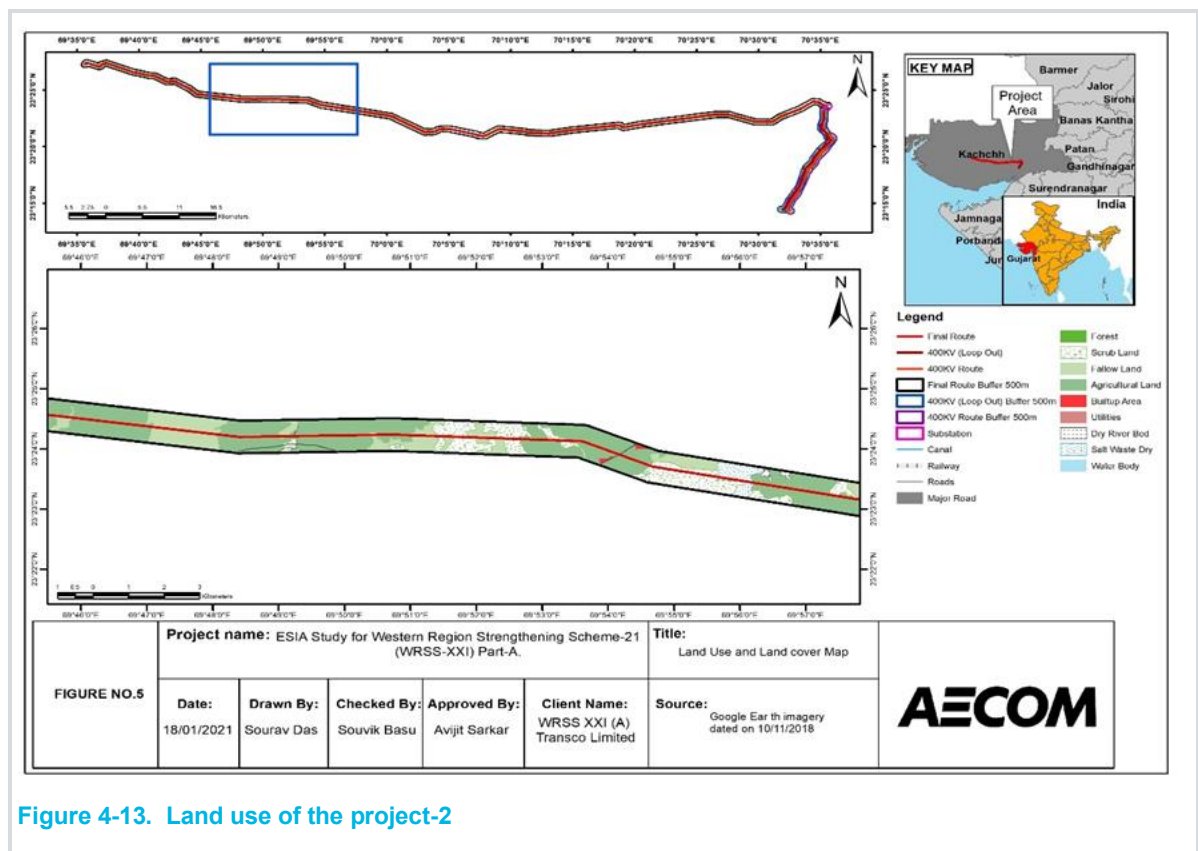


Figure 4-13. Land use of the project-2

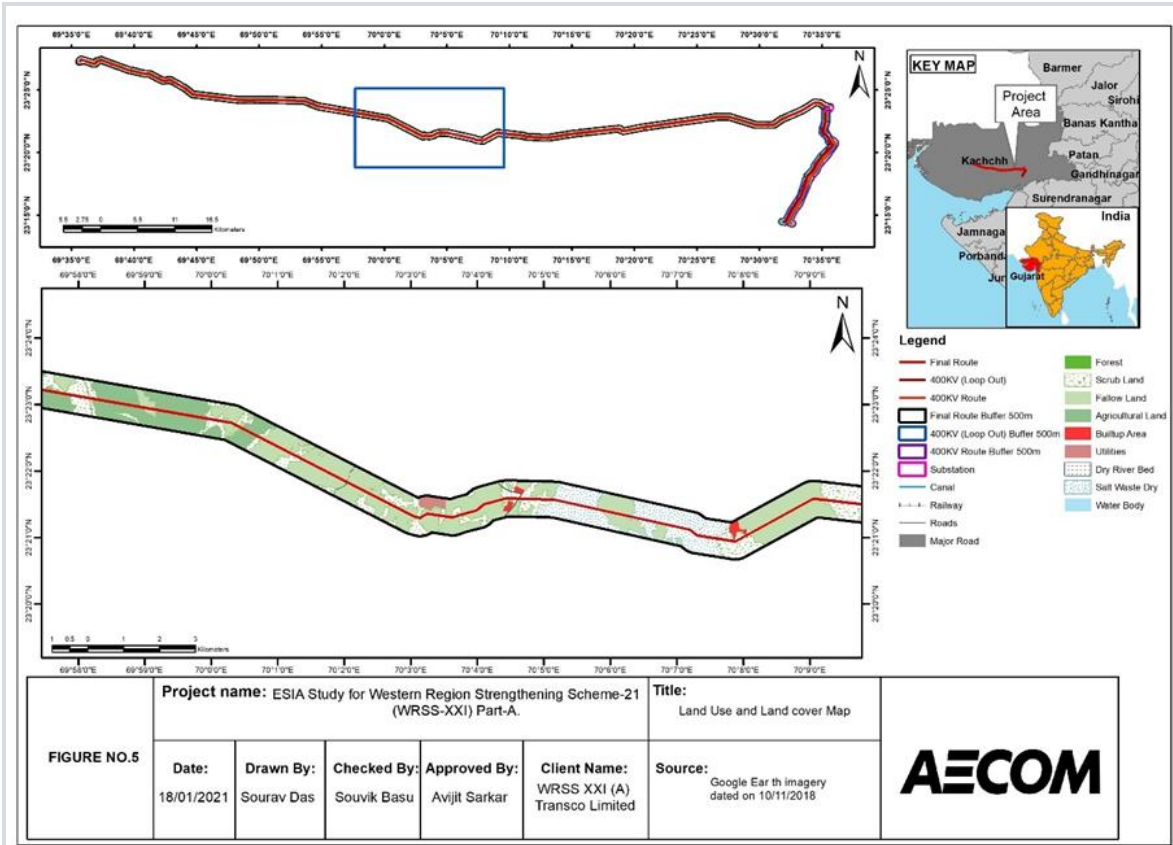


Figure 4-14. Land use of the project-3

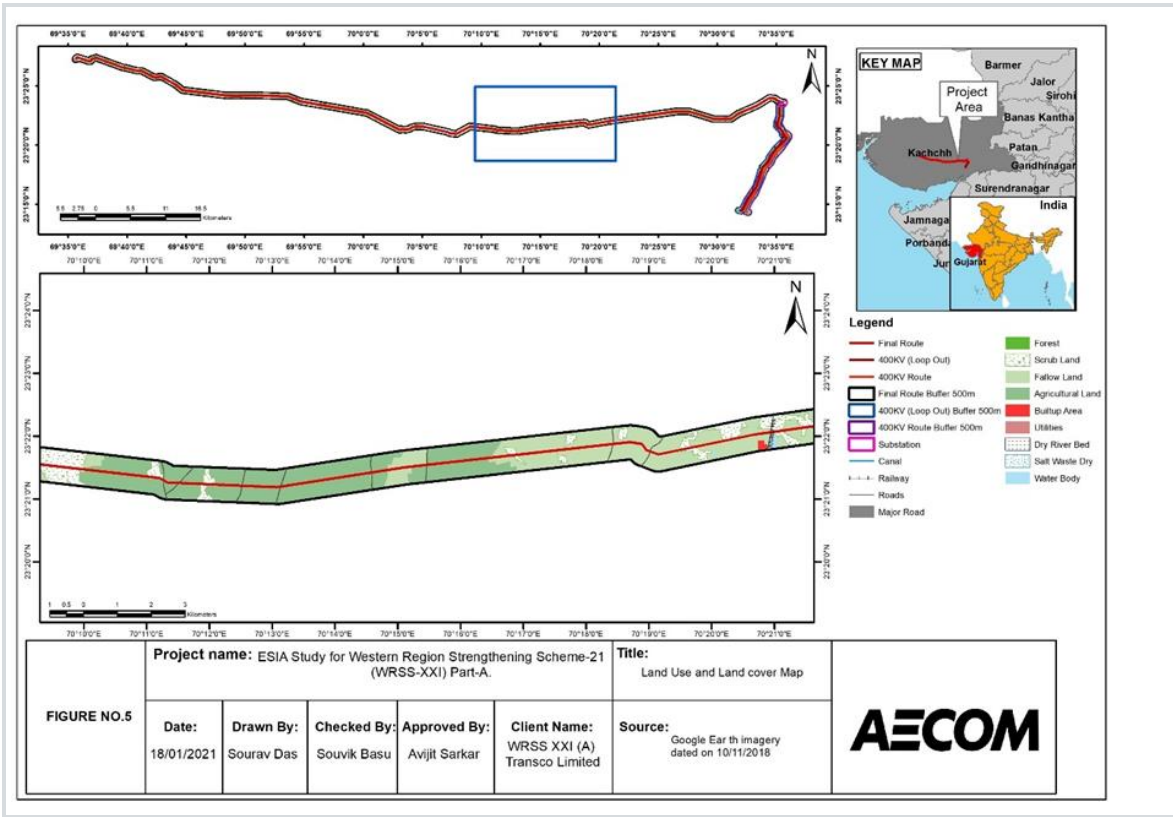


Figure 4-15. Land use of the project-4

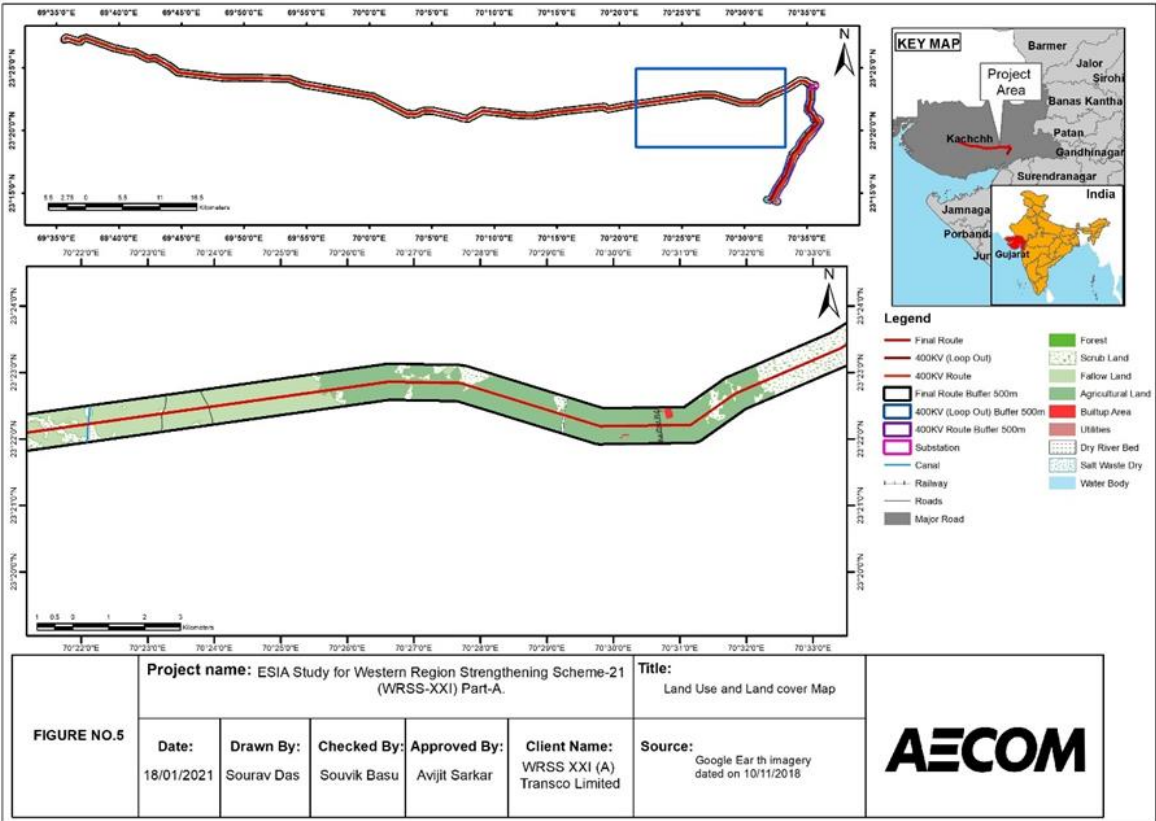


Figure 4-16. Land use of the project-5

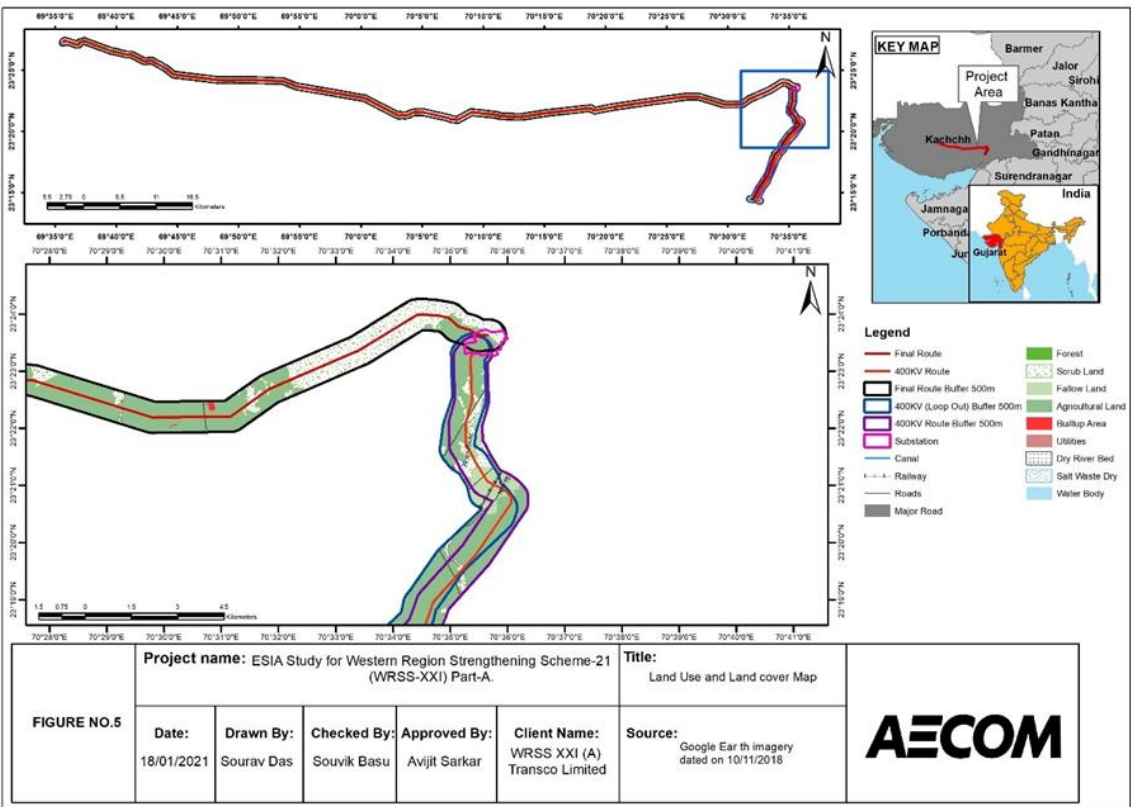


Figure 4-17. Land use of the project-6

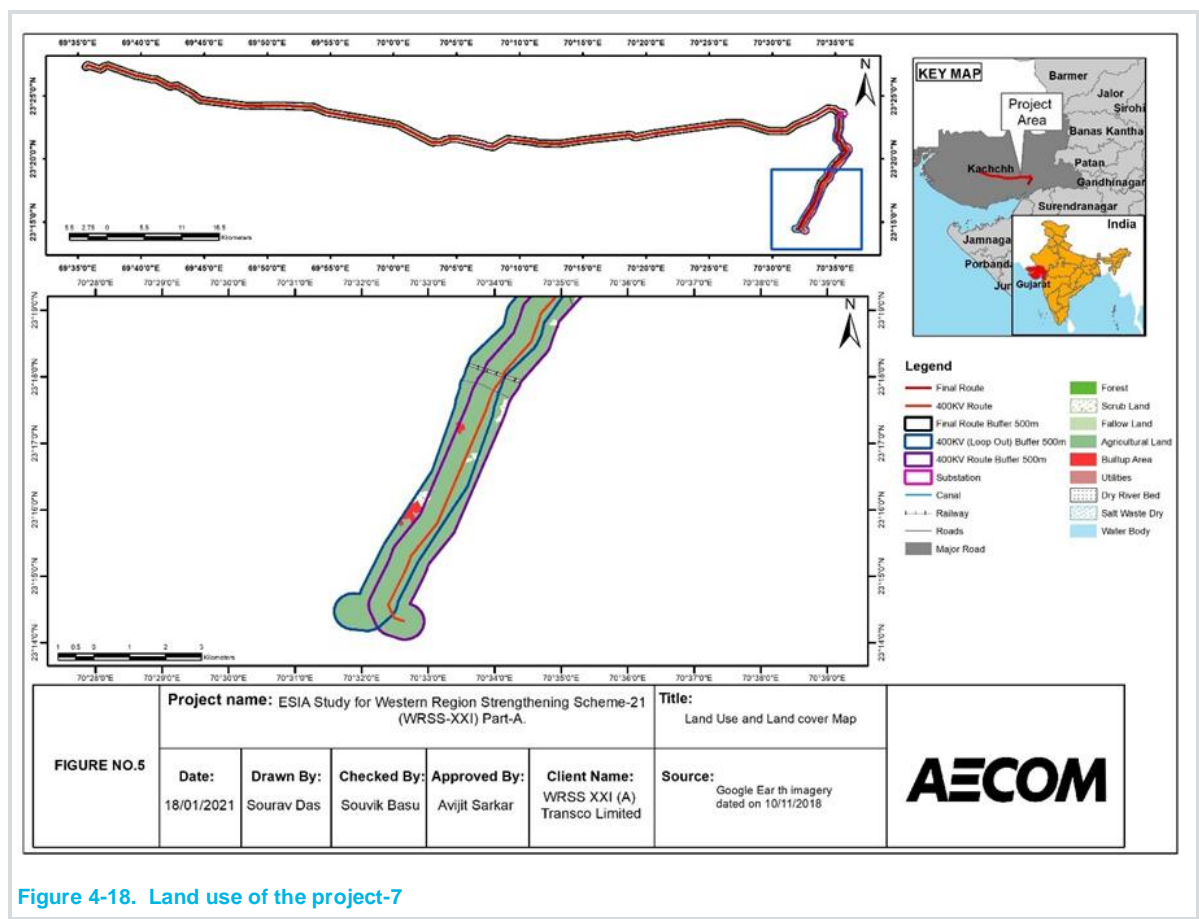


Figure 4-18. Land use of the project-7

4.4.7 Ground water

The depth to water was monitored by the Central Groundwater Board and it was found that in the pre- monsoon period (2012) the depth to groundwater is 2-5 m bgl along the alignment between Adipur Jn and Anjar. In regions near Bhuj the water level was 5-10 m bgl (below ground level). However, in the post – monsoon (2012) groundwater levels indicate that they are 5-10 m bgl across the entire alignment. Overall ground water development of the district is 79.34% and the district is categorized as semi-critical. The ground water development varies from as low as 24.40% in Lakhpat taluka to 107.98% in Bhachau taluka. Two talukas namely Bhachau and Mandvi are categorized as over exploited, two talukas namely Bhuj and Anjar are categorized as critical, The Gandhidham taluka is saline.

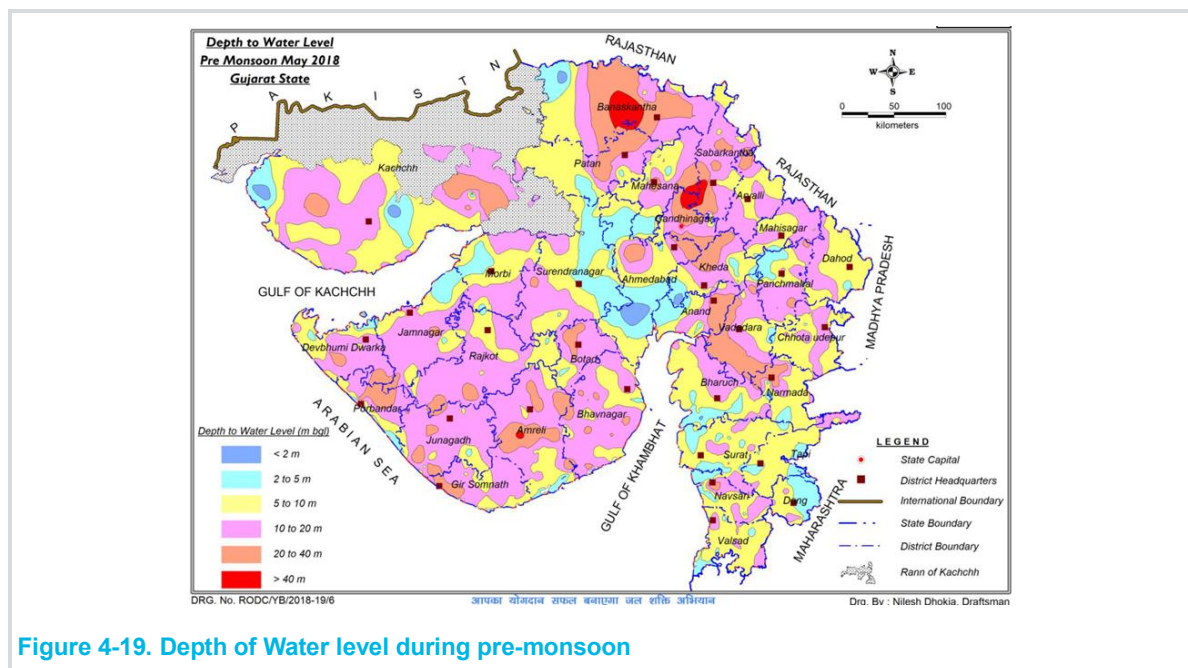


Figure 4-19. Depth of Water level during pre-monsoon

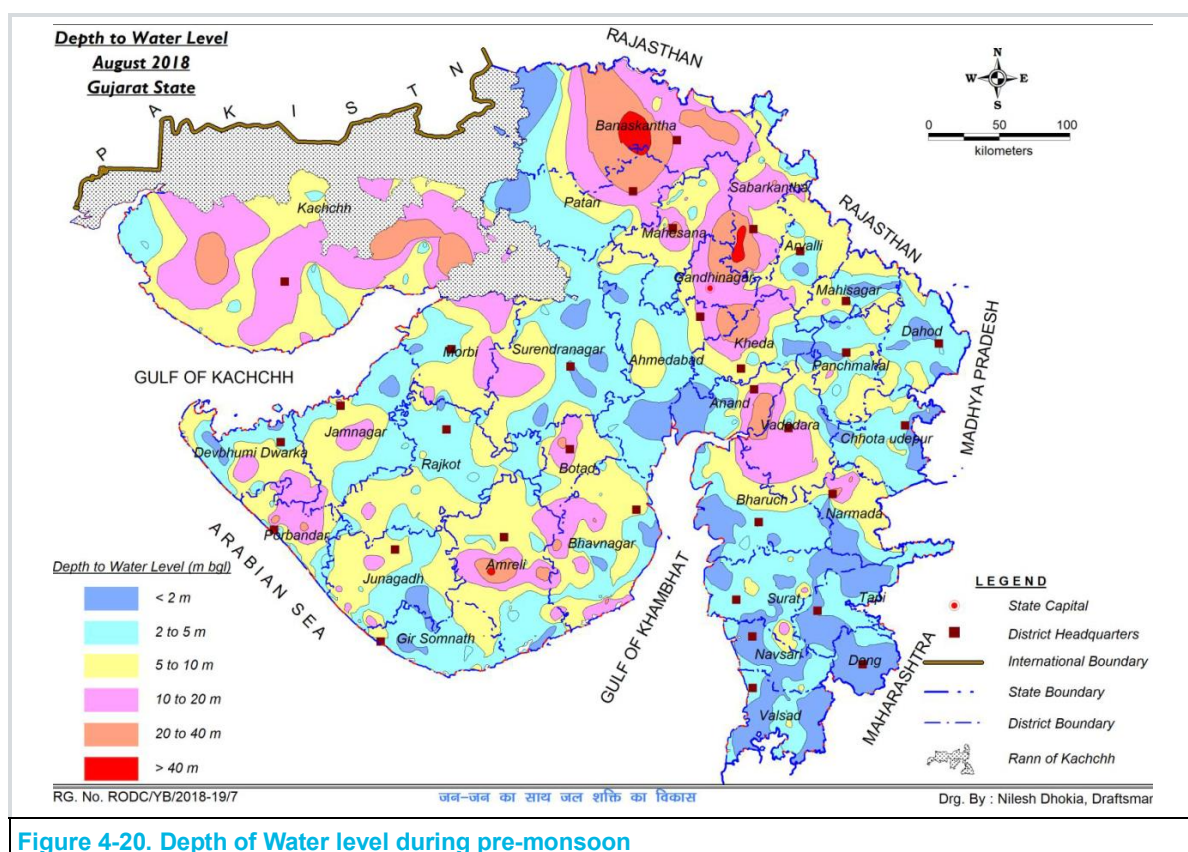


Figure 4-20. Depth of Water level during pre-monsoon

4.4.8 Surface Water

As there are no prominent surface water body river, lakes pond in the alignment or in the 500m within the alignment no surface water quality has analysed.

4.4.9 Natural Disaster

4.4.9.1 Earthquake

The whole of Gujarat region is vulnerable to earthquake and falls in Zone III to Zone V of the seismic zonation map of India signifying moderate to very high-risk zones. Kutch is seismically active area, falling in the highest magnitude

zone of V, where several devastating earthquakes have taken place (Table 4.3). It is the unstable structural framework of the crust of the area.

Table 4-3: Earthquakes in Gujarat during the Last Few Decades

Date and Time	Location Magnitude and Intensity	Details
27.06.1819	Bhuj	Accompanied by a loud noise
19.04.1845	Lakhpat	Sixty six shocks some which were destructive
31.10.1940	Dhrol-Jamnagar area VI.	Maximum observed intensity This earthquake might be the same as the previous event reported in Kutch for which no date (day and month) or origin times are available.
26.01.2001	Bhachau, Rapar Richter scale 7.9	The most severe earthquake of the century, felt all over the country, lead to severe damage in Kutch, Ahmedabad, Jamnagar, and Surat District. More than 20000 people killed and 167000 reported injured. Total property damage was around 500 billion rupees
28.01.2001	Suvi-Rapar area, Mw 5.8:	A moderate to strong aftershock struck Gujarat, at 06:32 AM local time causing considerable panic in Gujarat. Tremors were also felt in adjoining parts of Maharashtra & Rajasthan.

Source: Trends of Changing Climate and Effects on Eco-Environment of Kutch District, Gujarat: 2011

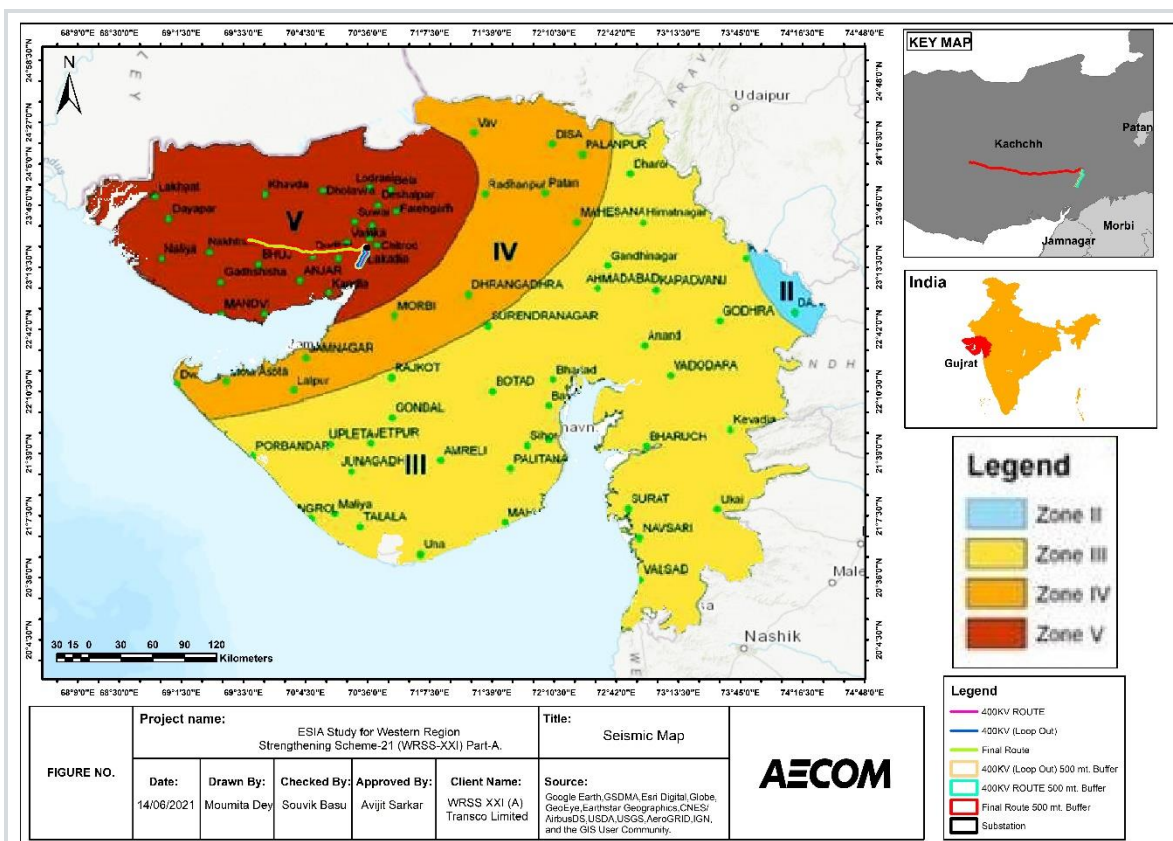


Figure 4-21. Earthquake Hazard Map-Gujarat

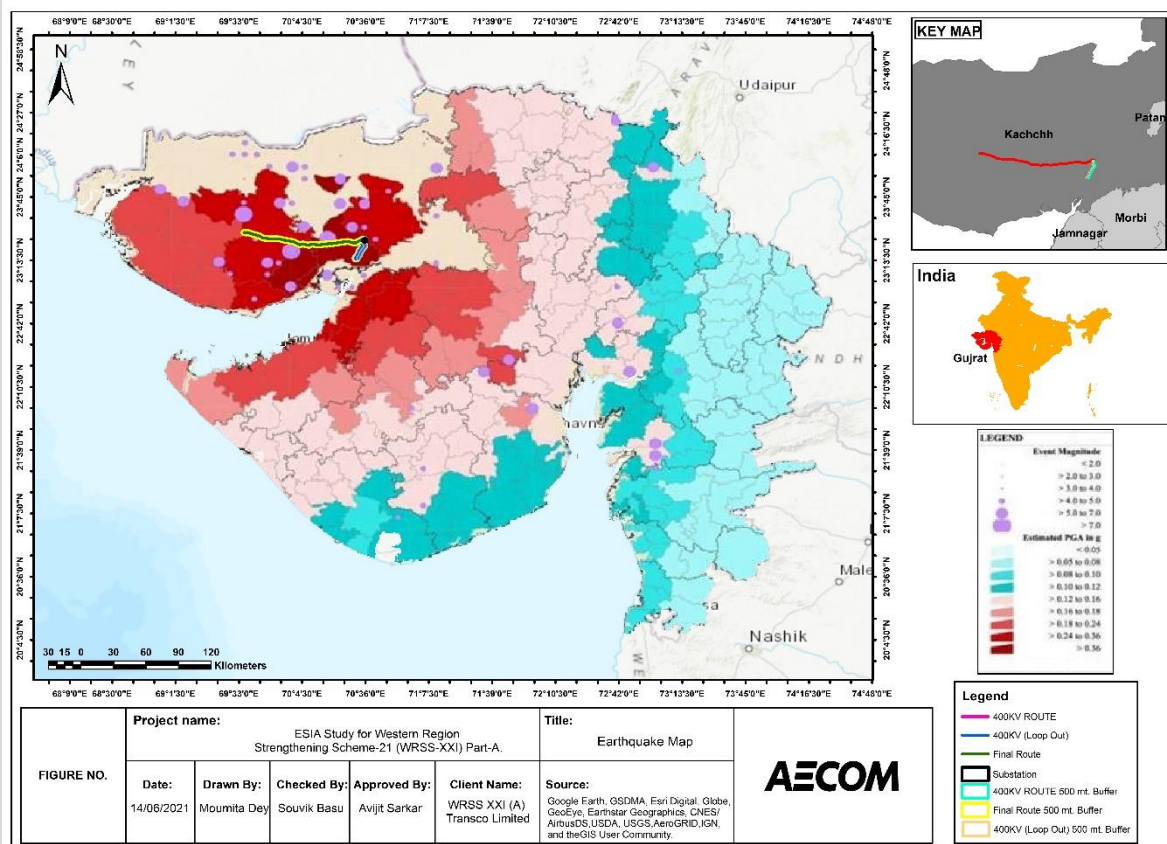


Figure 4-22. Gujarat Earthquake Hazard Risk Zonation: 100 year return period Estimated Mean Taluka Peak Ground Acceleration (PGA) (in g)⁸

⁸g (the acceleration due to Earth's gravity, equivalent to g-force) as either a decimal or percentage; in m/s² (1 g = 9.81 m/s²)

4.4.9.2 Floods

Figure 4.23 shows the Hazard Risk and Vulnerability Atlas prepared by GSDMA and the estimated inundation based on Probable Maximum Surge (PMS) at highest high tide level. The Authority has declared Kutch as one of the tsunami prone areas of Gujarat. The oldest record of tsunami is available from November 326 BC earthquake near the Indus delta /Kutch region that set off massive sea waves in the Arabian Sea. However there has been no occurrence of tsunami in the Kutch region in the recent past.

Table 4-4: History of Tsunami in Kutch

Sl. No.	Date	Location	Longitude	Latitude	Reference
1	326 BC	Indus Delta/Kutch Region	-	-	Lisitzin (1974)
2	16.06.1819	Kutch	26.6 E	71.90 N	Macmurdo (1821)
3	19.06.1845	Kutch	23.6 E	68.37 N	Nelson (1846)

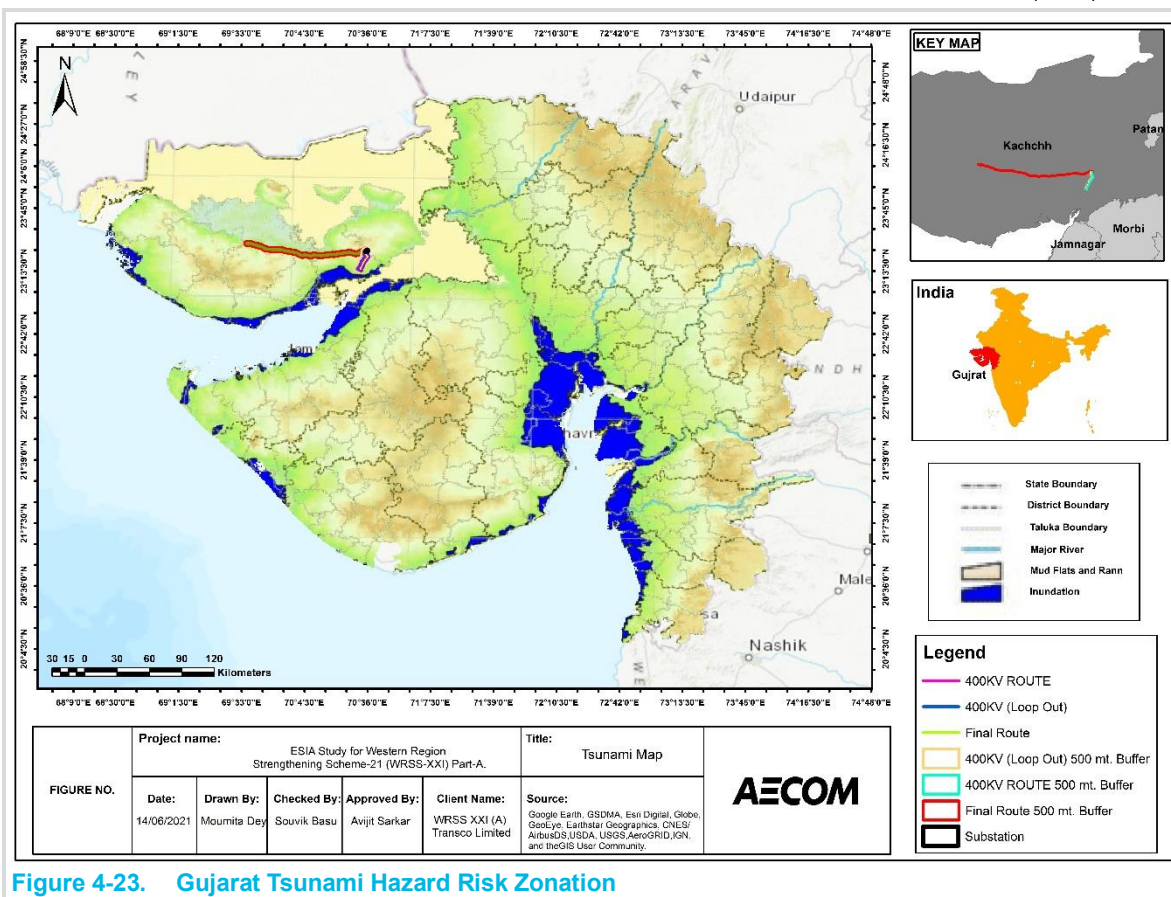


Figure 4-23. Gujarat Tsunami Hazard Risk Zonation

4.4.9.3 Cyclone

Gujarat falls in the region of tropical cyclone. With the longest coastline of 1600km in the country, it is highly vulnerable to associated hazards such as floods, storm surges etc. **Figure 4.24** shows the wind and cyclone hazard map of Gujarat with the project site being marked on the map which shows that the project site lies in a very high damage risk zone with $V_b = 50$ m/s.

The 1998 cyclone was one of the severest cyclones affecting Gujarat, which hit Saurashtra coast. The death toll was over 3,000 and around 46 lakh people in 33 talukas in the Gujarat State were affected. The worst hit district was Kutch followed by Jamnagar, Rajkot, Porbandar, Valsad and Junagarh. **Table 4-5** gives a list of most intense cyclones experienced in Kutch District and nearby areas.

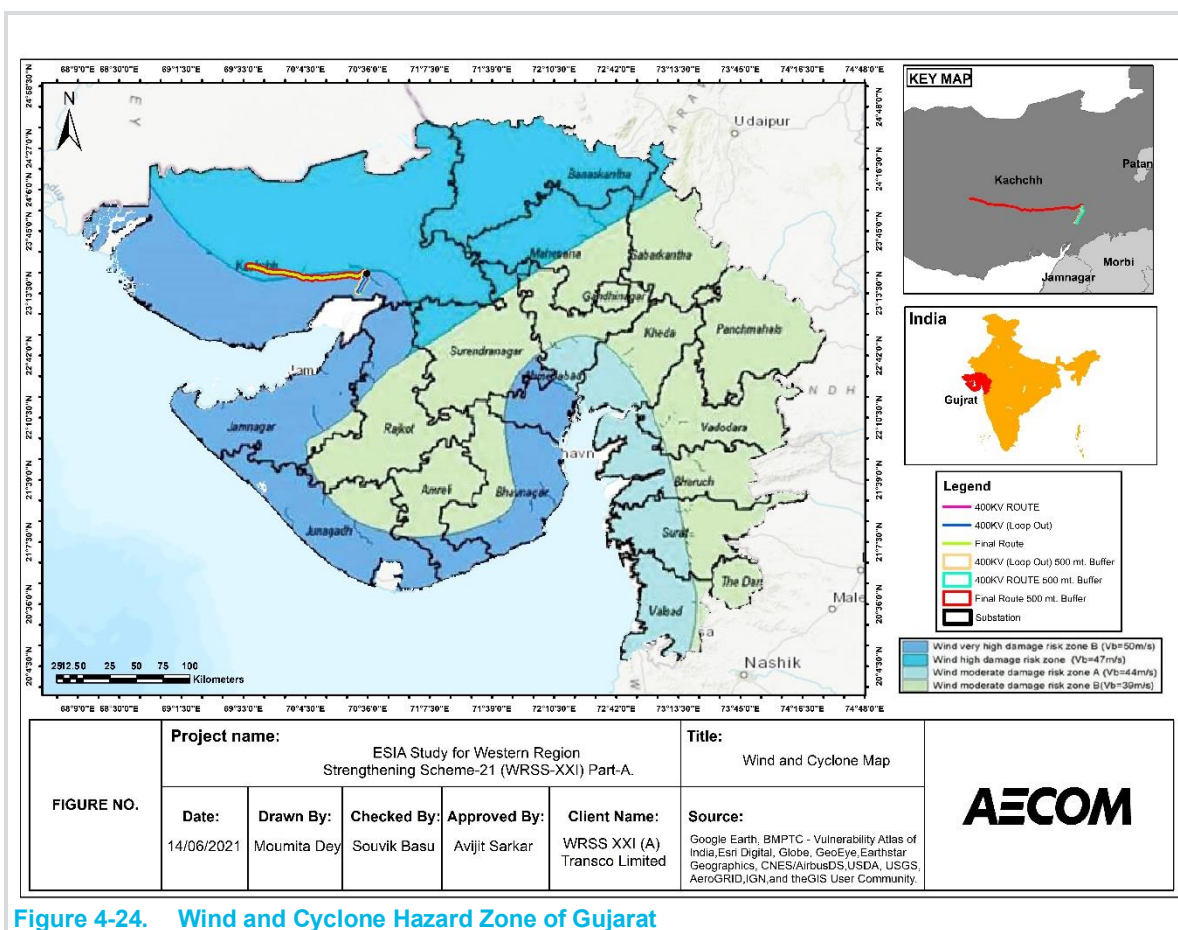


Figure 4-24. Wind and Cyclone Hazard Zone of Gujarat

Table 4-5: History of Cyclones in Gujarat

Sl. No.	Cyclone	Date	Observed/Estimated Maximum Wind Velocity	Landfall/Devastation
1	Very severe Cyclonic Storm over the Arabian sea	June 4-10, 1998	167 Kmph	Gujarat & Rajasthan states were affected. Porbander of Gujarat state was the most affected areas. Loss incurred due to storm was estimated to be about Rs.1855.38 Crores in Kandla
2	Very severe Cyclonic Storm over the Arabian sea	May 16-22, 1999	195 kmph	This system caused severe damage in Kutch and Jamnagar district of Gujarat 453 people died. Loss of property estimated to about Rs. 80 crores. In Rajasthan one person died and 5104 cattle heads perished. 5133 houses were partially damaged

Source: Indian Meteorological Department, New Delhi

4.4.10 Climate Vulnerability

The State Action Plan for Climate Change adopted by Government of Gujarat shows the following Climate Change Projections

- The historical data (past 30 years) analysis indicates an increase of mean maximum temperature over Gujarat by 0.11°C. The global as well as regional modelling results show a rise in the range of 1.5 to 2.5°C for the period of 2030.
- Historical data for the 40-year period (1969-2008) over Gujarat shows an increase in rainfall over all stations specifically over Saurashtra and Southern Gujarat. The rainfall extremes also show an increase over the same regions.
- Cyclones over Indian coastlines are projected to increase in intensity in future though the number of cyclones occurring does not show an increase

The RFP is floated after approval of MOP & CEA. RFP doc. has been finalized & approved by taking consideration of all safety requirement for earthquake Kutch zone V, Tsunami & floods. All the design are as per technical specification mentioned in RFP, which are line with the relevant regulatory & safety requirements. WRSS has followed all the design & technical requirement of RFP.

4.5 Ecological Environment

An Ecology and Biodiversity study along with the ROW of 765KV Bhuj-Lakadia line, 765KV Lakadia-Banaskatha line and 400KV Lilo line, located in Kutch District, Gujarat was conducted to recognise the possible impacts of the said transmission line on existing biodiversity resources. The study has been carried out in post-monsoon season during month of November 2020. This information will further enable to measure probable ecological impacts that can be created from the present transmission line project activities. Understanding of the substantial risks and impacts is imperative to implement mitigation procedures. Based upon the ecological survey, a mitigation measures would be suggested to managed properly the present ecological conditions and minimize or nullified project related impacts.

Survey Methodology

The baseline survey was conducted in last week of November between 25nd to 28th November 2020 throughout the transmission line (5km of each side from the centre of the line) and Substation area. Prior to that secondary data regarding sensitive ecological habitat (National Park, Wildlife Sanctuary, Protected Forest like Community Reserve, Conservation Reserve, Ecological Sensitive Area, Migratory Corridor, Critically Endangered, Endangered and range restricted species etc.), Forest types and forest cover, Wetlands, Important Bird Areas has been collected from Forest Department, different reports and research publications. A total of 21 transects were selected based on topography, land use, habitat and vegetation pattern. Floral and Faunal species were assessed by transect method by travelling a known distance ($1 \pm 0.05\text{km}$), along or near the ROW, and observed floral and faunal species along the length were noted. Also, Evaluation of faunal species was also done by using indirect method such as scats, pug marks, prey kills, calls, nests, feathers, skin molts and road-kills. Primary data was collected through most of the diurnal period from early morning till late evening. Books like Trees and shrubs of India, the book of Indian Trees, Birds of the Indian Sub-continent, Indian Mammals- A field guide, Snakes of India, The Book of Indian reptiles and Amphibians were also consulted. Field identification has been based on professional experience, and following, standard field guides and identification keys were made use of. Flora and Fauna was checked for their IUCN status (International Union for Conservation of Nature, Red List Version 3.1) and faunal species status in the Schedules of Wildlife Protection Act, 1972. GPS locations of transects laid is given in following table and Figures.

Table 4-6: Geographic Coordinates of the Transect Locations

Sr. No.	Transect	Start point	End point	Nearest Wells/ Habitat Type
1	TL1	23°27'17.66"N, 69°36'6.15"E	23°27'27.76"N, 69°35'32.00"E	Dry Barren Land, Some scrub land
2	TL2	23°27'43.65"N, 69°37'13.48"E	23°27'9.98"N, 69°37'14.24"E	Agricultural Land, Roadside Plantation
3	TL3	23°26'57.71"N, 69°39'41.84"E	23°26'23.67"N, 69°39'41.95"E	Agricultural Land, Small Grass Land
4	TL4	23°26'14.71"N, 69°41'1.37"E	23°26'48.07"N, 69°40'53.75"E	Agricultural Land, Social Forest Land
5	TL5	23°26'7.13"N, 69°43'6.37"E	23°26'2.51"N, 69°43'40.39"E	Agricultural Land, Very small scrub land

Sr. No.	Transect	Start point	End point	Nearest Wells/ Habitat Type
6	TL6	23°25'2.0 6"N, 69°47'5.6 0"E	23°25'13. 41"N, 69°47'30. 94"E	Open scrub land, barren land – A portion of Greater ran of Katch
7	TL7	23°24'3.6 0"N, 69°49'3.3 0"E	23°24'2.8 7"N, 69°49'37. 55"E	Agricultur al Land, Very small scrub land
8	TL8	23°23'44. 17"N, 69°51'8.6 1"E	23°23'24. 68"N, 69°51'29. 64"E	Scrub Land, Small Water Body, Agricultur al Land, Roadside Plantation
9	TL9	23°23'43. 22"N, 69°52'28. 25"E	23°23'25. 06"N, 69°52'15. 04"E	Open Scrub Land, Two Small Water Body
10	TL10	23°25'0.0 9"N, 69°52'30. 62"E	23°24'27. 15"N, 69°52'35. 90"E	Agricultur al Land, Scrub land
11	TL11	23°23'53. 09"N, 69°53'9.4 6"E	23°23'36. 41"N, 69°53'28. 57"E	Agricultur al Land, Settlemen t and Small Water Body
12	TL12	23°23'8.0 4"N, 69°54'6.6 1"E	23°22'42. 76"N, 69°53'42. 29"E	Agricultur al Land, Check Dam of Kaswali River
13	TL13	23°22'52. 75"N, 69°59'50. 07"E	23°22'31. 48"N, 69°59'35. 36"E	Agricultur al Land, Scrub land
14	TL14	23°21'11. 01"N, 70° 3'7.77"E	23°21'42. 62"N, 70° 3'1.92"E	Agricultur al Land, Patches of grassland
15	TL15	23°19'54. 02"N, 70° 9'51.03"E	23°20'18. 92"N, 70° 9'26.72"E	Settlemen t area, Agricultur al Land, Scrub Land with Go-Char
16	TL16	23°21'49. 89"N, 70°20'54. 08"E	23°22'22. 34"N, 70°20'59. 45"E	Scrub Land, Small Water

Sr. No.	Transect	Start point	End point	Nearest Wells/ Habitat Type
				Body, Social Forest, Settlement area
17	TL17	23°24'2.21"N, 70°28'11.78"E	23°23'56.19"N, 70°28'46.82"E	Scrub Land
18	TL18	23°22'15.40"N, 70°30'42.26"E	23°21'42.65"N, 70°30'46.33"E	Agricultural Land
19	TL19	23°23'44.40"N, 70°35'3.81"E	23°23'16.24"N, 70°35'17.54"E	Agricultural Land
20	TL20	23°19'49.34"N, 70°34'49.99"E	23°19'20.09"N, 70°35'5.28"E	Agricultural Land and dry Riverbed
21	TL 21	23°17'13.78"N, 70°34'37.43"E	23°16'42.91"N, 70°34'31.60"E	Agricultural Land and Scrub land

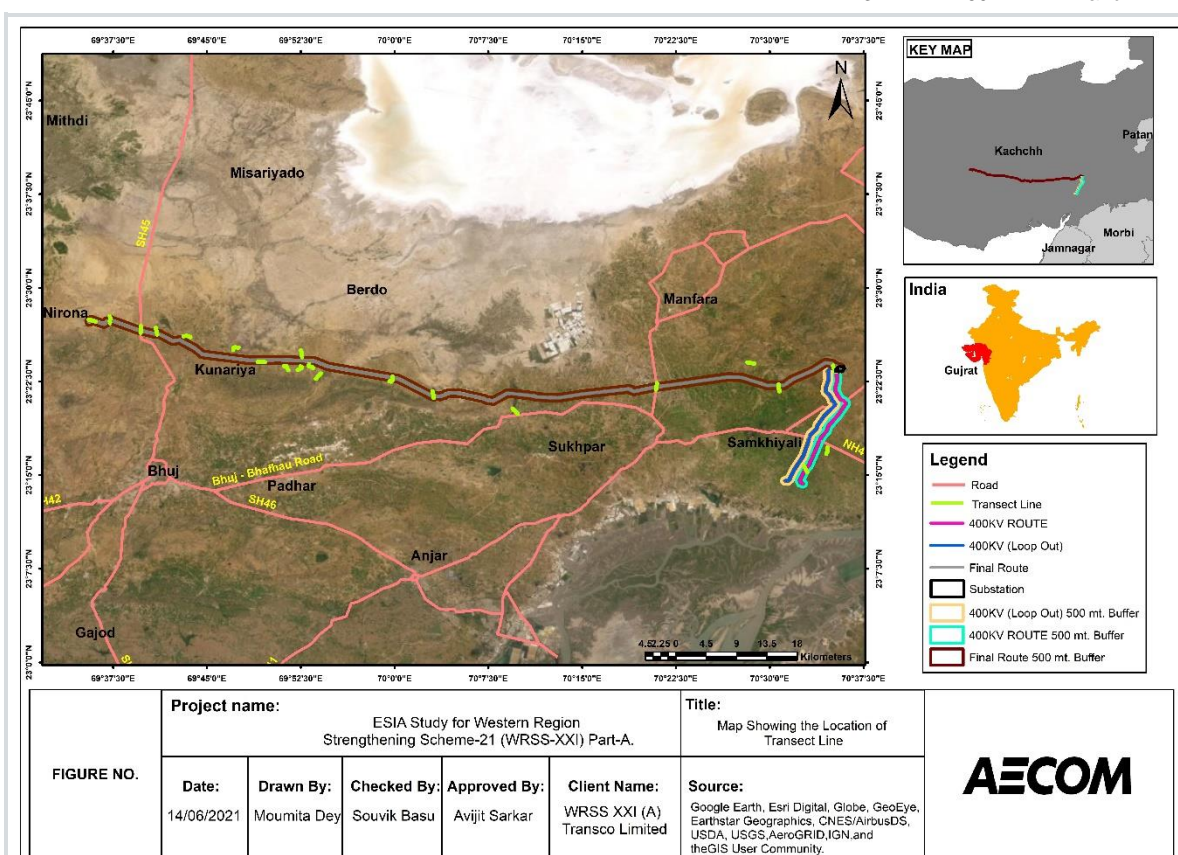


Figure 4-25. Transect Locations Maps

4.5.1 Biogeographical Zone

As per classification of Indian Biogeographic zones published by Wildlife Institute of India (Rodgers, et al. 2002), the project site falls under Biogeographic Zone 3 - the Indian Desert and the Biogeographic Province Kutch Desert-

3B (Figure). Globally, the region falls in Indo-Malay Realm and Deserts and Xeric Shrublands Biome represents a large expanse of scattered dry forest.

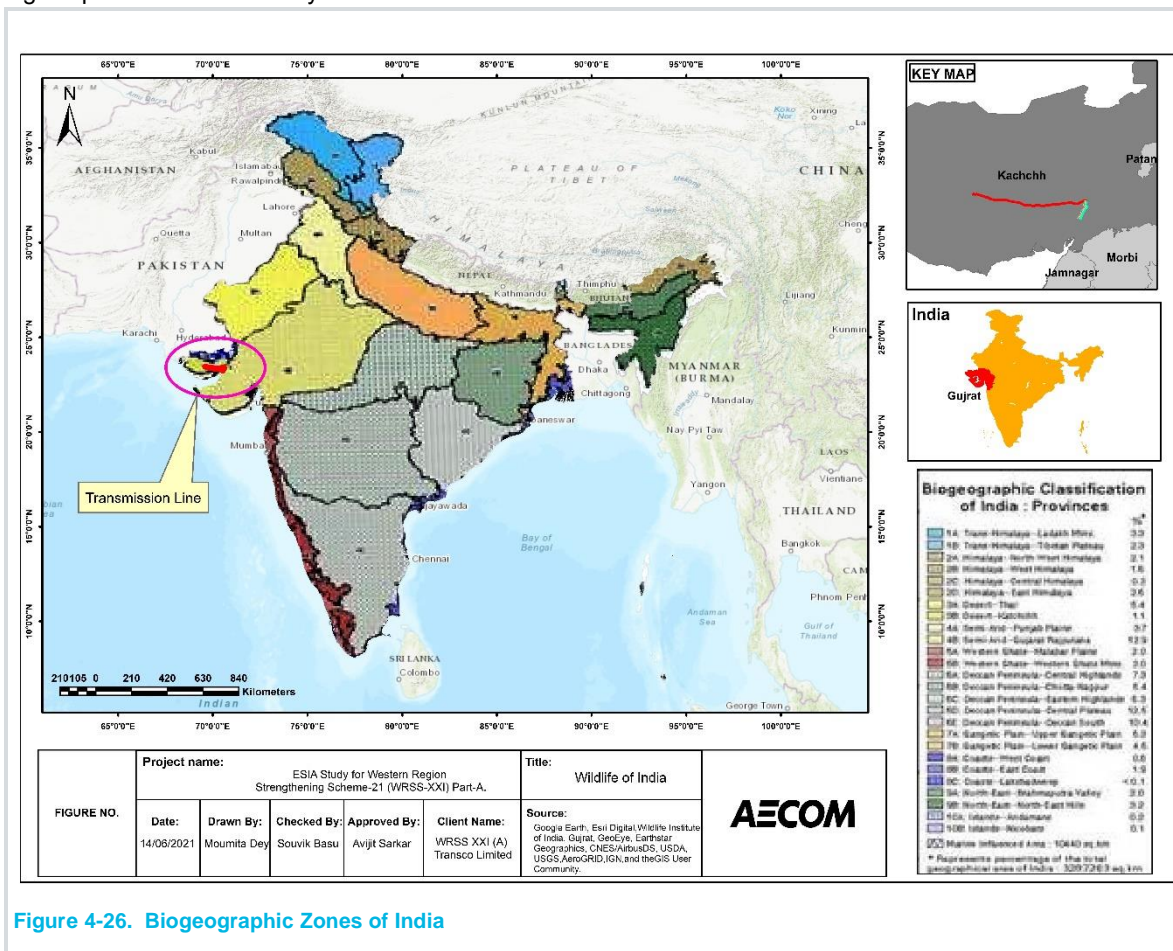


Figure 4-26. Biogeographic Zones of India

4.5.2 Details Forest Along the Alignment within AOI

Forest of Kutch district classified under the Type 6B- Northern Tropical Thorn Forest, as per the forest classification of Champion and Seth (1968). These forests also known as Open scrub thorn forest due to poor canopy formation. This can be further divided in to 5/D-Dry deciduous Scrub, 6/E4 -Salvadora scrub, 6B/C-Desert Thorn Forest, 6B/DS2-Tropical Euphorbia scrub, 6B/ DS1- Zizyphus sp. scrub and Capparis sp. association 5/E3 -Babul (*Acacia nilotica*) forest, 5/DS5-Dry Savannah type vegetation (*Acacia nilotica*- *Salvadora* sp. association, 6/E2-Gorad (*Acacia Senegal*). However, due to the invasion of *Prosopis juliflora* in these forests, has changed the floral composition and vegetation structure. The transmission line wise protected/reserve/social forest area are given below:

- 765 KV D/C Bhuj to Lakadia Transmission Line: Within this segment of the transmission line 3.0916ha forest land is present under Kutch-East Division and Kutch SF Division, in Kutch District. Within three villages namely Meghpar (Kunjisar) - 0.1406ha, Lodai - 2.6666ha and Loriya 0.2844ha, the forest land is present.
- 400 KV D/C LILO Transmission Line 1 & 2: Within this segment the transmission line is crossing through social forest area (road site) of Kutch district. and. Total 0.7507ha forest land is present under Kutch SF Division, in Kutch District. Within two villages namely Lakadiaya - 0.3821ha and Shamkhiyali- 0.3686ha, the forest land is present.

4.5.3 Protected Areas Along the Alignment with in AOI

Both transmission lines have been passed through social forest area and Stage I forest clearance for these social forest segment has already been granted by MoEF&CC. The details about nearby internationally recognized areas are given below:

Wild Ass Sanctuary IBA (IBA Code IN097):

Wild Ass Wildlife Sanctuary is in the Little Rann of Kutch in the Gujarat state of India. It is spread over an area of 4954 km². The wildlife sanctuary was established in 1972 and came under the Wildlife Protection Act of 1972. The

east portion of 765 KV D/C Bhuj to Lakadia Transmission Line, i.e. Shivilakha (Substation area) is situated approximately 24km east-southeast away from the Wild Ass Sanctuary.

The southern portion (Jangi) of 400 KV D/C LILO Transmission Line, is situated approximately 8km North-northwest away from the Wild Ass Sanctuary.

Kutch Desert Wildlife Sanctuary:

Kutch Desert Wildlife Sanctuary is situated in the Great Rann of Kutch, Kutch district, Gujarat, India, it was declared a sanctuary in February 1986. It is spread over an area of 7506.22 km². 765 KV D/C Bhuj to Lakadia Transmission Line, is approximately 1km away from the Kutch Desert Sanctuary. However, as the ESZ notification of Kutch Desert Sanctuary till not notified, some portion of the line is passed through the 10km ESZ area of Kutch Desert Sanctuary. However, Chief Conservator of Forest, Kutch Forest Division, issued NOC for the ESZ area, mentioning that – i) User Agency shall not do any activity which will have adverse effect on Wildlife and its habitat, ii) The User Agency shall not encroach in Kutch Desert Wildlife Sanctuary, iii) The User Agency shall not cut/remove/damage any tree during execution of works, iv) The activity by User Agency shall be done between Sunrise and Sunset only and v) The User Agency will have to install the bird diverter in consultation with the Deputy Conservator of Forest.

The northern end (Shivilakha) of 400 KV D/C LILO Transmission Line, is situated approximately 31km South-southeast away from the Kutch Desert Sanctuary.

Chari-Dhand Wetland Conservation Reserve

The Chari-Dhand wetland conservation reserve is located on the edge of arid Banni grasslands and the marshy salt flats of the Rann of Kutch in Kutch District, Gujarat State in India. The Gujarat State forest department had originally proposed that Chari Dhandh be declared as the Kutch bird sanctuary and later it was decided to accord Chari-Dhand wetland the status of a Conservation Forest. The West end of 765 KV D/C Bhuj to Lakadia Transmission Line, is situated approximately 26 km northwest away from the Chari-Dhand wetland conservation reserve.

Thus, the entire length of 765 KV D/C Bhuj to Lakadia Transmission Line, is situated 24 km and 1km km from the boundaries of Wild Ass Sanctuary and Kutch Desert Sanctuary respectively. On the other hand, the 400 KV D/C LILO Transmission Line is situated 8km and 31 km from the boundaries of Wild Ass Sanctuary and Kutch Desert Sanctuary respectively. Also, Chari-Dhand wetland conservation reserve is 26km away from the 765 KV D/C Bhuj to Lakadia Transmission Line. There is no coincidence or overlap between the transmission line or Study Area and any designated area.

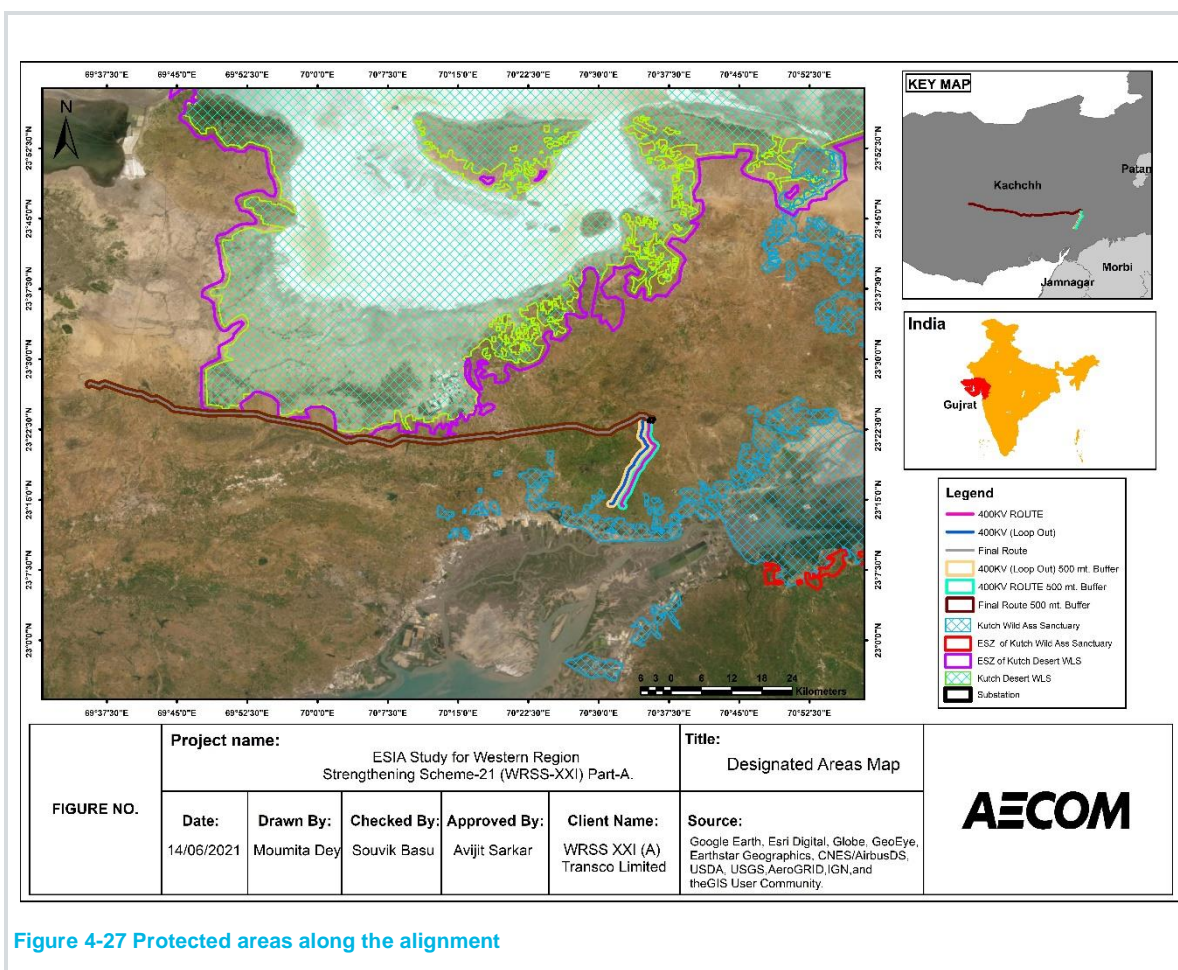


Figure 4-27 Protected areas along the alignment

4.5.4 Flora

Sixty-five (65) floristic species were recorded collectively at the sampling sites. The study area comprises of 18 tree species belonging to 9 families, 10 shrubs species belonging to 8 families and 35 herbs species belonging to 14 families. Most common species were *Azadirachta indica*, *Prosopis cineraria*, *Prosopis juliflora*, *Salvadora oleoides*, *Ziziphus nummularia*, *Blumea* sp., *Aristida* sp. Table presents the floristic species recorded at the sampling sites, along with the botanical family to which each species is assigned, its type and its status as per the IUCN Red List.

Table 4-7: Floristic Species recorded in the Study Area

S. No.	Species	Botanical Family	Type	IUCN Status*
1	<i>Azadirachta indica</i>	Meliaceae	Tree	LC
2	<i>Ailanthus excelsa</i>	Simaroubaceae	Tree	NE
3	<i>Acacia nilotica</i>	Fabaceae	Tree	NE
4	<i>Acacia catechu</i>	Fabaceae	Tree	NE
5	<i>Acacia auriculiformis</i>	Fabaceae	Tree	NE
6	<i>Mangifera indica</i>	Anacardiaceae	Tree	NE
7	<i>Ficus benghalensis</i>	Moraceae	Tree	NE
8	<i>Prosopis cineraria</i>	Mimosaceae	Tree	NE
9	<i>Prosopis juliflora</i>	Mimosaceae	Tree	NE
10	<i>Salvadora oleoides</i>	Salvadoraceae	Tree	NE
11	<i>Senegalia polyacantha</i>	Fabaceae	Tree	NE
12	<i>Senegalia senegal</i>	Fabaceae	Tree	NE
13	<i>Tecomella undulata</i>	Bignoniaceae	Tree	NE
14	<i>Vachellia jacquemontii</i>	Mimosaceae	Tree	NE
15	<i>Vachellia nilotica</i>	Mimosaceae	Tree	NE

S. No.	Species	Botanical Family	Type	IUCN Status*
16	<i>Vachellia tortilis</i>	Mimosaceae	Tree	NE
17	<i>Ziziphus jujuba</i>	Rhamnaceae	Tree	LC
18	<i>Artocarpus heterophyllus</i>	Moraceae	Tree	NE
19	<i>Cocos nucifera</i>	Arecaceae	Shrub	NE
20	<i>Citrus aurantifolia</i>	Rutaceae	Shrub	NE
21	<i>Calotropis gigantea</i>	Apocynaceae	Shrub	NE
22	<i>Calotropis procera</i>	Apocynaceae	Shrub	NE
23	<i>Capparis decidua</i>	Capparaceae	Shrub	NE
24	<i>Euphorbia nivulia</i>	Euphorbiaceae	Shrub	NE
25	<i>Leptadenia pyrotechnica</i>	Apocynaceae	Shrub	NE
26	<i>Salvadora persica</i>	Salvadoraceae	Shrub	NE
27	<i>Ziziphus nummularia</i>	Rhamnaceae	Shrub	NE
28	<i>Punica granatum</i>	Lythraceae	Shrub	NE
29	<i>Achyranthes aspera</i>	Amaranthaceae	Herb	NE
30	<i>Aeluropus lagopoides</i>	Poaceae	Herb	NE
31	<i>Aerva javanica</i>	Amaranthaceae	Herb	NE
32	<i>Aerva pseudotomentosa</i>	Amaranthaceae	Herb	NE
33	<i>Ammania baccifera</i>	Lythraceae	Herb	LC
34	<i>Blumea sp.</i>	Asteraceae	Herb	-
35	<i>Celosia argentea</i>	Amaranthaceae	Herb	NE
36	<i>Cenchrus biflorus</i>	Poaceae	Herb	NE
37	<i>Chloris barbata</i>	Poaceae	Herb	NE
38	<i>Citrullus colocynthis</i>	Cucurbitaceae	Herb	NE
40	<i>Cocculus hirsutus</i>	Menispermaceae	Herb	NE
41	<i>Convolvulus prostratus</i>	Convolvulaceae	Herb	NE
42	<i>Cyperus sp.</i>	Cyperaceae	Herb	-
43	<i>Dactyloctenium sp.</i>	Poaceae	Herb	-
44	<i>Datura innoxia</i>	Solanaceae	Herb	NE
45	<i>Echinops echinatus</i>	Asteraceae	Herb	NE
46	<i>Eragroatis sp.</i>	Poaceae	Herb	-
47	<i>Fagonia cretica</i>	Zygophyllaceae	Herb	NE
48	<i>Lycium edgeworthii</i>	Solanaceae	Herb	NE
49	<i>Heliotropium marifolium</i>	Boraginaceae	Herb	NE
50	<i>Indigofera cordifolia</i>	Fabaceae	Herb	NE
51	<i>Indigofera sp.</i>	Fabaceae	Herb	-
52	<i>Launaea procumbens</i>	Asteraceae	Herb	NE
53	<i>Oligochaeta divaricata</i>	Asteraceae	Herb	NE
54	<i>Pergularia daemia</i>	Apocynaceae	Herb	NE
55	<i>Senna italica</i>	Caesalpiniaceae	Herb	NE
56	<i>Cymbopogon martinii</i>	Poaceae	Herb	-
57	<i>Cynodon dactylon</i>	Poaceae	Herb	-
58	<i>Solanum trilobatum</i>	Solanaceae	Herb	NE
59	<i>Solanum virginianum</i>	Solanaceae	Herb	NE
60	<i>Tephrosia purpurea</i>	Fabaceae	Herb	NE
61	<i>Tribulus terrestris</i>	Zygophyllaceae	Herb	LC
62	<i>Vernonia cinarens</i>	Asteraceae	Herb	NE
63	<i>Aristida adscensionis</i>	Poaceae	Herb	-
64	<i>Aristida funiculata</i>	Poaceae	Herb	-
65	<i>Aristida histricula</i>	Poaceae	Herb	-

4.5.5 Fauna

This section of the report presents the higher faunal species, namely vertebrates, comprising mammals, birds, reptiles and amphibians, having reported ranges that include the Study Area. The detailed species-tables are provided as annexures to this report. Each annexed table gives the scientific and common names of each species, the conservation status assigned to it by the International Union for Nature and Natural Resources (IUCN) and the Schedule of the Wildlife Protection Act, 1972 (WPA) under which it is listed. Names of the species observed (in bold font) or recorded from consultation (in bold font with asterisk mark) as part of the primary data appear in each annexures.

Mammals

At least thirty-five (35) species of mammals have reported ranges that include the Study Area. With respect to the IUCN Red List, one (01) of these species is designated as endangered and two near threatened. With respect to the WPA Schedules, eight (08) of these species are listed under Schedule I. Six (06) species of mammals were observed and six (06) recorded from consultation as part of the primary data. **Appendix E** present the lists of mammal species of the Study Area.

Birds

One hundred sixty-two (162) species of birds have reported ranges that include the Study Area. These include seventy-nine (79) species which are resident with respect to the Study Area and Eighty-three (83) species, which are migratory with respect to the Study Area. With respect to the IUCN Red List, out of 79 resident bird species one vulnerable (Sarus Crane) and one near threatened birds (Black-necked Stork) have reported ranges in study area. Out of 83 migratory birds' species one endangered, three vulnerable and five near threatened birds' species have reported ranges along the study area. With respect to the WPA Schedules, two (02) bird species from both resident and migratory birds of the Study Area are listed under Schedule I. Forty-eight (48) species of birds, consisting of thirty-six (36) resident species and twelve (12) migratory species, were recorded as part of the primary data. **Appendices F** and **G** list the resident and migratory bird species respectively of the Study Area. Pictures of some birds taken during field survey are given below:



Desert Wheatear (*Oenanthe deserti*)



Isabelline Wheatear (*Oenanthe isabelline*)



White-eared Bulbul (*Pycnonotus leucotis*)



Sind Sparrow (*Passer pyrrhonotus*)



Rose-ringed Parakeet (*Psittacula krameri*)



Chestnut Headed Bee-eater (*Merops leschenaulti*)



Brahminy Starling (*Sturnia pagodarum*)



Demoiselle Crane (*Grus virgo*)



Eurasian collared Dove (*Streptopella decaocto*)



Red-wattled Lapwing (*Vanellus indicus*)



Laughing Dove (*Spilopelia senegalensis*)



Wood Sandpiper (*Tringa glareola*)

Reptiles

At least twenty-three (22) species of reptiles have reported ranges that include the Study Area. With respect to the IUCN Red List, one (01) of these species is designated as vulnerable. With respect to the WPA Schedules, one (01) of these species is listed under Schedule I. Two (02) species of reptiles were observed and five (05) recorded from consultation as part of the primary data. **Appendix H** lists the reptile species of the Study Area.

Amphibians

At least six (06) species of amphibians have reported ranges that include the Study Area. With respect to the IUCN Red List, none of these species are designated as globally threatened. With respect to the WPA Schedules, none of these species are listed under Schedule I. No species of amphibians were observed as part of the primary data and however two (02) recorded from primary consultation. **Appendix I** lists the amphibian species of the Study Area

Invasive Alien Species

At least two (02) species, comprising one (01) floristic species and one (01) faunal species, reported from the Study Area, are designated as invasive alien species with respect to the Study Area. Both these species were recorded as part of the primary data. The invasive alien floristic species is *Prosopis juliflora* (Bilayati Banwal), which native range is Central and South America. The IUCN status of this species is Not Evaluated (NE).

The invasive alien faunal species is *Columba livia* (Kabootar), which native range is Europe. The IUCN status of this species is Least Concern (LC).

4.5.6 Habitat Profile of the Study Area and Critical Habitat Assessment

Habitats are classifiable into natural, modified habitats and critical habitat. Natural habitats are areas composed of viable assemblages of plant and/or animal species of largely native origin, and/or where human activity has not essentially modified the area's primary ecological functions and species composition.

Modified habitats are areas that contain a considerably large proportion of plant and/or animal species of non-native origin, and/or where human activity has substantially modified the area's primary ecological functions and species composition. Modified habitats may include areas managed for agriculture, forest plantations, reclaimed coastal zones, and reclaimed wetlands. Definition of the modified habitat also includes significant biodiversity value, as determined by the risks and impacts identification process required in Performance Standard 1. WRSS should minimize impacts on such biodiversity and implement mitigation measures as appropriate.

Critical habitat (as per IFC PS 6, 2012) are the areas with high biodiversity value, including (i.) habitat of significant importance to Critically Endangered and/or Endangered species; (ii.) habitat of significant importance to endemic and/or restricted-range species; (iii.) habitat supporting globally significant concentrations of migratory species and/or congregatory species; (iv.) highly threatened and/or unique ecosystems; and/or (v.) areas associated with key evolutionary processes.

To assess possible triggers of critical habitat as defined in IFC's Performance Standard (PS) 6 on Biodiversity Conservation and Sustainable Management of Living Natural Resources (IFC, 2012a) and the associated guidance note (IFC, 2012b), the baseline data on habitats and species described was assessed as described in the Table. The habitat-profile of the Study Area is composed of natural, as well as, modified habitats. Each of these types include both, terrestrial and seasonal (monsoon) riverine habitats. The habitats of the Study Area are fragmented mainly by metalled roads, dirt roads, foot-trails and canals, while the aerial envelope of the study area is mainly interrupted by power distribution lines, pylons and transmission towers. Types of habitats in the Study area are described in detail in this section below:

Table 4-8: Habitat Identification as per IFC 2012 PS 6

Land Use Class.	Characteristics	Habitat Type	Justification
Scrub Land grasslands, sandy plains and saline flats	The scrub land is mostly found in non-cultivated lands mostly hard wood short tree, shrubs and herbs. Hard wood plants like <i>Prosopis cineraria</i> , <i>Acacia nilotica</i> , <i>Zizyphus numularia</i> , <i>Acacia catechu</i> , <i>Prosopis juliflora</i> , etc. are commonly found in the natural scrublands.	Natural	This type of vegetation is naturally growing here without any human intervention.
Homestead Plantation and Orchards	In some regions of the study area small orchards and private plantation, having commercial value, has been found. Commonly planted trees are <i>Mangifera indica</i> , <i>Punica granatum</i> , <i>Artocarpus heterophyllus</i> , <i>Cocos nucifera</i> , <i>Citrus aurantifolia</i> .	Modified	All trees/ shrubs planted are for domestic use purpose like fuel wood, fodder, food and no succession have been observed and human planted habitat cannot be considered as a Natural Habitat
Roadside Plantation	At some portion on the study area road side plantation has been found. In case of roadside plantation only tree species were planted, and the common planted trees were <i>Ficus benghalensis</i> , <i>Azadirachta indica</i> , <i>Acacia auriculiformis</i> .	Modified	All trees are mainly used for roadside shed tree and timber. The habitat planted by human cannot be considered as a Natural Habitat
Agricultural Land	Different agricultural activities are found in and around the study area. However, seasonally the agricultural crops are rotated. Agricultural fields are mainly used for growing Greengram (<i>Vigna radiata</i>), Wheat (<i>Triticum aestivum</i>), Cotton (<i>Gossypium hirsutum</i> , <i>G. arboreum</i>), Bajra/Pearl millet (<i>Pennisetum glaucum</i>), Castor (<i>Ricinus communis</i>), Groundnut (<i>Arachis hypogaea</i>), Mothbean (<i>Vigna aconitifolia</i>), Cumin (<i>Cuminum cyminum</i>), Sorghum (<i>Sorghum bicolor</i>) etc. The common weed occurring in the agricultural lands are <i>Cynodon dactylon</i> , <i>Aristida adscensionis</i> , <i>Aristida funiculata</i> , <i>Aristida histricula</i> etc.	Modified	Due to relatively minimal succession in agricultural land, components of agricultural lands cannot be considered Natural Habitat.

Land Use Class.	Characteristics	Habitat Type	Justification
Riverine Habitat	The riverine natural habitats of the study area consist of seasonal freshwater or brackish-water river/nala (Kaila River, Pur River, Kaswali River, Lotia Nala, Nihwara Nala, Adhoi River).	Natural	River and its channel are confined mostly within natural banks and minimum alteration have been done. Also, aquatic vegetation and aquatic faunal components are naturally growing here without any human intervention.

Pictures of Natural habitat



Pictures of Modified habitat



Table 4.9. Screening of Critical Habitat in and around the 5km radius of project area as per IFC PS6

Sr No.	Criterion	Observations
1	Criterion 1: Habitat of significant importance to Critically Endangered and/or Endangered species;	<p>No Critically Endangered species recorded. One endangered mammal Indian Pangolin (<i>Manis crassicaudata</i>) and one endangered bird Saker Falcon (<i>Falco cherrug</i>) have reported range include the study area.</p> <p>Indian Pangolin: Confirmed records of Indian Pangolin are very rare due to its low-density occurrence and elusive nature. During field survey this animal have not been observed and local people also not stated regarding the presence/observation of this animals. Thus, the presence of this animals did not meet the thresholds stipulated for the Study Area to qualify as a CH with respect to any of the concerned species</p> <p>Saker Falcon is a very rare winter visitor in Gujarat. As per previous records¹ Saker Falcon very irregularly spotted in Little Runn of Kutch area. So, this bird may use the project area as a migratory route. However, Firstly, this bird is a high elevation flyer and secondly the gap between two wires of 765KV transmission line is 15m. So, there are very little chances of electrification or collision. During field survey this bird have not been observed and consultation with local people evidence of this birds not found. Thus, the presence of this birds did not meet the thresholds stipulated for the Study Area to qualify as a CH with respect to any of the concerned species</p>
2	Criterion 2: Habitat of significant importance to endemic and/or restricted-range species	<p>Endemic or Restricted Range species are species which occur only within a pre-specified limited area.</p> <p><i>Equus hemionus khur</i> (Indian Wild Ass), a subspecies of <i>Equus hemionus</i> (Asiatic Wild Ass), is endemic to a restricted range which includes the Study Area. The entire global population of <i>Equus hemionus khur</i>, estimated to be 4000 individuals, is distributed in and around the Little Rann of Kutch (Wild Ass Sanctuary), which is 24km away from the project area. The species itself is designated as Near Threatened (NT) as per the IUCN Red List, but no evaluation is available for the sub-species. The sub-species is listed in Schedule I of the Wildlife (Protection) Act of India, 1972.</p>

Sr No.	Criterion	Observations
3	Criterion 3: Habitat supporting globally significant concentrations of migratory species and/or congregatory species	<p>Migratory Species are defined as species of which a significant proportion of members cyclically and predictably move from one geographical area to another, including within the same ecosystem. The Study Area is located within the Central Asian Flyway, as also, in proximity to the East Asia - East Africa Flyway. Thus, the Study Area is very likely to be situated in the annual cyclical flight-paths of the various winter, summer, passage migratory or nesting birds migrating either to or through the region in which it is situated. At least Eighty-three (83) such Migratory Species, all birds, have reported ranges that include the Study Area, which may serve as a wintering/summering destination, staging site or flight-path for these species. However, it has to be noted that the gap between two wires of 765KV transmission line project is 15m. So, there are very little chances of electrification or collision during migration.</p> <p>Congregatory species include species that gather in globally significant numbers at a particular site at a particular time in their life cycle for feeding, breeding or mid-migration resting. However, in and around the Study Area very few small waterbodies and some almost dry small river (adequate water present in only monsoon), which may not support occurrence of migratory and/or congregatory waterfowl.</p> <p>Throughout the transmission line (5km of each side from the centre of the line) and Substation area no such globally significant concentration of migratory species and/or congregatory species have been reported and also not observed during field visit.</p>
4	Criterion 4: Highly threatened and/or unique ecosystems	No such significant concentration of highly threatened, Biome restricted, rare species observed in this area. Also, due to project activity no highly potential significant risk were observed for which the quality of area will decrease.
5	Criterion 5: Areas associated with key evolutionary processes	<ol style="list-style-type: none"> 1. No isolated areas were observed with populations that are phylogenetically distinct. 2. High endemism of floral and faunal species not observed, 3. No such landscapes was found which have high spatial heterogeneity, 4. Specific juxtapositions of soil types were not found, 5. No such biological corridors which ensure species migration and gene flow and help in conservation of metapopulation were observed.

* As listed on the International Union for the Conservation of Nature (IUCN) Red List of Threatened Species. The determination of critical habitat based on other listings is as follows: (i) If the species is listed nationally / regionally as critically endangered or endangered, in countries that have adhered to IUCN guidance, the critical habitat determination will be made on a project by project basis in consultation with competent professionals; and (ii) in instances where nationally or regionally listed species' categorizations do not correspond well to those of the IUCN (e.g., some countries more generally list species as "protected" or "restricted"), an assessment will be conducted to determine the rationale and purpose of the listing. In this case, the critical habitat determination will be based on such an assessment.

¹ Mori, D & Shah, Y. 2017, Records of Saker Falcon *Falco cherrug* from Gujarat, India. *Indian Birds*, 13(6):158-159.

A Critical Habitat Screening (CHS) conducted for the Study Area identified potential CH triggers with respect to the Study Area as per the CH criteria of critically endangered or endangered species, endemic or restricted range species, migratory and/or congregatory species, as also, key evolutionary processes. Significant globally concentration of Floral and faunal species under IUCN-designated Critically Endangered (CR) / Endangered (EN) species, Migratory species, Congregatory species or Endemic/ Restricted Range species have not been recorded during study period from direct observations and consultation with local peoples. Thus, as per criteria for critical habitats as defined in PS6 Guidance Notes (GN6) (IFC, 2019) the CHS identified no potential CH triggers as per the other CH criteria.

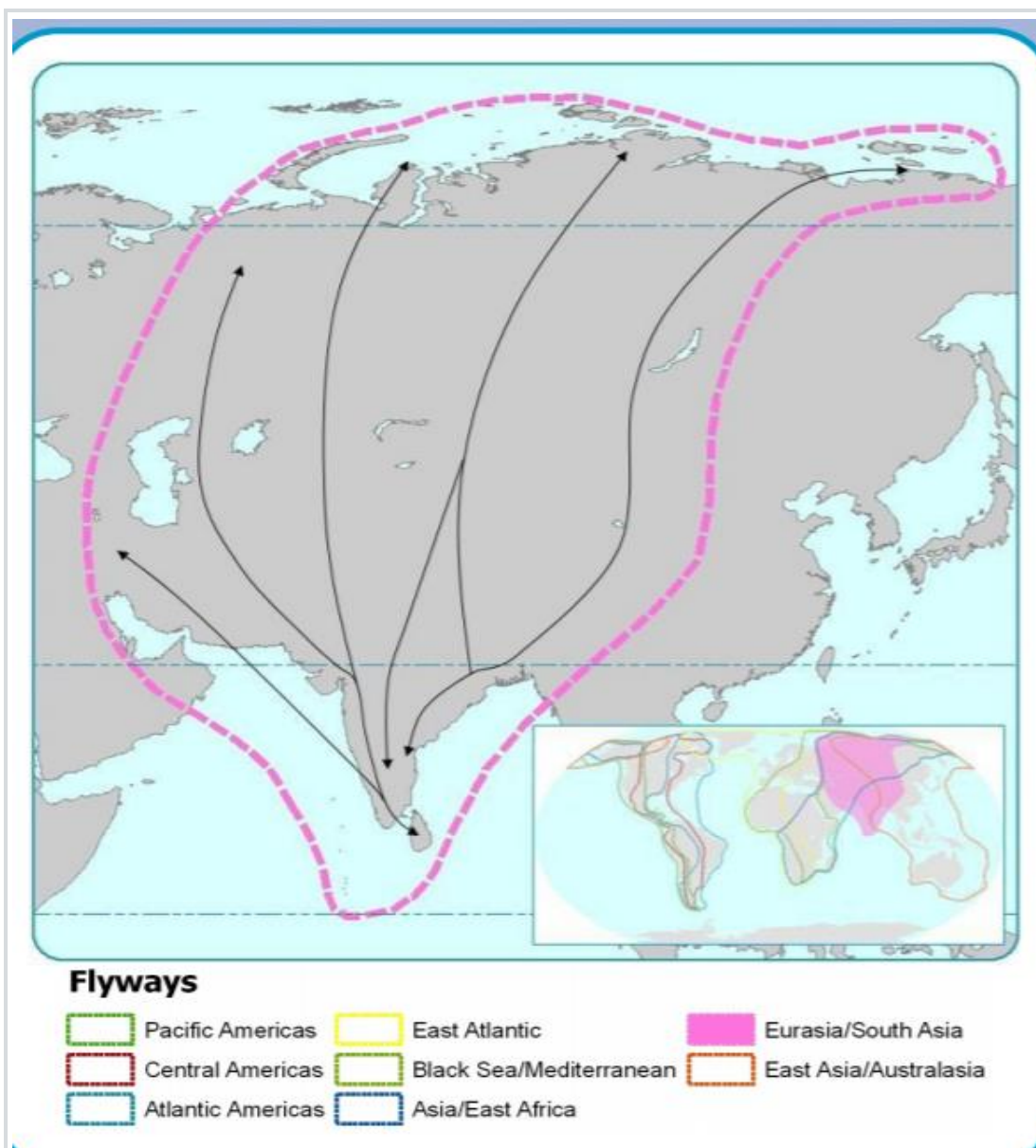


Figure 4-28 The Central Asian Flyway

Source: Birdlife International (2020). Birdlife Data Zone: Central Asia/South Asia.

4.6 Socio Economic Environment

This section provides an understanding on the socio-economic baseline of the proposed 106.854 km length from Lakadia-Bhuj 765 kV DC, 18.9 kms for LILO of Bhachau – EPGL 400kV D/c (triple) line at Lakadia PS and establishment of 2x1500MVA, 765/400kV Lakadia PS. This section provides an understanding of the administrative set up of the district, the demographic profile of the villages in the project area, the livelihood profile, land use patterns, social infrastructure.

4.6.1 Area of Influence

The Project Footprint for this project includes

- Erection of 399 transmission towers, minimum base area varies from 400 sqm to a maximum of 1200 sqm base area;
- Stringing of conductors across the transmission line of 107.6km length from Lakadiya-Bhuj and 18.9 kms for LILO of Bhachau – EPGL 400kV D/c (triple) line at Lakadia PS
- Lakadiya substation 168 acres (67.98 hectares);
- Temporary use of vacant private land for storage of materials and equipment and for labour camp. The total area for stockyard and labour camp is 15 acres. The land was leased from one landowner on a yearly basis.
- Labour accommodation, is a temporary arrangement for labour on pro-rata shifting basis that span for 10-15 days

The project area of influence considered with respects to social resources include the project footprint area (considered as the direct impacts due to acquiring rights of use/RoW for tower bases and land-use restrictions in transmission corridor) and the area within a corridor of 500 meter on either side of the transmission line and the substation. These together comprise the “Aoi” for the project.

4.6.2 Settlement Within Area of Influence

The AOI is spread across 86 villages which falls under three Blocks/Tehsils of Kutch district in Gujarat. The villages come under Anjar, Bhachau, Bhuj and Nakhatarana Blocks/Tehsil. Out of the 85 villages, 13 villages fall along the LILO (triple) line at Lakadia PS and 72 villages falls within the corridor of the 764 kV TL from Bhuj PS – Lakadia Pooling Substation. Only three villages were identified along the 500-metre corridor of the Transmission line and the substation. **Table 4.10** provides details of the villages that falls within the Aoi.

TL Description	Core Villages	Buffer
LILO of Bhachau – EPGL 400kV D/c line	13	1
Bhuj PS – Lakadia PS 765kV D/c line	72	2
Lakadia Pooling Substation	1	

Table 4-10: Settlement within the AOI

Sl. No	Block/Tehsil	Villages along the Project Footprint	Sl. No	Buffer Villages
LILO Line				
1.	Bhachau	Wastava,	1	Katariya Nav
2.	Bhachau	Shivlakha,		
3.	Bhachau	Lakadia,		
4.	Bhachau	Gharana,		
5.	Bhachau	Pipra Talav**		
6.	Bhachau	Rajansar		
7.	Bhachau	Samakhiali**		
8.	Bhachau	Laliana,		
9.	Bhachau	Gorasar Talav**		
10.	Bhachau	Nava Katana**		
11.	Bhachau	Lakhdhargarh,		
12.	Bhachau	Jangi,		
13.	Bhachau	Bhimasar Talav**		
Lakadiya-Bhuj Transmission line				
14.	Bhachau	Lakadia***	1.	Gamdau
15.	Bhachau	Shivlakha***	2.	Amarapar
16.	Bhachau	Shivlakha RS,		
17.	Bhachau	Pipra Talav***		

Sl. No	Block/Tehsil	Villages along the Project Footprint	Sl. No	Buffer Villages
18.	Bhachau	Rajansar***		
19.	Bhachau	Balasari,		
20.	Bhachau	Wastava***		
21.	Bhachau	Gharana***		
22.	Bhachau	Adhoi		
23.	Bhachau	Udaipur**		
24.	Bhachau	Lakhat		
25.	Bhachau	Vijpasar		
26.	Bhachau	Rampar		
27.	Bhachau	Halra		
28.	Bhachau	Karmana		
29.	Bhachau	Vondhada		
30.	Bhachau	Meghpar- Kunjisar		
31.	Bhachau	Lakhavat**		
32.	Bhachau	Bandhadi**		
33.	Bhachau	Sikara,		
34.	Bhachau	Kageshwar Mahadev**		
35.	Bhachau	Kumbhardi		
36.	Bhachau	Bhaveswar Mahadev**		
37.	Bhachau	Kabrau		
38.	Bhachau	Shri Krishna Nagar**		
39.	Bhachau	Amardi		
40.	Bhachau	Morgar		
41.	Bhachau	Desalpur-Kothavala		
42.	Bhachau	Baniari.		
43.	Anjar	Fatehpur**		
44.	Anjar	Budharmora		
45.	Anjar	Chakarmora**		
46.	Anjar	Dhamadka		
47.	Anjar	Amrapar,		
48.	Anjar	Indraprastha (New Dudhai)**		
49.	Anjar	Dudhai		
50.	Anjar	Devisar,		
51.	Anjar	Lakhara Velara**		
52.	Anjar	Velara Talav**		
53.	Anjar	Khirsara (Rahim Wandh)**		
54.	Anjar	Khirsara (Haleputra Wandh)**		
55.	Anjar	Khirsara (Mor Wandh)**		
56.	Anjar	Kirsara (Miyana)**		
57.	Anjar	Khirsara (Umar Wandh)**		
58.	Anjar	Yamunagar**		
59.	Anjar	Khirsara		
60.	Anjar	Khengarpar,		
61.	Bhuj	Jawaharnagar,		
62.	Bhuj	Lothia,		
63.	Bhuj	Dharampur		
64.	Bhuj	Wanthra**		
65.	Bhuj	Lodai		
66.	Bhuj	Umedpar**		
67.	Bhuj	Keshavnagar**		
68.	Bhuj	Dhrang,		
69.	Bhuj	Fulay		
70.	Bhuj	Kotay,		
71.	Bhuj	Lakhara Talav**		
72.	Bhuj	Kunaria**		
73.	Bhuj	Dhori, Dhori,		
74.	Bhuj	Sumrasar,		

Sl. No	Block/Tehsil	Villages along the Project Footprint	Sl. No	Buffer Villages
75.	Bhuj	Amibag**		
76.	Bhuj	Loria,		
77.	Bhuj	Jatwadh**		
78.	Bhuj	Mithaniwadi**		
79.	Bhuj	Vakilwadi**		
80.	Bhuj	Jhura**		
81.	Nakhtarana	Wadi**		
82.	Nakhtarana	Palanpur		
Lakadiya Pooling Stataion				
83.	Bhachau	Shivlakha		

Source: Section 164 Authorisation Gazette Publication

** (information of village ** mark could not be obtained)

*** villages overlap with LILO 400kV Line.

4.6.3 Methodology for Socio Economic Assessment

The socio-economic baseline for this project has been developed based on the secondary literature review and primary sources which includes inferences drawn from the consultation with different stakeholder including the local community.

4.6.3.1 Review of Secondary Information

Review and assessment of the available secondary data and information for the study area was undertaken to substantiate the findings from the stakeholder consultations. This also allows for a comparative assessment of the project area vis-à-vis the villages and block level socio-economic baseline information. For secondary review, following documents and literature have been reviewed:

- Village Directory Data (2011);
- Primary Census Abstract Data (2011);
- District Statistical Handbook-2011 for Kutch District

4.6.3.2 Primary data collection through stakeholder consultation

Key group of stakeholders who were consulted during the study process were affected landowner, local community, Headman/Sarpanch, EPC Contractor etc. The main objective of the consultation was to gain understanding of the area, the demographic profile, the livelihood activities, cropping pattern, land value and understanding the development needs of the area in general. **Table 4.11** listed down the consultation carried out with different stakeholder. Details regarding the consultation with each group can be found in Stakeholder Consultation Chapter.

Table 4-11: List of stakeholders Consulted

Stakeholder Group
Consultation with Local Community
Consultation with Headman/Sarpanch
Consultation with Contractor

4.6.4 Administrative Set Up of AOI

4.6.4.1 State Profile: Gujarat

Gujarat was created out of seventeen (17) northern districts of the former state of Bombay on May 1, 1960. Located on the western coast of India, it has the longest coastline of 1,600 Km and is bounded by the Arabian Sea to the west and south west and by Pakistan in the North. It has a population of approximately 6.03 Crore (4.99% of Indian Population). The State of Gujarat is surrounded by the States of Rajasthan and Madhya Pradesh towards the north east and east, Maharashtra and the Union Territories of Daman, Diu and Nagar Haveli, towards the south. Gandhinagar, the capital city of Gujarat is located close to Ahmedabad, the commercial capital of the State which is also the most populated District in the State, with 7.20 million people. The State has diverse climatic conditions with mild and pleasant winters and hot and dry summers and heavy monsoon. The state currently has 33 districts. Table 4.12 provides the demographic profile Gujarat state

Table 4-12: Demographic Profile of Gujarat State

Attribute	2011	2001
Population	60,439,692	50,671,017
Male	31,491,260	26,385,577
Female	28,948,432	24,285,440
Population Growth	19.28%	22.48%
Sex Ratio	919	920
Child Sex Ration	890	883
Total Child Population (0-6 Age)	7,777,262	7,532,404
Male Population (0-6 Age)	4,115,384	4,000,148
Female Population (0-6Age)	3,661,878	3,532,256
Literacy	78.03 %	69.14%
Male Literacy	85.75 %	79.66 %
Female Literacy	69.68 %	57.80 %

Source: <https://www.census2011.co.in/census/state/gujarat.html>

As per Gujarat Population Census Data shows that it has total Population of 6.03 Crore which is approximately 4.99% of total Indian Population. Literacy rate in Gujarat has seen upward trend and is 79.31% as per 2011 population census. Of that, male literacy stands at 87.23% while female literacy is at 70.73%. The sex ratio in the State is 920, which is significantly lower than that of India which stands at 933 (946 rural & 900 urban) females per 1000 males as per census 2011 data.

4.6.4.2 District Profile:

Kutch falls in the north-western part of Gujarat. It lies between the parallels of latitude 22° 44' to 24° 42' and the meridians of longitude 68° 10' to 71° 55'. It is bounded on north and north-west by Pakistan, on the north-east by Rajasthan state, on the east by Banas Kantha and Patan districts, on the south-east by Surendranagar district, on the south by the gulf of Kutch and Rajkot district and on the south-west by the Arabian Sea. It is largest district in terms of area and consist longest coastline of about 406 km., in the state. The total area of the district is 45,674 sq.km i.e. it covers 23.27 % of total geographical area of Gujarat. The district is characterised by treeless and barren Rann, rocky hills and low-lying plains. 51 percent area of Kutch is occupied by high saline unproductive desert (Greater Rann of Kutch-GRK and Little Rann of Kutch-LRK) and 34.73% of the area is under agriculture. The coverage of forest area is 15.67%. The district has 17.31% of their cultivable land as unutilized land, 21.07% land is waste land. Pastureland forms 3.58% of geographical area.⁹

Kutch district has 10 Talukas, 632 Gram Panchayats, 6 Municipalities, 14 towns and 924 villages. Of the 924 villages, 877 are inhabited villages and 47 are Uninhabited villages.

Table 4-13: Demographic details of Kutch

Attribute	2011	2001
Population	2,092,371	1,583,225
Male Population	1,096,737	815,152
Female Population	995,634	768,073
Sex Ratio	908	942
Child Sex Ratio	921	922
% Literary	70.59	59.79
% Male Literacy	79.40	70.39
% Female Literacy	60.87	48.59
%Schedule Tribe Population	1.16	8.2
%Schedule Caste Population	12.3	11.7

Source: Census of India 2011 data

As per 2011 census data mentioned in **Table 4.13** Kutch has a total population of 2,092,371 of which male and female were 1,096,737 and 995,634 respectively. In 2001 census, Kutch had a population of 1,583,225 of which males were 815,152 and remaining 768,073 were females. Kutch District population constituted 3.46 percent of total Maharashtra population. As per 2011 census data, sex ratio of the district has declined to 908 females per 1000 males as compared to 2001 census data. The Scheduled Caste people form 12.3% population, while the

⁹ DCHB, Kachchh District, Directorate of Census Operations, Gujarat

proportion of Scheduled Tribe population is quite low at 1.16%. The literacy rate has increased from 59.79% in 2001 to 70.5% in the year 2011.

The district is second largest district in India and covers a large geographical area. Majority of the farmers having land holding more than 2 hectares. Net area the district under cultivation of different crops is 7.0 lac hectare, which is 75.33% of total geographical area of the district.

4.6.4.3 Block/Tehsil Profile

The project falls under four blocks/tehsils of Kutch districts. These are Anjar, Bhachau, Bhuj and Nakharana. As per 2011 census data among the four blocks, Bhuj has the highest number of populations followed by Anjar, Bhachau and Nakharana. The percentage of the Schedule caste in all the district is not more 20% and Schedule Tribes population is very minimal (less than 2%). Among the four blocks, lowest literacy rate is observed in Bhachau (60.1%) as compared to the other three Blocks. **Table 4.14** provides a profile of the Blocks that falls within the study area.

Table 4-14: Profile of Block/Tehsil

Attribute	Tehsils/Block			
	Anjar	Bhachau	Bhuj	Nakhatarana
Population	2,35,537	1,86,035	4,43,269	1,46,367
Male Population	1,23,401	97,897	2,28,136	74,380
Female Population	1,12,136	88,138	2,15,133	71,987
Sex Ratio	909	900	943	968
% of Schedule Tribes	1.09	1.14	1.0	0.97
% of Schedule Caste	8.60	9.79	9.82	17.30
% of Literacy Rate	72.65	60.10	73.1	71.12
% of Female Literacy Rate	63.1	47.3	61.01	62.52
% of Male Literacy Rate	72.65	71.5	85.43	79.52

Source: Census of India 2011 data

4.6.5 Socio Economic Profile of AOI

The study area as mentioned in section 4.4.2 comprised of 85 villages falls under the AOI of the proposed project. Of the 85 villages, 82 villages fall under the project footprint, and only 3 villages fall within the 500-metre buffer area.

The study area falls under 4 Blocks namely Anjar, Bhachau, Nakhtarana and Bhuj Tehsils/Blocks. 52% of the settlement with the AOI falls in Bhachau Blocks, 25% in Bhuj, 20.2% in Anjar and only 2.4% falls in Nakhtarana Blocks. Details of the socio-economic profile of AOI is provided in the following section.

4.6.5.1 Demography

The demography of the study area as can be seen in the table 4.6 below is characterised by a total population of 8,41,185 individuals from the villages under the project footprint and 2,951 individuals from the buffer areas from the total 1,87,97 households. The average household size is 4.7 individuals per households. The average sex ratio in the study area is 967 females per thousand males much higher than the district sex ratio of 908 females per thousand males. A look at the gender wise population male population accounted 50.8% of the total population and female 49.2%. The data corroborate with the finding's consultations with the local community whereby it was reported that male and female population are almost equal while in some villages female population is more than the male population. Data below reveal that 8 villages have a higher female population than the national average sex ration, Lothia under Bhuj Tehsils has the lowest female population (30%) and Sex ratio (438). **Table 4.15** provides an overview of the demographic details of the study area.

4.6.5.2 SC and ST Community

As can be seen from **Table 4.16**, the Study Area is characterised by Schedules Caste (SC) representation of approximately (12%). This reveal that the study area has low proportions of ST and SC population in comparison with that of the State, district and tehsil levels. Consultation with the project team of WRSS reveal that the Transmission line corridor does not pass through any ST families. The major communities inhabiting the area are Koli, Ahirs, Rajput, Muslims. The livelihood pattern of the ST and SC community were reported to be more dependent on agriculture and wage labour.

4.6.5.3 Literacy Profile

As per the census data 2011, the villages in the Aol have a literacy rate of 58.62% which is significantly lower than the literacy rate of the state and district, 78% and 70.59% respectively. Of this the male literacy (61%) stood higher than female literacy rate (39%). Among the study area Dhamadka and Kumbhardi has the highest literacy rate (74%) much higher than the district literacy rate whereas Lothia has poor literacy rate. A look at the gender wise literacy rate Amardi (55%) and Shivilakha (56%) has a better female literacy rate as compared to other villages while Lothia has the worst female literacy rate.

Consultation with the local community on the status of education, reveal that standard VIII is the benchmark for many school going boys and girls post which many would drop out from their schools for economic reason and some drop out due to their lack of interest in studying. While there a few youths who still continue their higher education outside their village. People in the study area prefer to send their children for education outside their village mainly to nearby town and cities for better education as compared with the education in their villages.

Review of census data (2011) reveal that all villages in the study area have a government primary school. Private primary school is found only in 5 villages such as Lodai, Loria and Sumrasar of Bhuj Tehsils and Adhi and Samakhiari in Bhachau Tehsils. For secondary education, children from the study villages travel to nearby town/village at 5-10 kms distance and for college they travel to Bhuj and Adisar. **Table 4-15** provides an overview of the literacy profile of the study area.

Table 4-15: Demographic Profile of the Study Area.

Block/ Tehsils	Name	Total Households	Average HH Size	Total Population	Total Male Population		Total Female Population		Sex Ratio	Schedule Caste %	Schedule Tribe %	Literacy Rate %	Male	Female Literacy %
					Number	%	Number	%					Literacy %	
Anjar	Khirsara	382	4.7	1803	922	51.1	881	48.9	956	3.2	0.0	46.4%	60.6%	31%
Anjar	Devisar	8	4.0	32	17	53.1	15	46.9	882	0.0	0.0	48.3%	53.3%	43%
Anjar	Budharmora	489	4.5	2178	1121	51.5	1057	48.5	943	11.5	1.4	58.9%	68.3%	49%
Anjar	Dhamadka	631	4.6	2918	1516	52.0	1402	48.0	925	3.8	0.3	74.7%	83.3%	65%
Anjar	Dudhai	969	4.4	4244	2070	48.8	2174	51.2	1050	11.6	1.1	67.0%	77.0%	58%
Anjar	Khengarpar	41	4.6	190	114	60.0	76	40.0	667	0.0	15.3	75.0%	87.1%	57%
Bhuj	Dharampar	377	4.4	1670	870	52.1	800	47.9	920	4.1	0.2	59.6%	73.4%	45%
Bhuj	Dhori	954	4.7	4480	2243	50.1	2237	49.9	997	13.3	0.0	57.1%	71.6%	43%
Bhuj	Sumarasar - Shekhvali	1203	5.2	6236	3131	50.2	3105	49.8	992	16.7	0.2	51.9%	64.9%	39%
Bhuj	Loria	425	4.9	2084	1094	52.5	990	47.5	905	22.8	0.0	62.0%	70.8%	52%
Bhuj	Kunaria													
Bhuj	Nana-Mota	349	4.8	1662	818	49.2	844	50.8	1032	19.0	0.1	57.5%	69.8%	46%
Bhuj	Fulay	10	6.2	62	26	41.9	36	58.1	1385	0.0	0.0	2.7%	7.7%	0%
Bhuj	Dhrang	205	4.1	845	446	52.8	399	47.2	895	14.0	0.0	62.2%	76.2%	47%
Bhuj	Vantra	52	4.9	256	136	53.1	120	46.9	882	0.0	0.0	32.1%	30.0%	34%
Bhuj	Jawaharnagar	308	4.6	1410	723	51.3	687	48.7	950	5.9	0.0	53.9%	65.5%	42%
Bhuj	Lothia	6	3.8	23	16	69.6	7	30.4	438	0.0	0.0	7.1%	12.5%	0%
Bhuj	Sumarasar (Jatvali)	167	4.8	805	413	51.3	392	48.7	949	0.0	0.0	46.5%	56.1%	37%
Bhuj	Lodai	910	4.5	4087	2203	53.9	1884	46.1	855	8.2	0.2	54.9%	68.6%	39%
Bhuj	Kotay	219	4.6	1005	505	50.2	500	49.8	990	25.4	0.3	62.4%	77.4%	48%
Bhachau	Sikara	442	3.7	1654	800	48.4	854	51.6	1068	7.8	1.9	55.1%	64.9%	46%
Bachau	Baniari	197	4.4	858	439	51.2	419	48.8	954	1.5	0.0	60.1%	75.6%	44%
Bachau	Morgar	348	4.3	1494	762	51.0	732	49.0	961	9.0	0.0	48.2%	59.3%	37%
Bachau	Amardi	286	4.2	1213	574	47.3	639	52.7	1113	15.1	0.5	64.1%	75.2%	55%
Bachau	Kabrau	302	4.6	1395	704	50.5	691	49.5	982	16.8	0.3	55.3%	64.2%	47%
Bachau	Kumbhardi	305	5.2	1571	791	50.4	780	49.6	986	7.3	0.0	74.0%	83.9%	64%

Block/ Tehsils	Name	Total Households	Average HH Size	Total Population	Total Male Population		Total Female Population		Sex Ratio	Schedule Caste %	Schedule Tribe %	Literacy Rate %	Male Literacy %	Female Literacy %
					Number	%	Number	%						
Bachau	Meghpar (Kunjisar)	153	4.1	626	293	46.8	333	53.2	1137	8.0	0.8	50.7%	59.0%	43%
Bachau	Vondhada	203	4.5	913	457	50.1	456	49.9	998	15.0	0.0	62.0%	74.5%	49%
Bachau	Halra	94	5.9	554	279	50.4	275	49.6	986	4.2	1.3	52.6%	66.4%	38%
Bachau	Rampar	158	4.2	668	350	52.4	318	47.6	909	9.3	0.0	60.8%	78.2%	42%
Bachau	Adhoi (Pasakayara)	2401	4.5	10794	5453	50.5	5341	49.5	979	20.7	1.7	61.2%	73.9%	48%
Bachau	Vasatva	47	5.8	273	146	53.5	127	46.5	870	0.0	0.0	54.7%	54.1%	55%
Bachau	Shivlakha	502	4.4	2200	1130	51.4	1070	48.6	947	9.2	0.0	63.8%	70.6%	57%
Bachau	Lakadiya	1915	4.5	8651	4427	51.2	4224	48.8	954	11.1	1.1	62.4%	75.1%	50%
Bachau	Gharana	705	4.9	3469	1757	50.6	1712	49.4	974	6.0	0.1	56.2%	68.4%	44%
Bachau	Lakhpat	216	3.7	807	371	46.0	436	54.0	1175	8.8	0.0	56.9%	70.3%	46%
Bachau	Vijpasar	475	5.1	2417	1236	51.1	1181	48.9	956	12.1	0.0	56.5%	69.4%	43%
Bachau	Rajansar	122	5.6	680	340	50.0	340	50.0	1000	0.0	0.0	55.1%	72.4%	39%
Bachau	Laliana	525	4.7	2488	1300	52.3	1188	47.7	914	14.2	0.0	59.8%	71.2%	47%
Bachau	Jangi	913	5.2	4713	2383	50.6	2330	49.4	978	17.2	0.0	51.9%	66.2%	37%
Bachau	Lakhdhargadh (Alepar)	65	5.0	322	171	53.1	151	46.9	883	0.0	0.0	60.9%	75.9%	44%
Nakjtarana	Palanpar	99	4.4	435	217	49.9	218	50.1	1005	0.0	0.0	40.5%	53.3%	29%
Total Project Footprint		18178		84185	42764	50.8	41421	49.2	969	12.4	0.6	58.8%	70.9%	46%
Bhachau	Amarapar	398	4.4	1747	908	52.0	839	48.0	924	2.2	1.4	52.3%	66.9%	37%
Bhachau	Gamdau	131	5.0	661	338	51.1	323	48.9	956	0.0	0.8	46.5%	58.0%	35%
Bhachau	Katariya Nav	90	6.0	543	293	54.0	250	46.0	853	0.0	0.0	0.0%	0.0%	0.0%
Total Buffer		619		2951	1539	52.2	1412	47.8	917	1.6	1.0	53.7%	67.7%	39%
Grand Total		18707		87136	44303	50.8	42833	49.2	967	12.1	0.6	58.6%	61.0%	39%

Source: Census Data 2011

4.6.5.4 Occupation and Livelihood

The study area is characterised by Worker Participation Ratio ¹⁰(WPR) of 34.7% of which male WPR 79.4% and female WPR is 20.6%. The female WPR is found to be much lower than the national female average WPR (23%). As per survey conducted by International Labour Organisation and Institute of Applied Manpower Research-Low Female Employment in a period of High Growth reveal that the major factors cited for women pulling out of the work space are reproductive roles, household and care responsibilities, cultural sanctions and patriarchal hierarchies. Continuing in education and migration after marriage were also cited by females as reasons for withdrawal from the labour force. On the other side, the push factors for women joining the workforce are availability of opportunities, household income, migration, and economic distress.

Of the total working population (34.7%) in the study 87.8% is comprised of main working population (engaged in an economic activity for more than 180 days in a year). Of the main working population, those engaged as cultivators comprises of 9.4% and agricultural labourers (10.7%). These are basically farmed based activities. Apart from this, 10.1%% are engaged in 'Other' activities which comprise of non-farm-based activities including construction labourers in industries their neighbouring villages industries (solar plant etc), small businesses and service sector etc. Consultation with the local community reveal that nearly 70-80% of the population are engaged in agriculture as their primary occupation. According to the 2011 Census, the overall WPR is 37.34 percent of the total working population of the district was engaged in agriculture, as against 49.61 percent in the State as a whole. Beside agriculture, livestock is another major livelihood activity of the people in the study area. These includes cattle, buffaloes, goat, sheep, and horses Consultation with the local community reveal that livestock rearing contribute about 70% of the household income. However, it has been reported that women play a major role in livestock rearing. **Table 4.16** provide an overview of the working population in the study area.

¹⁰ Work Participation Ratio is defined as the percentage of total workers (main and marginal workers) to total population

Table 4-16: Proportion of Working Population in the Study Area

Block	Name	Total Population	Total WPR in %	% Male WPR	% Female WPR	Main Worker %	%Male Main Worker	%Female Main Worker	% Marginal Worker	%Male Marginal Worker	%Female Marginal Worker
Anjar	Khirsara	1803	32.3	81.5	18.5	91.1	85.9	16.4	8.9	36.5	63.5
Anjar	Devisar	32	43.8	78.6	21.4	71.4	100.0	0.0	28.6	25.0	75.0
Anjar	Budharmora	2178	36.3	75.7	24.3	78.6	89.7	11.5	21.4	24.3	75.7
Anjar	Dhamadka	2918	32.4	87.4	12.6	95.1	89.8	11.4	4.9	41.3	58.7
Anjar	Dudhai	4244	31.5	84.4	15.6	97.2	85.3	17.3	2.8	55.3	44.7
Anjar	Khengarpar	190	55.8	56.6	43.4	100.0	56.6	76.7	0.0	0.0	0.0
Bhuj	Dharampar	1670	43.2	69.5	30.5	69.9	93.8	6.6	30.1	12.9	87.1
Bhuj	Dhori	4480	46.2	62.0	38.0	90.3	66.1	51.2	9.7	23.0	77.0
Bhuj	Sumarasar - sekhvali	6236	31.8	87.2	12.8	99.6	87.3	14.6	0.4	71.4	28.6
Bhuj	Loria	2084	42.6	68.3	31.7	71.1	77.3	29.3	28.9	46.1	53.9
Bhuj	Kunaria Nana-Mota	1662	33.1	80.0	20.0	92.5	82.9	20.6	7.5	43.9	56.1
Bhuj	Fulay	62	37.1	52.2	47.8	100.0	52.2	91.7	0.0	0.0	0.0
Bhuj	Dhrang	845	35.4	89.6	10.4	81.6	96.7	3.4	18.4	58.2	41.8
Bhuj	Vantra	256	51.6	55.3	44.7	39.4	98.1	2.0	60.6	27.5	72.5
Bhuj	Jawaharnagar	1410	37.1	79.0	21.0	99.8	79.1	26.4	0.2	0.0	100.0
Bhuj	Lothia	23	26.1	100.0	0.0	100	100	0.0	0.0	0.0	0.0
Bhuj	Sumarasar (Jatvali)	805	24.6	95.5	4.5	97.5	97.4	2.7	2.5	20.0	80.0
Bhuj	Lodai	4087	36.7	76.9	23.1	80.8	86.8	15.2	19.2	35.1	64.9
Bhuj	Kotay	1005	37.1	85.3	14.7	98.1	85.8	16.6	0.0	0.0	0.0
Bhachau	Sikara	1654	34.0	78.5	21.5	96.1	80.6	24.1	3.9	27.3	72.7
Bachau	Baniari	858	34.8	87.6	12.4	89.3	93.6	6.8	10.7	37.5	62.5
Bachau	Morgar	1494	28.8	92.8	7.2	90.0	92.5	8.1	10.0	95.3	4.7

Block	Name	Total Population	Total WPR in %	% Male WPR	% Female WPR	Main Worker %	%Male Main Worker	%Female Main Worker	% Marginal Worker	%Male Marginal Worker	%Female Marginal Worker
Bachau	Amardi	1213	37.1	74.0	26.0	99.6	74.3	34.5	0.4	0.0	100.0
Bachau	Kabrau	1395	40.8	74.2	25.8	82.8	85.6	16.9	17.2	19.4	80.6
Bachau	Kumbhardi	1571	33.2	94.6	5.4	99.0	95.2	5.1	1.0	40.0	60.0
Bachau	Meghpar (Kunjisar)	626	28.0	90.9	9.1	92.6	90.1	11.0	7.4	100	0.0
Bachau	Vondhada	913	31.3	91.3	8.7	99.3	91.9	8.8	0.7	0.0	100.0
Bachau	Halra	554	31.6	89.1	10.9	97.7	91.2	9.6	2.3	0.0	100.0
Bachau	Rampar	668	46.7	63.8	36.2	55.1	95.9	4.2	44.9	24.3	75.7
Bachau	Adhoi (Pasakayara)	10794	31.4	81.6	18.4	83.8	91.0	9.9	16.2	32.8	67.2
Bachau	Vasatva	273	35.9	88.8	11.2	89.8	96.6	3.5	10.2	20.0	80.0
Bachau	Shivlakha	2200	42.3	69.7	30.3	72.5	88.6	12.9	27.5	19.9	80.1
Bachau	Lakadiya	8651	30.2	82.8	17.2	84.1	90.9	10.1	15.9	40.0	60.0
Bachau	Gharana	3469	32.4	84.3	15.7	91.2	87.9	13.8	8.8	47.5	52.5
Bachau	Lakhpat	807		84.5	15.5	99.2	84.7	18.0	0.8	50.0	50.0
Bachau	Vijpasar	2417	34.0	91.6	8.4	74.1	91.6	9.1	25.9	91.5	8.5
Bachau	Rajansar	680	27.9	91.1	8.9	85.8	94.5	5.8	14.2	70.4	29.6
Bachau	Laliana	2488	32.1	90.6	9.4	94.2	92.4	8.2	0.8	0.0	0.0
Bachau	Jangi	4713	33.4	79.6	20.4	92.1	80.4	24.4	4.4	0.0	0.0
Bachau	Lakhdhirdh (Alepar)	322	45.3	61.0	39.0	67.8	85.9	16.5	3.4	0.0	0.0
Nakjtarana	Palanpar	435	26.9	94.9	5.1	97.4	95.6	4.6	2.6	66.7	33.3
Bachau	Amarapar	1747	52.1	55.4	44.6	99.1	55.7	79.7	0.0	0.0	0.0
Bachau	Gamdau	661	41.0	67.2	32.8	72.0	88.2	13.4	0.0	0.0	0.0
Bachau	Nav Katariya	543	35.9	93.8	6.2	100.0	93.8	6.6	0.0	0.0	0.0
Grand Total		87136	34.7	79.4	20.6	87.8	85.2	14.8	11.5	36.3	61.3

4.6.5.5 Gender

Along the project area, women population is comprised of 46% of the total population, the average sex ratio in the study village is 967, female literacy rate in the study area is 39% as compared fir male literacy rate 61%. Analysis of the workforce participation of the surveyed population indicates that majority of the women are not participating in the workforce and the consultations also revealed that majority of the women are engaged in unpaid domestic work and marginal work. Therefore, women are almost entirely unrepresented in the workforce.

Table 4-17 Gender Disaggregated Profile of Study Area

Attributes	% Male	% Female
% Population	50.8	49.2
% Literacy rate	61.0	39.0
% Total WPR	79.4	20.6
% Main Worker	85.2	14.8
% Marginal Workers	36.3	61.3

4.6.5.6 Agricultural Profile of AOI

In Kutch as in other districts of Gujarat, agriculture happens to be the main source of subsistence for most people. According to the 2011 Census, 37.34 percent of the total working population of the district was engaged in agriculture, as against 49.61 percent in the State as a whole. Though the shift in the land use of agriculture sector to non-agriculture sector has been increased in the Kutch district, yet agriculture is still the main occupation of the large number of the farmers in the district.¹¹ The major crops grown in the villages within AOI are Maize, Wheat, Mustard, Bajra, Jowar, Sesame, Cotton, Castor and Cumin. Along the project footprint and ROW corridor, double cropping pattern is practised by the local community. As reported during limited consultation with the local community, and as observed during site visit, local farmers whose landholding was impacted by other existing transmission line still undertake cultivation underneath post tower erection and agriculture resume back to normalcy once construction completed. Cropping pattern and productivity is discussed in the following section.

Land Type

The total area of the district is 45,652 sq. km of which 17,050.25 sq. km is rural area. The classification of rural land indicates that the total irrigated area is 1,352.23 sq.km and total unirrigated area is 5,901.60 sq. km. Land and land use pattern have been classified into forest areas, area under non-agriculture uses, barren land, cultivable waste land, fallow land and pastures land. As can be seen from the below the land type in comprised mainly of the Net sown area (61/6%) of which unirrigated land is 75.9% ad irrigated land 20.04%. Barren uncultivable land comprises of 18.8% of the total area. This has also been observed during AECOM site visit whereby majority of the land are rainfed and agriculture thrives on monsoon. As reported during consultation, the most of the land are left uncultivated and this has been the trend so far, however the local community reported that in the current year (2020) most of the uncultivated land has been brought under cultivation due to good amount of rainfall received this year. Forest area and land under tree in the study area account for only 1% of the total area.

¹¹ District Census Handbook, Kachchh 2011

Table 4-18: Land Type Classification in Study Area

Block	Village Name	Total in Hectare	Forest Area (in Hectares)	Area under Non-Agricultural Uses (in Hectares)	Barren & Un-cultivable Land Area (in Hectares)	Permanent Pastures and Other Grazing Land Area (in Hectares)	Land Under Miscellaneous Tree Crops etc. Area (in Hectares)	Culturable Waste Land Area (in Hectares)	Current Fallows Area (in Hectares)	Net Area Sown (in Hectares)	Total Unirrigated Land Area (in Hectares)	Area Irrigated by Source (in Hectares)
Anjar	Budharmora	1559.1	0.0	1.8	1.4	0.0	0.0	42.8	1.2	52.9	34.9	18.0
Anjar	Devisar	2202.8	0.0	22.7	26.9	1.5	0.0	35.9	0.0	13.1	13.1	0.0
Anjar	Dhamadka	3101.7	0.0	2.4	49.6	0.0	0.0	1.2	0.0	46.8	40.4	6.4
Anjar	Dudhai	3228.2	0.0	1.4	0.0	13.7	0.0	0.0	15.7	69.3	27.1	42.1
Anjar	Khengarpar	338.6	6.1	1.5	0.0	0.0	0.0	4.1	64.4	23.9	5.0	18.9
Anjar	Khirsara	2825.0	0.0	0.4	0.0	0.0	0.0	45.0	0.0	54.5	35.4	19.1
Bhachau	Lakhdhargadh (Alepar)	532.3	0.0	0.2	0.0	5.7	0.0	0.0	0.0	94.1	94.1	0.0
Bhachau	Rajansar	1008.5	0.0	0.2	17.3	3.7	0.0	1.9	0.0	76.9	73.0	4.0
Bhachau	Adhoi (Pasakayara)	5070.6	0.0	0.9	17.6	13.7	0.0	0.2	0.0	67.6	43.9	23.7
Bhachau	Amardi	1036.3	0.0	0.2	12.1	5.9	0.0	1.3	0.0	80.6	56.5	24.1
Bhachau	Bandhadi	2951.1	0.0	0.4	7.5	4.2	0.0	10.8	0.0	77.0	77.0	0.0
Bhachau	Baniari	3023.8	0.0	0.1	51.4	1.4	0.0	2.5	0.0	44.5	44.5	0.0
Bhachau	Gharana	1411.2	0.0	0.8	1.8	5.9	0.0	1.2	0.0	90.3	82.5	7.8
Bhachau	Halra	775.2	0.0	0.0	0.9	9.3	0.0	0.0	0.0	89.8	39.5	50.3
Bhachau	Jangi	6506.5	0.0	4.6	15.9	25.5	0.0	0.5	0.0	53.6	53.6	0.0
Bhachau	Kabrau	2073.0	0.0	1.3	19.3	3.7	0.0	4.6	0.0	71.2	54.3	16.9
Bhachau	Kumbhardi	1655.8	0.0	0.2	4.4	7.5	0.0	11.5	0.0	76.3	31.0	45.3
Bhachau	Lakadiya	2196.4	0.0	3.8	17.0	16.1	0.0	8.4	0.0	54.7	52.0	2.7
Bhachau	Lakhpat	1367.7	0.0	0.1	0.2	2.9	0.0	0.0	0.0	96.7	48.3	48.5
Bhachau	Laliana	2620.3	0.0	0.0	4.5	6.1	0.0	1.0	0.0	88.4	88.4	0.0
Bhachau	Meghpar (Kunjisar)	966.0	0.0	1.3	7.5	10.8	0.0	1.7	0.0	78.8	78.8	0.0

Environmental and Social Impact Assessment (ESIA) Report For WRSS XXI(A) Transco Limited

Block	Village Name	Total in Hectare	Forest Area (in Hectares)	Area under Non-Agricultural Uses (in Hectares)	Barren & Un-cultivable Land Area (in Hectares)	Permanent Pastures and Other Grazing Land Area (in Hectares)	Land Under Miscellaneous Tree Crops etc. Area (in Hectares)	Culturable Waste Land Area (in Hectares)	Current Fallows Area (in Hectares)	Net Area Sown (in Hectares)	Total Unirrigated Land Area (in Hectares)	Area Irrigated by Source (in Hectares)
Bhachau	Morgar	2683.1	0.0	0.7	2.8	6.3	0.0	6.0	0.0	84.1	67.3	16.8
Bhachau	Rampar	2090.4	0.0	1.0	10.3	1.0	0.0	15.6	0.0	72.1	68.0	4.1
Bhachau	Samakhiari	2095.2	0.0	10.5	5.5	1.1	0.0	2.2	0.0	80.8	80.8	0.0
Bhachau	Shivlakha	5474.4	0.0	0.4	27.6	4.8	0.0	2.0	0.0	65.2	64.0	1.3
Bhachau	Sikara	3273.0	0.0	1.1	4.1	8.2	0.0	3.4	0.0	83.2	51.1	32.1
Bhachau	Vasatva	1108.2	0.0	0.6	69.5	0.4	0.0	0.0	0.0	29.5	20.0	9.5
Bhachau	Vijpasar	2069.4	0.0	0.7	10.9	1.8	0.0	0.1	0.0	86.6	85.1	1.4
Bhachau	Vondhada	1420.5	0.0	0.5	1.8	5.2	0.0	1.2	0.0	91.3	89.9	1.4
Bhuj	Lothia	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bhuj	Sumarasar - Shekhvali	2255.3	0.0	7.0	9.0	11.6	0.0	0.0	0.0	72.4	10.5	61.9
Bhuj	Dharampur	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bhuj	Dhori	1960.1	0.0	1.0	0.0	22.5	16.1	0.0	0.0	60.4	23.2	37.2
Bhuj	Dhrang	2072.5	0.0	1.3	50.8	0.0	0.0	0.0	0.0	48.0	48.0	0.0
Bhuj	Fulay	791.1	0.0	1.4	0.0	4.1	5.3	0.0	0.0	89.3	89.3	0.0
Bhuj	Jawaharnagar	3684.9	15.7	0.2	17.8	7.1	0.0	0.0	0.4	58.8	57.0	1.8
Bhuj	Kotay	2125.8	16.1	0.5	24.6	1.4	0.0	0.0	5.2	52.2	48.9	3.3
Bhuj	Kunaria Nana-Mota	3370.9	0.0	0.3	26.3	7.2	0.0	0.0	0.0	66.3	54.8	11.5
Bhuj	Lodai	5254.8	0.0	2.2	26.6	17.9	0.0	0.0	0.8	52.5	48.7	3.8
Bhuj	Loria	6364.8	0.9	0.2	0.0	8.8	0.2	0.0	0.0	89.9	19.0	70.9
Bhuj	Meghpar	1848.0	0.0	2.1	76.4	0.8	0.0	8.5	0.0	12.3	8.4	3.8
Bhuj	Sumarasar (Jatvali)	841.7	0.0	0.4	64.9	3.8	1.2	0.0	0.0	29.6	23.4	6.2
Bhuj	Vantra	2215.0	0.0	3.2	44.7	2.5	0.0	0.0	0.2	49.4	49.4	0.0

Environmental and Social Impact Assessment (ESIA) Report For WRSS XXI(A) Transco Limited

Block	Village Name	Total in Hectare	Forest Area (in Hectares)	Area under Non-Agricultural Uses (in Hectares)	Barren & Un-cultivable Land Area (in Hectares)	Permanent Pastures and Other Grazing Land Area (in Hectares)	Land Under Miscellaneous Tree Crops etc. Area (in Hectares)	Culturable Waste Land Area (in Hectares)	Current Fallows Area (in Hectares)	Net Area Sown (in Hectares)	Total Unirrigated Land Area (in Hectares)	Area Irrigated by Source (in Hectares)
Nakhatrana	Badi (Palanpur)	1908.6	0.0	0.3	73.6	3.0	0.0	0.0	4.4	18.7	15.5	3.2
Bhachau	Gamdau	838.1	0.0	0.4	0.0	59.6	0.0	0.7	0.0	39.4	13.1	26.2
Bhachau	Katariya Nava	674.2	0.0	0.3	0.0	0.3	0.0	19.9	0.0	79.5	79.5	0.0
TOTAL		102869.8	1.0	2.0	18.8	8.2	0.4	4.7	1.0	64.0	75.9	24.1

Land Holding Pattern

As per census data 2011, majority of the farmers in Kutch having land holding more than 2 hectares. Net area the district under cultivation of different crops is 7.0 lac hectare, which is 75.33% of total geographical area of the district. As reported during consultation with the local community in the study area, the average land holding size of farmer vary from 5-8 hectares (15-20 acres) for small farmers and 20 hectares in the case of large farmers. The ownership of land is mainly with male members. The practice of sharecropping is common in the area. Under sharecropping, the people who do not have land or possess marginal land, generally taken the land on lease to carry out agriculture. These are considered vulnerable groups. The landowner provides all the inputs and the produce are distributed among the landowner and the cultivator. As observed during site visit, two type of sharecropping is prevalent in the study area

- People who do not have land or possess marginal land, generally lease out land to carry out agriculture. The landowner provides all the inputs supply and the produce are share 80:20
- Another form of sharecropping is that when one party provides the land and labour and the third party provides the water. Under this kind of arrangement, each party get 1/3 of the produce

Both these practices are very common in the study area; however, no sharecroppers were reported along the tower footing. For ROW corridor, the exact presence of the sharecroppers could not be ascertained since the process of acquiring easement rights/right of use along the ROW corridor is still ongoing.

Land Price

As per consultation with the local people, land price in the study area varies according to their location. Land value located near to highway ranges between INR 6 lakhs -8 lakhs/acre. and INR 200000-600000/bigha for land located inside the village. As reported the government circle rate was reported to be INR 2 lakh per acre much lower than the market value however, the government land schedule rate (2011) is yet to be updated.

Irrigation

For a district like Kutch, rainfall irrigation is a fundamental necessity for its agricultural development. The area under canal irrigation, through Narmada project, is increasing at a much faster pace over past years; however, there remains the problem of irregular and insufficient water supply¹². As per the 2011 census data, the total net sown area in the study area is 72765.04 hectare of which 23.1% is irrigated and 76.9% is unirrigated land. As per consultation with the local community reveal that farmers usually have an informal contract with other parties for providing irrigation facilities. The irrigation service provider would supply irrigation water from the Narmada canal to villages as far as 10-15 km with the help of diesel pump set and a pipe water. The agreement/term of payment is ¼ of the crop produce is shared with the irrigation provider for providing irrigation system. Though few farmers had tried to explore used of borewell however the depth of the ground water accompanied with its high salinity make it unfit for irrigation facilities.

Cropping Pattern

In Kutch mostly three types of farming systems are observed i.e. rain fed farming, irrigate farming through open well/canal and irrigate farming through tube well. Along the study area, farmers practice double cropping pattern. The primary crops grown are Bajra, Groundnut, Cotton, Castor, Wheat Pearl Millet, and sesame amongst Kharif crops (monsoon crops from June/July to September/October). In Rabi the major crops grown include Groundnut, Cumin, Wheat, Mustard and Coriander. (winter crops from November to April/May).

As observed during site visit, Cotton, Castor, Mustard are the seen growing on the agricultural farms. The average yield of the crops is provided below.

Table 4-19: Crop Productivity in Study Area

Crop	Agricultural Season	Productivity (kg/ha)
Mustard	Sept/Oct - Jan/Feb	3676
Cotton	Jun/July-Sept/Oct	3492
Castor	Jun/July-Sept/Oct	2368.3
Bajra	Jun/July-Sept/Oct	2217
Jowar	Jun/July-Sept/Oct	150
Groundnut	Jun/July-Sept/Oct	3974
Pearl Millet	Jun/July-Sept/Oct	541

¹² District Census Handbook, Kutch, 2011

Crop	Agricultural Season	Productivity (kg/ha)
MungBean	Feb/March-Jun/July	570
Cumin	Sept/Oct-Jan/Feb	812
Wheat	Jun/July-Sept/Oct	2368.3
Sesame Seed	Sept/Oct-Jan/Feb	761.3

** As per District Agriculture Office, Gandhigram

4.6.5.7 Horticulture Crops in the AOI

The major horticultural crops are Date Palm, Mango, Ber, Papaya, Pomegranate and Guava. The vegetable crops grown in the area are Brinjal, Potato, Tomato, Coriander, Onion, Chillies, Ladies Finger, Cabbage, Cauliflower, Bottle Gourd and Bitter Gourd.

4.6.5.8 Social Infrastructure

Drinking Water:

The major source of drinking water is government supplied tap water. As per the census data 2011, 90% of the villages in the study area are connected through Tap water. Other source of drinking water is tube well/borehole, covered Well functioning mainly in summer months. For tube well the water table is found at the depth of 700-800m. As reported during consultation that villages are facing drinking water crisis due to irregular supply of tap water and soil salinity problem as a result the villager are facing difficulty in getting access to clean drinking water.

Banking Facilities

The major source of banking facilities is Agricultural Credit Societies, Self-help groups, commercial banks and cooperative bank. Self Help groups is access for 90% of the villages in the study area, followed by Agricultural Credit societies and commercial bank. For availing the banking facilities (except SHGs) the villagers have to travel for more than 10 kms.

Electricity

About 100% villages in the study area have access to electricity for domestic purposes. The electricity is reported to be available throughout the day. For agriculture purposes, electricity is available for 8 hr a day both during summer and winter season

4.6.5.9 Common Property Resources

The major common property resources in the study area are the grasslands used as fodder for livestock. Along the AOI, in Dhamadka village that falls under Anjar Tehsil, there are these non-reserved *vidis* (local term for grasslands) being managed and protected, e.g., Gaushalas (trusts that maintain aged cattle) Maldharis cooperative societies, village panchayats and milk cooperative. Besides grasslands, canal is another the common physical resources access by the communities along the AOI.

4.6.5.10 Sensitive Receptor along the Alignment within AOI





Potential Area of sensitivities along the alignments includes nearby settlements and houses located near the ROW corridor, agriculture fields.

- Review of GIS satellite imagery, the TL corridors near to the angle point 38/3 will pass through few houses located at a distance of 70 metres from the 765-kV dc line. This is identified as the area of sensitivity regarding health and safety of those residing near to the corridor. (Corridor of transmission line is 33.5 m from the centre line. As such it is out of corridor area)
- TL will pass through near to human settlements in Liliyana (Angle point LO 5.3), Lakadiya (Angle point LO 18/0 to LO 21/0), Aadhoi (Angle point 11 A/1 to 12/3). (Corridor of transmission line is 23 m from the centre line. As such all the locations mentioned are out of corridor)
- Other sensitivity areas include small temples and schools located near to the ROW corridor.
- The tower footing and the ROW corridor will cause long term restriction of land use and diminution of land value. As mentioned earlier, villagers along the ROW undertake double cropped cultivation, hence the damage to agricultural crops is anticipated during construction and stringing activities

Mitigation measure such as crop compensation for damages to crops due to construction and stringing activities will be compensated. Other existing mitigation measures adopted while executing construction near houses & settlement, has been discussed in section **5.4.13** of the report.

4.7 Cultural and Heritage Site`

Kutch is famous for its rich living heritage of handicrafts – embroideries, bandhani tie-dye, block printings, metal crafts, woodwork, pottery and some rare arts thrive in the district. Some of these historical places, the archaeological site at Dholavira offers an insight into the 5000-year old Indus Valley Civilisation, the palaces of Bhuj house incredible art treasures, and scores of fortified villages are worth visiting for their heritage in Bhachau Tehsils, Tomb of Jesal Toral in Anjar, Koteswar Mahadev in Lakhpatri, Puanrodadh Monuments in Nakhatarana, Aina Mahal, and Ramkund Step well in Bhuj. Along the project sites, no records of presence of cultural heritage sites in the project area, except the local temple and mosque. Consultation with the local community in Loriya reveal that major cultural heritage is located mainly in town areas and far from the villages. Discussion with site representatives also reveal that the TL corridor does not pass through any cultural, religious, historical sites.

 	
<p>Photo 1. Common Property Resources in Dhamadka</p>	
	
<p>Photo 2. Water Tanker for - labour camp</p>	<p>Photo 3. Labour Camp for L&T workers</p>
 	
<p>Photo 4. Laydown Area</p>	<p>Photo 5. Canvass Camp at construction site</p>

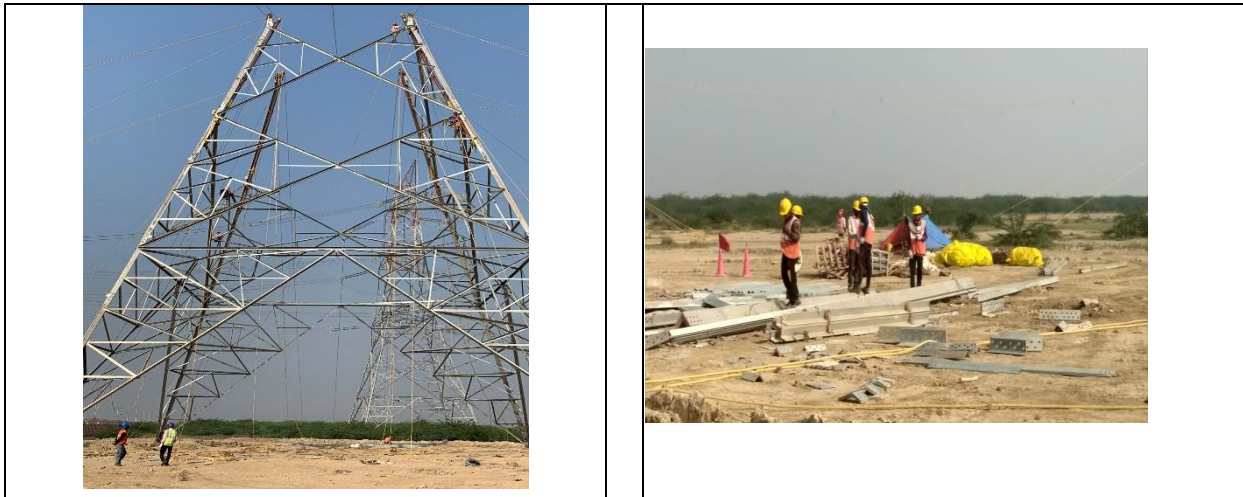


Photo 6. Ongoing Tower Erection Work





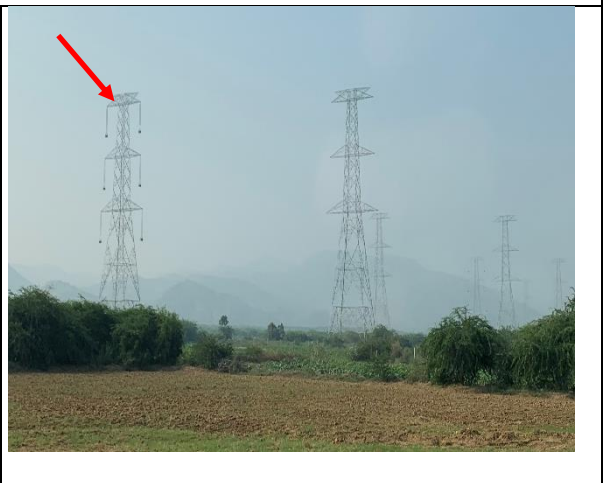


Photo 7. Ongoing Tower Foundation Work (Existing PowerGrid Transmission Line)

Photo 8. Ongoing Tower Foundation Work



Photo 9. Interaction EPC site safety Officer and Project Manager

			
<p>Photo 10. EPC Contractor onsite EHS display board and Fire Extinguisher</p>		<p>Photo 11. Mustard Farm</p>	
			
<p>Photo 12. Castor Farm</p>			
<p>Photo 13. Existing Power Line</p>		<p>WRSS Towers</p>	

5. Anticipated Impacts and Mitigation Measures

This section identifies, predicts, evaluates and provides mitigation measures for the probable impacts on different environmental and social parameters due to construction and operation of the proposed 765 KV WRSS transmission line in Kutch District of Gujarat. Survey and assessment of the existing baseline environmental and socio-economic scenario has been done through primary & secondary data collection, reviewing the process and as per the statutory requirements. The environmental impacts that the proposed project is likely to usher during construction and operation phases are identified and assessed in this section along with recommended mitigation measures. Superimposing impacts on the existing baseline scenario will enable formulation of a suitable and site-specific Environmental Management Plan in the subsequent section of the report.

Identification of anticipated significant environmental impacts due to the activities during the pre-construction/detailed design, construction and post-construction as well as operation stages of the proposed power plant project was carried out using the checklist method during the course of ESIA exercise and later during EIA study. Such anticipated impacts without any mitigation measure had been characterized as being of varied intensities – minor, medium and major and were mostly of adverse nature. Beneficial impacts, although few, were characterized as significant. During ESIA study, identification of significant environmental impacts due to the activities during various stages of the proposed transmission line were identified through a detailed matrix developed and presented in subsequent sections.

Identification of anticipated significant environmental impacts of the proposed project has been followed by formulation of measures toward mitigating them. Enhancement measures for beneficial impacts and compensation to project affected persons have also been proposed. The mitigation measures, in addition to the EIA regulatory requirements have also taken into consideration the compliance requirements of environmental and social risk management standards/guidelines of Institutional Funding Agencies like IFC E&S Performance Standards and EHS Guidelines.

The alignment of the transmission line has been done in line with the statutory requirements under the Electricity Act and Central Electricity Authority, Ministry of Power and Ministry of Environment, Forest and Climate Change (MoEF), GoI guidelines. The alignment does not pass through any ecologically sensitive area such as biosphere reserve, national park and wildlife sanctuary. The Kutch Desert Wildlife Sanctuary is approximately 1 km from the alignment. Further, there is no archaeological/ cultural/ historically important monument or place within the 10 km radius. The project site involves 3.8423 ha of forest land.

As described earlier the emissions and discharges are only expected during the construction period. However, construction and demolition and hazardous waste would be generated during the election, and string activities. In case of operations emissions and discharges are negligible. Hazardous waste, E-waste and Battery waste would be generated through the entire lifecycle of the project.

5.1 Impact Assessment Methodology

Impact identification and assessment starts with scoping and continues through the remainder of the process.

- **Impact prediction:** to determine what could potentially happen to resources/receptors because of the Project and its associated activities.
- **Impact evaluation:** to evaluate the significance of the predicted impacts by considering their magnitude and likelihood of occurrence, and the sensitivity, value and/or importance of the affected resource/receptor.
- **Mitigation and enhancement:** to identify appropriate and justified measures to mitigate negative impacts and enhance positive impacts.
- **Residual impact evaluation:** Evaluation of the significance and scale of the environmental impacts predicted to remain after the application of mitigation measures outlined in this ESIA study

5.2 Impact Criteria and Ranking

Once all project environmental aspects were comprehensively identified for the different activities of the project, the level of impact that may result from each of the activity-component interactions has been assessed based on subjective criteria.

For this, three key elements have been taken into consideration based on standard environmental assessment methodologies:

- **Severity of Impact:** Degree of damage that may be caused to the environmental components concerned;
- **Extent of Impact:** Geographical spread of impact around project location and corridors of activities; and
- **Duration of Impact:** Time for which impact lasts taking project lifecycle into account.

These elements have been ranked in three levels viz. 1 (low), 2 (moderate) and 3 (high) based on the following criteria provided in Table 5.1.

Table 5.1. Impact Prediction Criteria

Impact Elements	Criteria	Ranking
Intensity	<ul style="list-style-type: none"> Impact resulting in long term and/ or medium damage to the natural environment. Major impact on community and occupational health (e.g. serious injury, loss of life) on account of accidental events and related operational activities. 	3
	<ul style="list-style-type: none"> Impact resulting in short term change and / or damage to the natural environment. Temporary loss of land, source of livelihood for affected communities Impact on terrestrial habitat, endangered species, drainage pattern and community resources. Moderate impact on occupation and community health & wellbeing (e.g. noise, light, odour, dust, injuries to individuals) 	2
	<ul style="list-style-type: none"> Impact causing temporary change in air shed, surface water quality, loss of some species etc. Limited impact on human health and well-being (e.g. occasional dust, odour, light, and traffic noise). 	1
Extent	<ul style="list-style-type: none"> Where the extent of impact is beyond the AoI to cover impacts that affect nationally important environmental resources or affect an area that is nationally important/protected or have macro-economic consequences 	3
	<ul style="list-style-type: none"> Impacts extend beyond the area of influence to affect regionally important environmental resources or are experienced at a regional scale as determined by administrative boundaries. 	2
	<ul style="list-style-type: none"> when impact due to the proposed Project related activities is restricted within Area of Influence which has been determined as 5 km. 	1
Duration	<ul style="list-style-type: none"> when impacts would occur during the development of the Project and cause a permanent change in the affected receptor or resource that endures substantially beyond the Project lifetime 	3
	<ul style="list-style-type: none"> when impacts would continue for an extended period of time; this is based on the understanding that there will be recovery of the effected environmental component to its best achievable pre-project state within 1 to 5 years 	2
	<ul style="list-style-type: none"> when impact is likely to be restricted for a duration of less than 6 months; This is based on the understanding that there will be recovery of the effected environmental component to its best achievable pre-project state within 1 year; 	1

A positive or beneficial impact that may result from this project has not been ranked and has been depicted in the form of ++.

5.3 Impact Significance

The significance of impact has been determined based on a multiplicative factor of three element rankings. Table 5.2 depicts impact significance in a scale of LOW-MEDIUM-HIGH and would be used for delineation of preventive actions, if any, and management plans for mitigation of impacts.

Impact significance has been determined considering measures which have been factored in the design and planning phase of the project. Legal issues have been taken into account, wherever appropriate in the criterion

sets, to aid in WRSS effort to comply with all relevant legislation and project HSE requirements. Additionally, the results of quantitative impact prediction exercise, wherever undertaken, have also been fed into the process.

Table 5.2. Criteria Based Significance of Impacts

Severity of Impact (A)	Extent of Impact (B)	Duration of Impact (C)	Impact Significance (A X B X C)	
1	1	1	1	Negligible
1	1	2	2	Low
1	2	1	2	
2	1	1	2	
1	1	3	3	
1	3	1	3	
3	1	1	3	
1	2	2	4	
2	1	2	4	
2	2	1	4	
1	2	3	6	Medium
1	3	2	6	
2	3	1	6	
3	1	2	6	
3	2	1	6	
2	1	3	6	
2	2	2	8	
3	1	3	9	High
3	3	1	9	
1	3	3	9	
2	2	3	12	
2	3	2	12	
3	2	2	12	
2	3	3	18	
3	2	3	18	
3	3	2	18	
3	3	3	27	
Beneficial Impact -			++	Positive

The impacts on each of the environmental components and its significance during the different stages of the project is presented in Table 5.3 and discussed in detail in the following section. This is followed by a point wise outline of mitigation measures recommended.

5.2.1. Residual Impacts

Residual impacts refer to those environmental and social impacts predicted to remain after the application of mitigation outlined in the ESIA. The predicted residual effects are considered for each Project phase (Construction, Operation, Decommissioning/post-decommissioning, and Unplanned Events).

Table 5.3. Anticipated Impact of Important Environmental Components – Natural and Socio-economic Environment

Environmental Aspect Activity	Physical Environment		Physico-Chemical Environment							Ecological Environment		Human Environment								
	Land Use	Topography & Drainage	Soil/ Sediment Quality	Air Quality	Noise & Vibration	Surface water resource	Surface water quality	Ground water resource	Ground water quality	Terrestrial Flora & Fauna	Aquatic Flora & Fauna	Aesthetic & Visual Impact	Job & economic opportunity	Social & Cultural Structures	Economy & Livelihoods	Infrastructure & Services	Resettlement	Cultural Resources	Community Health & Safety	Occupational health & safety
Pre- Construction Phase																				
Obtaining of right of use Land by Company for transmission lines																				
Procurement of Land by Company for substation																				
Removal of Crops/ Trees																				
Procurement of Soil for filling of the sub-station land																				
Levelling and Compaction of the soil																				
Storage and Handling of Fuels (Unplanned Release)																				
Construction Phase																				
Building and operation of Construction camp and facilities																				
Strengthening and Widening of Access Road																				
Transport of Raw Material, Manpower																				
Development of Foundation for tower footing and substation																				
Erection of tower																				

Environmental Aspect Activity	Physical Environment		Physico-Chemical Environment							Ecological Environment		Human Environment								
	Land Use	Topography & Drainage	Soil/ Sediment Quality	Air Quality	Noise & Vibration	Surface water resource	Surface water quality	Ground water resource	Ground water quality	Terrestrial Flora & Fauna	Aquatic Flora & Fauna	Aesthetic & Visual Impact	Job & economic opportunity	Social & Cultural Structures	Economy & Livelihoods	Infrastructure & Services	Resettlement	Cultural Resources	Community Health & Safety	Occupational health & safety
Transport and installation of Equipment for Substation																				
Stringing of conductor																				
Generation of Sewage and Discharge																				
Storage and Handling of Chemicals/Fuels (unplanned release)																				
Waste Handling and Storage																				
Testing and Commissioning																				
Operation Phase																				
Operation of Transmission Line																				
Operation of substation																				
Maintenance of Transmission Line																				
Maintenance of substation																				
Management of Non-Hazardous Waste (O&M)																				
Management of Hazardous Waste (O&M)																				

5.4 Impact Assessment (Detailed Design Construction and Operation)

5.4.1 Potential Impact on Land Use

Potential impact on land use during preconstruction and construction phase may arise due to below mentioned activity

Construction Phase

- Procurement of land for substation construction
- Obtaining Right of Use of land for transmission line
- Land lease for setting up construction camp

Impact Due to Procurement of Land /Obtaining Right of Way

Total land requirement of the project is 17.3478 hectare would be obtained for the transmission line (tower footing) and 168 acres would be procured for substation. For ROW corridor 17.41 hectare would be required however, this land would not be procured but an easement rights would be obtained from the landowners. As per the site surveys and consultation with the community, majority of the land parcels are double crop agricultural land.

The establishment of the substation will result in long-term change in land use of the proposed project site from agricultural to industrial. However, in case of transmission line such impacts are not envisaged because the person can continue to cultivate the land. However, there would be some restriction imposed on the conversion of land to other land use e.g. residential, commercial and industrial over the entire lifecycle of the project

Thus, there is a direct change of land use for the substation, but no such impacts are anticipated for the transmission line. Given that the area for the substation is only 5.21% of the overall area involved in the project the impact on land use is considered negligible. The direct impact of the loss agricultural land in case on substation and resultant livelihood impacts on landowners, lease holder has been dealt separately in the socio-economic section

Intensity of Impact	1	Extent of Impact	1	Duration of Impact	3
Impact Significance = 3 i.e. Low					

Mitigation Measures

The following measures will be implemented to mitigate potential impact on land use.

- Land would be obtained limited to the tower footing and RoW required for the project as per the norms stipulated in the IS Codes for different capacities of transmission lines. In case of substation land required would also take into consideration requirement for future expansions as per the guidelines.
- WRSS would ensure full compensation is paid to landowners prior to taking possession of land for substation and transmission line;

Residual impact

With implementation of the precautionary and the mitigation measures mentioned impacts on land use would be further reduced.

Impact Due to Land Lease for Setting Up Construction Camp

A contractor camp has been setup on land leased for the purpose. The Contractor has taken total 15.6 acres land at Lodai from one landowner on lease basis. As per the consultation this land was permanent fallow which would be returned to the owner in its original condition. Thus, there would be no permanent change in land use., however, the said area is very small. Change in land use is assessed to be negligible.

Intensity of Impact	1	Extent of Impact	1	Duration of Impact	1
Impact Significance = 1 i.e. Negligible					

Mitigation Measures

The following measures will be implemented to mitigate potential impact on land use.

- Minimum required amount of land for construction camp and strengthening and widening of access road would be taken
- Payment of compensation prior to taking possession of land and RoW clearance;
- Lease land would be restored in the previous condition after completion of lease period.

Operation Phase

During the operation phase the following impacts are envisaged

- Long term change in land use due to the operational substation

The operation of the substation or transmission line is unlikely to have any impact on the land use.

5.4.2 Potential Impact on Topography and Drainage

The proposed substation is located adjacent to a small stream that flows on the north eastern boundary of the substation. The shallow water body act as minor irrigation and a check dam is constructed across it. Time series analysis through satellite imagery, indicated that the flow of the shallow water body/nalla has gradually changed the land vegetation pattern. Similarly, as per the drainage study undertaken by the technical team from WRSS, the check dam is RL 88m for accumulating rainwater during monsoon and same has been used for farming and or percolating same in soil for increasing ground water table. There is no evidence of water stagnation, submergence.

The impact on land topography and drainage pattern would arise due to below mentioned activity

Construction Phase

- Filling of land for construction of the Substation
- Setting up construction camp

Impact Due to Filling of Land for Construction of proposed Substation

In Substation, for building switchyard land need to be levelled considering surrounding area wherein grading of land to be done in such a way that cutting and filling of earth is balance mean to say that no need to take borrow land and removal of extra soil to out side premises. During this process, it may block micro drainage channel which can have impact on the drainage

Impoundment if any can lead to water logging at a local level but would not impact the settlement of sivilakha adjacent to the substation. Also, the rainfall in this area is not very high thus the impacts are low and would be restricted within the vicinity of the project area. Thus, the impacts are assessed to be low.

In case of transmission line, no filling or cutting is envisaged so the impact has been scoped out.

Intensity of Impact	1	Extent of Impact	1	Duration of Impact	3
Impact Significance = 3 i.e. Low					

Mitigation Measures

The following measures will be implemented to mitigate potential impact on topography and drainage.

- No micro-drainage channel shall be blocked. Measures to be taken to retain the courses of the streams at the northern sides of the site

- Stormwater Drain outside plant boundary would be constructed to channelize the rainwater towards River Khari in the vicinity of the substation (approximately 500 m)
- Raise the ground level to prevent water logging/inundation, particularly in the north-eastern portion of Site
- Regular cleaning of drains would be done to restrict the blockage in the drain, ensuring free flow of water.
- As per drainage layout, storm water drainage is already planned for proper drainage of water.

Residual impact

With implementation of the precautionary and the mitigation measures mentioned for the land filling and to avoid or minimise impacts of land filling would be negligible.

5.4.3 Potential Impact on Soil Quality

Construction Phase

The potential sources of impacts to soil and sediment quality due to the preconstruction and construction phase activities include:

- Land Filling activity in proposed Substation
- Storage and handling of Fuel
- Storage and handling of Fuel and Chemical
- Waste handling and Storage

Impact Due to Land Filling in Proposed Substation

In Substation, for building switchyard land need to be levelled considering surrounding area wherein grading of land to be done in such a way that cutting and filling of earth is balance mean to say that no need to take borrow land and removal of extra soil to out side premises. Thus, impact due to the proposed activity has been assessed to be negligible.

Intensity of Impact	1	Extent of Impact	1	Duration of Impact	1
Impact Significance = 1 i.e. Negligible					

Mitigation Measures

The following measures have been implemented to mitigate potential impact due filling of land at the substation.

- The land filling would be restricted within the boundary of the proposed substation. Efforts would be made to ensure that there no spillage of fill material to adjoining properties.
- Regular surveillance of any spillage onto adjoining properties shall be carried out. Immediate removal of spilled fill material shall be done.
- The embankment of the substation shall be stabilised so that no erosion takes place
- The soil shall be procured from quarried which have been certified by the Department of Environment, Govt of Gujarat

Impact Due to Storage and Handling of Fuel and Chemical During Preconstruction and Construction Activity

Fuel (oil) used by the construction equipment would be stored within the substation site and the construction camp during preconstruction period as well as construction activities to refuel the earth moving vehicle. Accidental release of fuel oil can contaminate the soil of that area and also can contaminate the groundwater. Soil contamination during the construction phase may result from leakage and spillage of oil, lubricants, fuel from heavy equipment or leakage from chemical/fuel storage Fuel, chemical or any other hazardous materials e.g. paints, solvents transformer oil are usually, as practice stored in the open. Leakage or spillage during handling can cause soil

contamination. Maintenance of vehicle, equipment and machinery would can cause accidental spillage Following measures would reduce the chances accidental spillage of oil into open area (soil) and associated impact is negligible.

Intensity of Impact	1	Extent of Impact	1	Duration of Impact	1
Impact Significance = 1 i.e. Negligible					

Mitigation Measures

The following measures will be implemented to mitigate potential impact due to accidental spillage of fuel

- Drip tray would be used during refuelling
- Maintenance of earth moving vehicle would be carried out in designated place with concrete floor
- Oil, chemical Storage area would be covered and concrete floor and bund.
- Oil and chemical container would be stored with secondary containment like dyke or embankment.
- Presence if adequate spill control kits & their appropriate use to contain and clean small spills and leaks
- The Contractor will prepare guidelines and procedures for immediate clean-up actions following any spillages of oils, fuels or chemicals;
- A site-specific Emergency Response Plan will be prepared by the Contractor for soil clean-up and decontamination; and
- The construction contractor will implement a training program to familiarise staff with emergency procedures and practices related to contamination events.

Impact due to Construction of tower

The construction of the lattice structure tower for transmission lines would require development of foundation up to a depth of 3.5 m. At four legs of the tower, topsoil will be stripped, and foundations will be dug up to a depth of 3.5 m depending upon different technical consideration. General practice shows that upon construction of the transmission tower, land below the tower is used for cultivations. Therefore, if the topsoil is not removed and reinstated properly impacts are envisaged on the soil quality due to construction of the transmission tower. Further movement of vehicle carrying men and material to the tower location over agricultural land can cause compaction.

The intensity of such impact is medium because the soil would regenerate over a period of time and is limited to a tower footing area. Thus, the impact is considered as low. However, with these mitigations measure the intensity of the impact can further be reduced.

Intensity of Impact	2	Extent of Impact	1	Duration of Impact	1
Impact Significance = 2 i.e. Low					

Mitigation Measures:

- Fuel storage and refuelling areas, the area should be made impervious.
- Excess excavated material should not be dumped by the contractor on any adjoining vacant land or agricultural land. The excess excavated material to be stored at a specified location so that it can be reused wherever possible or used for strengthening of shoulders or other lower order roads.
- Construction debris especially from concreting should be utilized in the backfilling wherever possible. All construction debris which cannot be reused should be disposed at pre-designated sites. The Contractor should identify site for temporary storage of the construction debris during the pre-construction in consultation with the local panchayat. The PIU should be informed about the location.
- Vehicular movement over agricultural land should be restricted.

Impact Due to Waste Handling and Storage

Soil may become contaminated due to improper handling and storage of waste. During the construction of the transmission line MSW would be bulk of the waste generated. It is non-hazardous in nature. Construction waste e.g. will comprise of surplus or off-specification materials such as concrete, steel cuttings/filings, wooden planks, packaging paper or plastic, wood, plastic pipes, metals, etc would also be generated. Large quantities of which would be recyclable or inert. However, some hazardous waste would be generated from both transmission line e.g. Waste rags and cotton, in case of substation empty transformer oil drums, waste lube from machinery etc are hazardous waste. In addition, there are some possibly of generation of e-waste from substation e.g., off-spec equipment or damaged equipment. These hazardous waste and e-waste and unless handled stored and disposed of properly can lead to contamination of soil.

Even though the intensity of such impact is high it is only limited to the construction camp and substation construction site. As the contractor is responsible for cleaning the site before decommissioning the duration is considered as low and resultant impact is low. However, with these mitigations measure the intensity of the impact can further be reduced.

Intensity of Impact	3	Extent of Impact	1	Duration of Impact	1
Impact Significance = 3 i.e. Low					

Mitigation Measures:

The measures in place to properly manage waste and thereby minimize any impacts to soil and sediment quality are:

- Design of processes to prevent/minimise quantities of wastes generated, and hazards associated with the waste generated;
- Batteries containing liquid shall be kept on impervious surfaces;
- Training labourers for waste segregation and disposal in designated areas and use of sanitation facilities;
- Segregation of hazardous and non-hazardous waste and provision of appropriate containers for the type of waste type (e.g., enclosed bins for putrescible materials to avoid attracting pests and vermin and to minimise odour nuisance);
- Proper storage of the construction materials and wastes to minimise the potential damage or contamination of the materials.
- Implementation of construction materials inventory management system to minimise over-supply of the construction materials, which may lead to disposal of the surplus materials at the end of the construction period.
- Storage of wastes in closed containers away from direct sunlight, wind and rain;
- Storage of waste systematically to allow inspection between containers to monitor leaks or spills;
- Contractor to carry out site clearance and restoration of site to original condition after the completion of construction work; PIU to ensure that site is properly restored prior to issuing of construction completion certificate.

Residual impact

With implementation of the precautionary and the mitigation measures mentioned for the storage and handling of chemicals and to avoid /minimise impacts to soil/sediment the residual impact would be negligible.

Operational Phase

Potential impact on soil quality could arise due to:

- Accidental spillage of transformer oil from site and catch pit in substation;
- Surface runoff from spillage area into nearby agricultural land from substation.
- Maintenance of Equipment

The transformer oil would be stored at a designated area which will be paved. Thus, the contamination of soil can happen only due to accidental spillage of transformer oil. The surface runoff from spillage site to nearby land may lead to contamination of soil.

During the operational phase, hazardous wastes generated from the substation would include small quantities of used oil, contaminated absorbent material, busted bulbs or tube lights, used parts, scrap and debris. The transformer oil is expected to be changed every 15 years and the waste oil is planned to be reused through authorized recyclers. E-waste (electrical parts, panels, etc. which will need replacement) and used batteries would also be collected and disposed of or recycled through authorized agencies. In addition, as all hazardous waste will be stored in covered areas which have a lined floor and with appropriate physical barriers for containment of spills, it is very unlikely to contaminate soil or underlying groundwater at site. Implementation of these embedded mechanism, the impact on drainage and soils is expected to be Low.

Even though the intensity of the impacts arising out of the spillage are given the quantity of oil stored and the probability of the event occurring the significance is considered as Low.

The implementation of the good housekeeping practices would minimise adverse impacts.

Intensity of Impact	3	Extent of Impact	1	Duration of Impact	1
Impact Significance = 3 i.e. Low					

Mitigation Measures:

The following mitigation measures are will be implemented:

- Ensure proper spill control and management at site;
- Monitor and detect any contamination on soil & ground water;
- A designated waste storage area would be developed. This should have an impervious flooring, bunded covered
- Good housekeeping to prevent spillage and runoff from site.
- Obtain authorization for generation, storage and disposal for Hazardous Waste from the State Pollution Board and comply with the conditions mentioned in the authorization.
- Maintain record of the E-waste generated from the different facilities and provide annual report to the Rajasthan State Pollution Board
 - All transformers procured under the project should conform to the provisions of the Regulation of Polychlorinated Biphenyls Order 2016. CORE should ensure that the technical specification in the relevant bid documents of substation include these provisions.

Residual Impact:

Considering the implementation of above-mentioned mitigation measures, impact on soil quality is assessed to be negligible

5.4.7 Potential Impact on Air Quality

Impact on air quality may be arise due to below mention activity

Construction Phase

- Transport of construction material including earth to proposed substation site
- Fugitive emission from earthwork in proposed substation and tower construction

Impact Due to Dust

During construction, the project is likely to generate dust (as particulates). There will be times during the construction phase especially during the construction of foundation of towers and filling of soil at the substation to raise the height when elevated dust concentrations may occur. Higher amounts of dust will be generated at material handling and storage areas. A large percentage of such dust emissions from construction sites have been found to comprise of particles which are coarse in size (>10 microns) and tends to settle down within 200 meters of the source of emissions. The smaller fractions (PM10) can however be carried over longer distances in a dust cloud.

In the case wind velocity is higher and depending on prevailing wind direction maybe deposited in the adjoining settlements with a potential to cause soiling of residential premises, deposition on agricultural crops, etc. However, this will be a short-term impact lasting for a few months during the construction. Since the transmission lines avoid settlement areas and the minimum RoW for 765 kV and 400 kV is 62 m and 46 meter respectively, the intensity of impact is low.

Impact Due to Emissions

Heavy equipment such as DG sets excavators, cranes, and compactors would be used especially at the substation site. Emissions from these equipment and diesel generator sets used to generate power will cause impacts to ambient air quality. Transportation of construction material by tractor trolley and other transport vehicles will also contribute to exhaust emissions.

Since the number of vehicle plying would not be significantly higher due to dispersion impacts from vehicular emissions decrease rapidly with increasing distance from the source. It is not expected to be significant at distances of more than 200 m from the source; they would not be significant. Moreover these impacts would be limited to the construction period of approximately 18 months. Since these impacts would be restricted within the area of influence of the project the impact is of low significance.

The implementation of the good construction practices would minimise adverse air quality impacts.

Intensity of Impact	2	Extent of Impact	1	Duration of Impact	1
Impact Significance = 2 i.e. low					

Mitigation Measures:

To reduce dust impacts, the following measures would be put in place:

- Periodic water-spraying/sprinkling and sweeping of unpaved and paved roads to minimise dust and remove mud and debris. Sprinkling of water in dust prone activities like transportation on unmetalled road, digging works, material handling etc would be taken up.
- Covering of vehicles carrying dusty materials to prevent materials being blown from the vehicles while travelling;
- Ensuring any temporary site roads are no wider than necessary to minimise their surface area and thus the fugitive emission;
- Storing dusty materials away from site boundaries and in appropriate containment (e.g. sheeting, sacks, barrels etc.).
- If the residents and pedestrians complain about the dust and gas, the consultant of the supervision and contractors would reconsider the construction technique.
- Burning of wastes generated at the construction sites, work camps and any other project activity related site shall be strictly prohibited;
- All stockpile materials which are likely to generate airborne fugitive dust will be covered with canvas or plastic sheets during windy season.
- Storage of excavated materials in dumping/disposal areas designated for this purpose.

Exhaust emissions would be minimized as follows:

- Enforcing speed limits for vehicles to 20 km/hr on unmade surfaces to minimise dust entrainment and dispersion;
- Vehicles and machineries would be regularly maintained to conform to the emission standards stipulated under Environment Conservation Rules, 1997
- All fuels, oils and other chemicals would be stored in secure, sealed, labelled containers;
- Monitoring would be conducted for air quality parameters and in case the parameters are on borderline or exceeds the environmental standards, stricter control measures will be adopted.

- Consideration would be made on using prefabricated materials where possible so that localised air pollution is minimised;
- Vehicles and equipment would be switched off when not in use;
- Avoiding fabrication work and shot/sand blasting work onsite.

Residual Impact

With implementation of the precautionary and the mitigation measures mentioned for prevention/reduction of dust generation and exhaust emission the residual impacts would be low.

Operational Phase

Operational phase air quality impacts are not envisaged from the project.

5.4.8 Potential Impact Due from Noise and Vibration During Construction

This section identifies and evaluates the potential impacts of the project activities due to noise generation during construction phases; and formulates the measures to mitigate and manage the identified impact.

The main sources of noise at preconstruction and construction sites are as follows:

Construction Phase

- Movement of heavy earth moving vehicle during levelling and compaction of earth at the proposed sub-station.
- Transportation of equipment. Construction materials
- Operation of Materials handling equipment, stationary equipment and other types of equipment etc.
- Traffic congestion due to stringing of conductor.
- Operation of the Winching machine

The construction activities such as transportation of raw materials for tower construction, operation of winching machine and construction machinery are likely to cause increase in the ambient noise levels. The principal source of noise during construction of transmission lines would be from operation of winching machine during stringing of transmission lines. The winching machine produces noise level of more than 70 dB (A). This can cause disturbance to the settlement, if located near (within 500 m) of the construction site.

The noise generated from the above-mentioned project activities is likely to be attenuated within 500m from the construction site. This may, however, cause discomfort the construction workers of site. There is no major settlement or sensitive receptor near the transmission lines isolated houses are only present which may be affected by the increase in noise. The construction activity will be a short-term activity. The scale of impact will be low. The potential impact on noise quality due to above mentioned construction activities is assessed to be low.

Intensity of Impact	1	Extent of Impact	1	Duration of Impact	2
Impact Significance = 2 i.e. low					

Operational Phase

Noise would be generated from the operation of transmission lines due to the corona effect, however, the same is not expected to cause any impact to the local community as it would be mostly be head within the RoW. Similarly, in case of substations noise would be generated from the operation of transformers, however, the same is not expected to cause any impact to the local community.

Mitigation Measures:

During construction work, the management measures shall include in the first place, use of state-of-the-art low-noise equipment wherever feasible. Material and equipment transportation vehicles shall ensure adoption of techniques for reducing noise generation including engineering control mechanism such as installation of mufflers

and speed reduction in the residential area, therefore the vehicle noise impact would be minimized. Other measures include:

- Noise generating equipment e.g. DG sets, winching machine should not be located near settlement to reduce the disturbance.
- Vehicle transporting construction material should avoid honking near settlements except for precautionary honking to alert the pedestrian/vehicles.
- Minimize noise from construction equipment by using portable street barriers to minimize sound impact to surrounding sensitive receptor.
- Conduct noise monitoring/ inspection according to the Environmental Management Plan (EMP)
- As planned the work would be carried out during the daytime only. Only in case of emergency nightwork would be carried out. In case of Night work the Management Plan for Night works shall be applied.
- Noise limits for construction equipment to be procured such as front loaders concrete mixers, cranes (moveable), vibrators and saws will not exceed 75 dB (A), measured at one meter from the edge of the equipment in free field, as specified in the Environment (Protection) Rules, 1986.

Residual Impact

With implementation of the precautionary and the mitigation measures mentioned for prevention/reduction in noise generation at source impacts would further reduce.

5.4.9 Potential Impact on Surface Water Quality

Impact on surface water quality may arise due to below mention activity

Construction Phase

- Storage and handling of fuel
- Discharge of Sewage from Construction Camp
- Runoff from construction site

Impact Due to runoff from construction site

The substation site would be raised using earth. Thus, some amount of sand can be mixed with water and flow into the river, causing impacts like increased turbidity in the river water and change in sediment quality (discussed earlier). However, return water would be channelized through a designated channel where silt trap would be installed to trap the sand at the proposed site. This, along with the fact that it is temporary activity, the impact on water quality like increased turbidity would not be significant.

Intensity of Impact	1	Extent of Impact	1	Duration of Impact	1
Impact Significance = 1 i.e. Negligible					

Mitigation Measures

The following measures will be implemented to mitigate potential impact due to sand filling.

- Return water would be discharged in the river through designated channel.
- Silt trap would be installed before commencement of sand filling.

Impact Due to accidental leakage and spillage of Fuel and Chemical

Accidental release of fuel oil & chemical stored (transformer oil, paints and solvents) used at site can contaminate the surface water body. This impact would be important in case of River Khari which is located approximately 500 m from the substation site. Fuel, chemical or any other hazardous materials would be stored at site and refuelling of the earth moving vehicle and handling of chemical would be carried out by trained staff within a designated

place. Hence chance accidental spillage of oil would be very limited and chance of contamination of river water due to mixing of surface run-off would be low considering the embedded prevention measures.

Intensity of Impact	1	Extent of Impact	1	Duration of Impact	2
Impact Significance = 2 i.e. Low					

Mitigation Measures

The following measures will be implemented to mitigate potential impact due to accidental spillage of fuel

- Manual pumps would be used for transfer of fuel during refuelling
- Drip tray would be used during refuelling
- Maintenance of earth moving vehicle would be carried out in designated place with concrete floor and bund.
- Oil, chemical Storage area would be covered and have impervious or concrete floor and bund.
- Use of spill control kits to contain and clean small spills and leaks
- The Contractor will prepare guidelines and procedures for immediate clean-up actions following any spillages of oils, fuels or chemicals;
- A site-specific Emergency Response Plan would be prepared by the Contractor for soil clean-up and decontamination; and
- The construction contractor will implement a training program to familiarise staff with emergency procedures and practices related to contamination events.

Impact due to construction of water of water intake station & unloading jetty have been delineated in preceding section.

Impact Due to Discharge of Sewage

Sewage would be generated from the proposed power plant site and construction camp. However, it is proposed that sewage would be treated using septic tank and soak pit at the construction camp site Hence the impact significant is assessed to negligible.

Intensity of Impact	1	Extent of Impact	1	Duration of Impact	1
Impact Significance = 1 i.e. Negligible					

Impact due to discharge of wastewater from construction activity

Wastewater from the construction activities e.g. washing of concrete mixers, vehicles etc are likely to pose significant impact on the surface water quality if discharged without adequate treatment and mitigation measures. However, considering the construction activities to be of short duration and treatment of wastewater to be done before, the impact is assessed to be low and can be mitigated with following mitigation measures.

Intensity of Impact	3	Extent of Impact	1	Duration of Impact	1
Impact Significance = 3 i.e. Low					

Mitigation Measures:

- The effluent generated from washing of equipment/miller wash would be stored and treated in a sedimentation tank, to be installed on a temporary basis, because chemicals may be used at the time of

washing the equipment. The effluent will be discharged following coagulation/flocculation and removal of supernatant (and their discharge in an environmental sound manner) from the sedimentation tank.

- Channelize all surface runoff from the construction site through storm water drainage system and provide adequate size double chambered sedimentation tank;
- Oil leakage or spillage will be contained and cleaned up immediately. Waste oil would be collected and stored for recycling or disposal;
- Adequate sanitary facilities, i.e. bio-toilets toilets and showers, would be provided for the construction workforce;

Residual impact

With implementation of the precautionary and the mitigation measures mentioned for prevention of surface water contamination the residual impacts would be negligible.

5.4.10 Potential Impact on Groundwater Resource and Quality

The potential sources of impact on Ground water resources are as follows:

Construction Phase

- Extraction of water for Construction purpose;
- Extraction of water for domestic use by construction workers

Impact on Groundwater Resource

During construction, ground water would be used primarily for concrete preparation and curing of concrete for tower foundation and foundation of equipment at sub-station. In addition, water would be used for the purpose of domestic use. Maximum water requirement would be around 550 KL/day for the civil works and 15 KLD for domestic consumption in labour camps etc. It has also been reported by CGWB that the groundwater that while Bhuj and Anjar are in critical stage of groundwater development, Rapar is in "over-exploited" stage. Extraction of water for construction purpose can cause considerable impact on the already stressed resources.

Impact on Groundwater Quality

Like surface water the generation of waste from the construction camp and construction waste also has potential to contaminate groundwater quality if the untreated wastewater is discharged from camps and collects in trenches and excavations.

Impact of Groundwater Quality

In parts of the Kutch district especially along the Rann of Kutch region the ground water is of inferior quality as reported by CGWB. Groundwater would be used for domestic purpose. Since, there are issues related to quality of the water, it can have adverse impacts of the health of the workers. Mitigations need to be adopted to prevent misuse of the natural resources. Also, the water used for domestic purpose need to be treated to conform to the IS: 10500 standards.

Considering both the availability of resource as well as the quality of water the scale of impact will be medium, duration will be short term- only during construction phase and extent of impact will be local- immediate vicinity of the project site. The potential impact on groundwater resource quality is assessed to be low.

Intensity of Impact	2	Extent of Impact	1	Duration of Impact	1
Impact Significance = 2 i.e. Low					

Mitigation Measures:

The Contractor needs to adopt the following measures to ensure that :

- Sourcing of construction and domestic do not result in stress and water competition with nearby communities:
- The Contractor shall make arrangement for drinking water which conforms to IS 10500; 2012 or bottled drinking water which conforms to IS 14543 (2004).
- In case the contractor uses groundwater for drinking purpose he shall install adequate treatment technologies for the purification and disinfection
- Permission from the Central Ground Water Board is required in case of abstraction of ground water.
- Carry out the precautions especially related to fuel and lubricant presented in the above section to prevent any contamination of the groundwater.

5.4.11 Potential Impact on Ecological Environment

The main direct ecological impacts projected from the tower footing and erection of transmission line (WRSS - 765KV and 400KV Lilo line) and establishment of substation is loss or degradation of near-natural habitats along with the attendant loss of provisioning services, mainly in the form of fodder resources for the local livestock. The impact and mitigation measures for substation and transmission line for both construction and operation phase are discussed separately below:

5.4.11.1 Impact Due to construction of Substation

Impacts during the Construction Phase

Removal of natural vegetation: The removal of vegetation to clear the Substation Site for construction will cause loss of mostly modified agricultural land. The habitat loss at the Substation Site will directly altered the agricultural land results loss of provisioning ecosystem services, mainly foods and fodder. The removal of vegetation would also indirectly cause exposure of soil to desiccation by wind and sunlight, loss of soil anchorage and increased vulnerability of soil to erosion by wind and water, leading to changes in the soil regime and the corresponding loss or degradation of the related ecosystem services.

Filling, Levelling or grading of land: To prepare a construction bed for establishing a substation, filling, Levelling or grading of land could lead to alteration of the topography, and consequently, the present drainage, soil-profile, change soil properties and disrupt sub-soil habitats. Obstruction of present drainage channels may also lead to accumulation of salts and increase soil salinity, turning hitherto freshwater habitats into brackish water ones. This could also, affect the natural rainwater percolation into sub-surface layers, thereby impacting the natural groundwater recharge process and degrading the related ecosystem services.

Laying of roads and paving of surfaces: The laying of roads or paving of surfaces within the Substation Site will hinder or obstruct the percolation of rainwater into the ground. This will cause reduction of groundwater recharge and increase in surface run-off, leading to loss or degradation of soil and sub-soil habitats, as well as, the related regulating and supporting services.

Movement of vehicles and heavy machinery: Movement of vehicles and operation of construction machinery would expose the present environment, in and around the Substation Site, by vehicular emissions and unnatural levels of dust, noise, light and vibrations. This would generally lead to pollution of natural resources and possible contamination of food webs. It would cause compaction of soil substrates, leading to injury or death of soil organisms. It would also reduce percolation of rainwater into sub-soil layers and increase surface run-off, impacting the natural groundwater recharge process and destroying or degrading the related ecosystem services.

Artificial Illumination: Use of artificial lighting to illuminate the Substation Site and during night-time will lead to unnatural illumination in the area during the natural dark part of the day. Use of vehicles during night may also lead to artificial illumination. Interruption of the natural night period by light is known to disrupt the natural biological cycles of many floristic and faunal species.

Installation of internal transmission cables: Installation of over-head transmission cables would disrupt the aerial habitat space of the area, leading to death or damage to aerially moving organisms such as birds through accidental collision and electrocution. Installation of underground transmission cables would disturb the natural soil-profile and fragment sub-soil habitats. These effects would lead to injury or death of organisms, thereby impacting ecosystems and the related ecosystem services.

The loss of the present modified agricultural habitat of the Substation Site is of relatively medium significance owing to presence of alternative comparable habitat around the Substation Site and the Substation Site is faraway to wildlife habitats, including habitats used by migratory and/or congregatory species.

The overall of impact for the construction of substation is medium.

Intensity of Impact	3	Extent of Impact	2	Duration of Impact	1
Impact Significance = 6 i.e. Medium					

Mitigation Measures

1. Offset the loss of any natural vegetation removed from the Substation Site by planting ideally the same species, but higher numbers, of trees, shrubs and herbs, as applicable, in or adjacent to the Site or at the boundary of the site to visually screen it from wildlife habitats and human habitations in the surrounding area
2. Opt for diverse but strictly native species in any additional plantation carried out towards the Project. Species typical to the natural forest-types of the Study Area, as reported in the baseline data, may be used in plantations. Alternatively, advice may be sought from the local forest department office, which can also provide saplings of local native species for plantation.
3. Conserve the natural topography of the Site by integrating the natural topographical features into the project construction plans.
4. Minimise the number and the width of all internal roads.
5. Maintain the connectivity and integrity of existing natural water-channels, if any, while building internal roads or embankments.
6. Ensure that vehicles and machinery used in the construction activities comply with the prescribed emission standards.
7. Restrict movement of construction-related vehicles, especially heavy vehicles or machinery, strictly to pre-designated routes.
8. Restrict construction activities requiring high levels of illumination to daylight hours in order to prevent disruption of the natural night period by artificial lighting.
9. Insulate any over-ground transmission cables to prevent electrocution of organisms colliding with them or install bird deflector devices on them to render them relatively more visible to aerially moving organisms. Alternatively, opt for underground transmission cabling.
10. Opt for low-intensity artificial lighting, such as LED, to prevent insects from being attracted to the Substation area. Ensure that lights are provided with downward-facing shades to limit the dispersion of the illumination.

Impacts during the Operation and Maintenance Phase

Physical Hindrance by On-ground Installations: The physical presence of the electrical materials that will be used in the substation and its related installations would hinder faunal movement within and through the area, affecting their current access to habitats and resources. Aerially moving fauna, such as insects, birds and bats, may accidentally encounter electrical components of the project installations, leading to injury or death. The regular activity of humans in the Substation area also deters raptors, thus changing the bird community structure in the nearby areas.

Physical Hindrance by Overhead Transmission Lines: The physical presence of many overhead transmission lines which will meet in the substation area create a wire web in that area, which would disrupt the existing contiguous aerial habitat of the area, leading to death or injury to aerially moving organisms such as birds and bats, through accidental collision with cables.

Physical Hindrance by Underground Installations: The physical presence of underground installations, such as the mounting foundations of electrical instruments and underground transmission cables, would occupy a large

area of sub-soil habitats. This would lead to loss of habitat area for sub-soil species and hinder their access to resources.

Project Site Illumination: Use of artificial lighting to illuminate the project site in the night-time will lead to unnatural illumination in the area during the night. Interruption of the natural night period by light is known to disrupt the natural biological cycles of many floristic and faunal species.

Project-related Traffic: The movement of project-related vehicles and personnel to, from and around the Project Site would increase the ambient levels of vehicular emissions, dust, noise, vibrations and artificial illumination in and around the project site. This would lead to pollution of the natural environment. Also, disruption of the night-period by illumination is known to disturb natural floristic and faunal biological cycles.

This impact is of low significance owing to the Substation Site being located faraway from wildlife protected area including habitats used by globally threatened, as also, migratory and/or congregatory species. Also, in operation and maintenance phase very few personal is needed, so vehicular movement is limited.

Intensity of Impact	2	Extent of Impact	1	Duration of Impact	2
Impact Significance = 4 i.e. Low					

Mitigation Measures

- Opt for undergrounding the internal transmission cabling.
- Ensure that all electrical components are adequately insulated to prevent electrocution of fauna through accidental contact with project-installations.
- Restrict maintenance-related activities to the daytime.
- Avoid use of artificial lighting in and around the project site as far as possible.
- Opt for low-intensity artificial lighting, such as LED, to prevent insects from being attracted to the Substation area. Ensure that lights are provided with downward-facing shades to limit the dispersion of the illumination.
- Ensure that vehicles and machinery used in the project site for operation and maintenance activities comply with the prescribed emission standards.
- Restrict movement of vehicles used in the project site strictly to the minimum possible pre-designated routes.
- Ensure that operation or maintenance activities, that require illumination, are restricted to daylight hours to prevent disruption of the natural night period by artificial lighting.
- Prohibit the use of herbicides in the facility.
- Opt for manual weeding to control or regulate plant growth in the Substation area.
- Opt for manual sprinkling of water to control dust in and around the Substation area.

5.4.11.2 Impacts of the Transmission Line

Impacts during the Construction Phase

Removal of natural vegetation: The transmission line corridor traverses through a swathe of modified habitats, predominantly cultivated farmlands or plantations, interspersed with a few natural habitats, mainly patches of slightly degraded scrub and seasonal rivers/nala. During tower footing and erection of transmission wire will involve removal of trees, shrubs and herbs present along the transmission line corridors which will cause change in the modified habitat within the corridor leading to a loss of floral biodiversity at local level. The habitat loss at the will directly altered the agricultural land results loss of provisioning ecosystem services, mainly foods and fodder. The removal of vegetation would also indirectly cause exposure of soil to desiccation by wind and sunlight, loss of soil anchorage and increased vulnerability of soil to erosion by wind and water, leading to changes in the soil regime and the corresponding loss or degradation of the related ecosystem services. Moreover, removal of vegetation can adversely affect residential burrowing faunal species viz. reptiles (lizards and snakes), ground roosting birds

(sparrows, pigeon, doves etc.) and mammals (rats, mongoose, mouse etc.) and may cause loss of nesting habitats for bird species.

Moreover, some part of the 765 KV D/C Bhuj to Lakadia transmission line (3.0916ha) and 400 KV D/C LILO Transmission Line (0.7507ha) would traverse through forestland. WRSS have applied for Forest Clearance as per the provisions of the FCA, 1980 and already obtained Stage I Forest Clearance. Also, some portion of the 765 KV D/C Bhuj to Lakadia transmission line is passed through the proposed ESZ area of Kutch Desert Sanctuary. However, Chief Conservator of Forest, Kutch Forest Division, issued NOC for the ESZ area, by mentioning that no area under the ESZ area has not been encroached/cut/removed/damaged during project activities.

Filling, Levelling or grading of land: At the time of tower footing excavation of soil, input of concrete materials beneath the soil and after tower footing levelling of soil in and around the tower footing area could lead to alteration of the topography, and consequently, the present drainage, soil-profile, change soil properties and disrupt sub-soil habitats. Also, there is a chance of mammalian species falling in the excavated areas for transmission towers and get injured. However, these disturbances will be for a temporary period and expected to be of low magnitude and local in scale. During the operation phase, several species of birds identified during the ecological study which can perch or make nests within transmission line area and can get electrocuted. Collision with the transmission line can also result in bird mortality. The sensitivity of the site has been considered as medium due to the presence of Schedule I bird species.

Movement of vehicles and heavy machinery: Movement of vehicles and operation of construction machinery would expose the present environment, in and around every tower footing Site, by vehicular emissions and unnatural levels of dust, noise, light and vibrations. This would generally lead to pollution of natural resources and possible contamination of food webs. It would cause compaction of soil substrates, leading to injury or death of soil organisms.

This impact is of low significance there are similar habitats in the vicinity and the species can easily relocate to those areas. Also, trees within the transmission line corridors would be removed before construction and none of the floral species expected to be present within the site is threatened as per IUCN Classification. Also, after the tower footing under the tower will be reintroduced after some course of time. This impact for vehicular movement is of low significance because it is a very limited time activity during tower construction and transmission line erection. Thus, the overall impact is low.

Intensity of Impact	2	Extent of Impact	2	Duration of Impact	1
Impact Significance = 4 i.e. Low					

Mitigation Measures

1. Compensatory afforestation should be done as mention in the Forest Clearance Certificate with native species.
2. As per NOC issued by Chief Conservator of Forest, Kutch Forest Division, no area under the ESZ area has not to be encroached/cut/removed/damaged for the project activities.
3. Shield wire is the highest wire on a transmission pole with the smallest wire diameter. Most bird collisions happen with the shield wire as it is the highest on the pole and has very less visibility. The purpose of a shield wire is to protect the phase conductors from lightning. Thus, to reduce the collision risk, lightning arresters can be used to replace the shield wires. However, lightning arresters may increase the risk of electrocution in case of bird hits. Therefore, it is also recommended to increase the diameter of the shield wire and place line markers to increase its visibility.
4. It is also recommended that in places of multi-conductor transmission lines, the lines should be clustered so that all the power lines use the same ROW. Bundling or clustering of wires reduces collision risk as the resulting network of wires is confined to a small space and is more visible.
5. Restore the soil and natural vegetation of any construction-phase roads which are not necessary for carrying out operation or maintenance activities, and hence, are not required in the operation and maintenance phase.
6. Conserve the natural topography of the Site by integrating the natural topographical features into the project construction plans.
7. Ensure that vehicles and machinery used in the construction activities comply with the prescribed emission standards.
8. Restrict movement of construction-related vehicles, especially heavy vehicles or machinery, strictly to pre-designated routes.

9. Restrict construction activities in daylight hours in order to prevent disruption of the natural night period by artificial lighting.

Impacts during the Operation and Maintenance Phase

Physical Hindrance by Overhead Transmission Lines: The physical presence of many overhead transmission lines will be the disruption of the aerial habitat throughout the transmission line area. This may trigger avoidance action on part of aerially moving fauna, such as birds and bats, causing them to forfeit access to habitats on the far side of the transmission line or fly longer distances to access such habitats. The additional energy-expenditure associated with avoidance can be critical for long-distance migrant avifauna. Also, the transmission line leading to death or injury to aerially moving organisms such as birds and bats, through accidental collision with cables.

This impact is of moderate significance because no significant habitats used by globally threatened, as also, migratory and/or congregatory species not present at the vicinity of the transmission line. Though the 765 KV D/C Bhuj to Lakadia transmission line (East to West) crossed a part of central Asian flyway, however, the vertical distance between two wire of 765KV line is 15meter, thus there will be very minimum chances of electrification and collision of big size migratory birds and local birds with transmission line. On the other hand, the 400KV line is in North-South direction and minimum vertical distance between two wire of this line is 8meter. So, there area also bare minimum chances of electrification and collision of birds with transmission line.

Physical Hindrance by On-ground Installations: The physical presence of the transmission line towers would hinder faunal movement within and through the area, affecting their current access to habitats and resources. Aerially moving fauna, such as insects, birds and bats, may accidentally encounter electrical components of the project installations, leading to injury or death.

This impact is of low significance as there are similar habitats in the vicinity and the species can easily relocate to those areas and change their aerial route and there are bare minimum chances of electrification of birds with transmission line. Also, throughout the transmission line (5km of each side from the centre of the line) and Substation area no such globally significant concentration of migratory species and/or congregatory species have been reported and also not observed during field visit.

Intensity of Impact	1	Extent of Impact	1	Duration of Impact	3
Impact Significance = 3 i.e. Low					

Overall the significance of impact on biological environment can be rated to be moderate to Minor.

Mitigation Measures

1. Monitoring of bird collision risk before/after establishing the transmission line: As the area fall under Central Asia and East Asia-Africa flyway, thus monitoring of migratory birds as well as resident birds will be suggested along the transmission line and depending upon the monitoring results Birds Flight Diverter should be installed as guided by the Forest Department. Any incidents or bird hits should be reported, and location-specific mitigation measures should be employed. Before establishing a transmission line, "bird-use" areas should be identified to guide appropriate routing of the transmission line. In places of bird use or collision risks, the transmission line should be rerouted in such a way that important habitats are avoided, or bird diverter should be installed. Also, monitoring of birds perching, specially raptors species, should be recorded after construction of transmission line and "high birds perching" area should be identified. To reduce the possible electrocution due to birds perching "Raptor Perch Deterrent Devices or Anti Perch Devices" like Pole Cap/ Cone, Bird Spider, Bird Spikes.
2. Installation of Line Markers: Line markers are usually installed on the shield wire, which is associated with maximum collision risk to increase the visibility of the power lines. Commonly used line markers include the following:
 - Aerial spheres: Large spheres placed on the wires to increase visibility. For better reduction of risk – staggered placement, using different colors, using light with the spheres to increase visibility at night, anywhere between 5 to 30 m intervals, situated in the center of the span (60% of the span, excluding 20% on the sides of each pole)
 - Spirals and bird flight diverters: Spiral Vibration dampers reduce the line vibration and increase visibility of the line, placed 3m apart on shield wires. Bird flight diverters are increasing radius spirals.

- **Suspended Devices:** The suspended devices can be swinging, flapping or fixed. They have a clamp that attached to the line so that the device dangles and based on its type, can move in the wind. They are glow in the dark designs that increase the visibility in the night as well. They can be placed 10-15m apart in a staggering position.
 - **Tree wires:** Insulated phase conductors that provide protection from momentary contact with tree branches and prevent collision-electrocution. As the diameter of an insulated wire is more, the visibility of the wire increases.
3. **Use of blinking lights:** Using blinking lights instead of steady burning white or red lights can reduce the risk of collision. Steady burning lights disorient migrating birds and may attract them. Certain species are known to circle such stationary lights, which increases the risk of collision.
 4. **Restrict maintenance-related activities to the daytime.**

5.4.12 Socio Economic Impact

Loss of Land

Based on the present information available from the WRSS 168 acre of land would be required for setting up of Lakadia Pooling substation and entire land parcel has been already procured from approx. 41 private landowner through 6 land aggregator based on willing buyer willing seller. process.

Based on the visual observation during site the land is partially under cultivation by the affected landowner. As reported by the project team, the land under cultivation has already been procured by the WRSS XXI(A) however, the project site had given permission to the landowner to harvest the produce from the land. On the northern side of the land parcel, one semi-pucca¹³ structure was observed inside the land parcel. Reportedly the structure was used as a storage house for storing grains and agriculture equipment's. The replacement cost for the impacted structure has been provided to the affected landowners as per the current market value. During site visit visit, none of the landowners were present on site, hence the study team could not establish presence of any dependency on the landholdings. Similarly, the study team could not ascertain the land value received by the affected landowners for the land procured through the local and aggregator.

As per discussion with landowner and local community, land tract procured for substation has been used as agriculture land before procurement and this land tract is free from any , encroacher or squatter. Hence impact due to land procurement is assessed to be medium.

Intensity of Impact	2	Extent of Impact	1	Duration of Impact	3
Impact Significance = 6 i.e. Medium					

Mitigation Measure:

- Payment of compensation prior to taking possession of land;
- Replacement value for any structure loss
- Dissemination of information about the procurement;
- Additional compensation for Vulnerable Household¹⁴ if any
- Unskilled labour during the project construction phase would be sourced from the local community; and

Residual Impact

With implementation of the precautionary and the mitigation measures mentioned above impacts due to land procurement would be low.

¹³ A house that has fixed walls made up of pucca material, but the roof is made up of the material other than those used for pucca houses.

¹⁴ Vulnerable households/DPs may include (i) households that are headed by women with dependents, (ii) household heads with disabilities, (iii) households falling under the generally accepted indicator for poverty, (iv) elderly households who are landless and with no other means of support, indigenous peoples or ethnic minority households and (v) agriculture landless households or severely affected households

Economic Loss to private landowner's due land use restrictions

Total land for the entire length of the transmission line is comprised of 15 hectares for tower footing of land belong to 350 landowners) and for LILO line is comprised of 3 hectares of land belong to 200 landowners. For ROW, approximately 808 affected landowners have been identified so far. As the process of obtaining consent is still ongoing, details on the total number of landowners for ROW is expected to be completed by June 2021. As discussed earlier no land would be procured for transmission line, only easement right would be obtained. However, there is restrictions on land use along the transmission line route for maintaining a safe clearance distance from the transmission wires whereby no land use changes are permitted along the RoW route, thus restricts construction on these lands. Such restriction in future land-use changes diminishes the land value. Moreover, the alignment will pass and cut through roads and highways. The road facing plots which have a potential for non-agricultural use in the future will be restricted and will have a permanent implication on use of these lands for non-agricultural purpose. For this, one-time compensation for one-time compensation amount has been provided to the affected landowners.

Existing Measures

- Compensation at the rate of 85% of land value as per Govt of India and Govt. of Gujarat guideline would be paid to landowners for tower base area in three instalments (Foundation, Erection and Stringing). For RoW, compensation at the rate of 15% of land value would be paid to landowners, before beginning of stringing work.
- Considering the implication of the impacts, the compensation fixed for the land value was reported to be much higher than the prevailing market rate and circle rate. The compensation for land price the affected landowner was fixed for INR 900 for unirrigated land and INR 950 for irrigated land per sq m. This amount is divided between the landowner in case of multiple landownerships.

As no land has been procured and considering existing land compensation procedure and amount the impact significance would be negligible.

Intensity of Impact	1	Extent of Impact	1	Duration of Impact	3
Impact Significance = 3 i.e. Low					

Mitigation Measure:

- A grievance mechanism shall be made available to the landowners

Income Loss to Landowners in Tower Base Area due to damages to crops during construction and stringing:

The tower base area will impact 17 ha to land. Majority of the two alignments passes through double cropped agricultural land. ~550 private landowners from 85 villages will be impacted due to tower footing. No land would be procured for the construction of tower footing, however easement rights for ROW and tower footing will be required. Thus, no physical displacement will take place, however, the project activities will be resulted in crop loss due to civil work for foundation and tower erection activities including creation of access road to tower location, soil excavation and movement of equipment's; and stringing activities.

From the discussions with the landowners along the transmission line ROW, it is understood that the landowners were aware of the project. They are positive for the project and have no objection for providing easement land for tower and ROW. About 61 towers have been already erected and 173 foundation activity has been completed. of which 100 landowners have received compensation for crop loss during tower erection and foundation work. During consultation with the local community and landowner reported that there are existing TL in their neighbouring villages and farmers of those respective land parcel where the tower was erected would still be able to use the land under the tower for agricultural purpose. Hence impacts would not be pronounced as non-mechanised agriculture is carried out in in this area. The villagers were pleased with the compensation being provided and there are instances where the villages wanted the TL alignment to pass through their land.

As mentioned in socio-economic baseline section, there is a practice of sharecropping the study area, however, from limited consultation with the local community reported that landowner undertake cultivation on their own. Hence the study team, could not ascertain the presence of any affected sharecroppers along the TL corridor.

Existing Measure:

The crop compensation was based on the crop damaged at the time of the construction or stringing activity. The compensation was calculated by multiplying the total area affected with average yield of the crop, and the market value of the crop as determined by the agriculture & horticulture department. The yield rate of different crops and their market values considered for payment of compensation are as follows

Note: Crop Schedule developed for the project is provided in the **Annexure B**

As the impact of construction activities along the tower base is limited to construction period (maximum 10-15 days) and in case of crop damage, crop compensation would be paid by the company as per the crop schedule rate determined by the agriculture & horticulture department and thereafter construction completed, the farmers can still undertake cultivation underneath the tower, hence the impact magnitude is assessed as negligible.

Intensity of Impact	1	Extent of Impact	1	Duration of Impact	1
Impact Significance = 1 i.e. Negligible					

Influx of Labour:

The project will require 300 workers for construction. The unskilled labourers were recruited from the local villages mainly for foundation work, and semi-skilled and skilled labourers are reported to be workers from another district of Gujarat. Migrant labour from states like Jharkhand and Bihar were also being employed for constructions. A gang of 10-15 workers were clubbed in one unit for foundation and erection work. As the construction in one location completed, they move toward the next location. While the number of labourers is very small in comparison to the local community, however they lived in small makeshift/canvass camps at times near the villages.

Some of the significant issues related with migrant labour would include:

- Conflict amongst workers, and between workers and local community, based on cultural, religious or behavioural practices.
- Discontent amongst local community on engagement of outsiders.
- Security issues to local women from migrant workforce.
- Use of community facilities such as health centres, temples, transport facility etc. by migrant labour may lead to discontent with local community.
- In case contractors bring in unskilled migrant labour, there stands the risk of exploitation of a labourer. This can happen in the form of hiring underage labourers, low and unequal wage payments, forced labour and discrimination on basis of the basis of caste, religion or ethnicity

Existing Measure:

- The EPC contractors engaged for the project are responsible for ensuring adequate accommodation facilities for the labourers
- Used of Carbolic acid around the canvass/makeshift camp to prevent snake bite and another insect bite
- Thermal scanning for all worker prior to entering the premises for prevention of any infectious diseases
- Provision of safe drinking water and toilet facility for the workers

Mitigation Measure:

- As the labour camp temporary in nature and the movement of people will take place after every 10-15 days, there are chances of people getting infected to various disease and illness. A diseases management plan should be kept in place to avoid an outbreak/spread of infectious diseases
- Adequate monitoring should be undertaken to ensure the contractor's compliance to the applicable rules and regulations and provisions of the contractual agreement and construction phase ESMP for the remaining duration of construction
- health screening of migrant workers,
- Strengthen security personnel around labor camps in order to maintain adequate law and order and avoid any possible tensions between the migrant workforce and local community.
- Each worker and employee shall be provided a health and safety training as part of the induction process

- Create a labour management plan that will contain provisions to ensure non-discrimination and fair treatment for all workers. The labour influx management plan will also dictate the requirement of workers at different stages of construction cycle, thereby helping in management of employment issues.
- Access of local community and labourers to the grievance redressal mechanism for the project;

The impacts described above are primarily within the RoW or would only extend to the settlements in the immediate vicinity of the transmission line, therefore localize in nature. Moreover, the damage to crop and conflicts of the migrant labour with the community would be temporary. In addition, a planned labour camp for this project may further reduce the assessed potential impacts related to labour influx. Thus, socio-economic impact during the construction phase of the transmission lines is evaluated to be of low significance.

Intensity of Impact	2	Extent of Impact	1	Duration of Impact	1
Impact Significance = 2 i.e. Low					

5.4.13 Potential impact on Community Health and Safety

According to the satellite imagery, most of the tower passes through agricultural land field, thus, most of the construction sites were within the agricultural fields. Review of GIS satellite imagery, the TL corridors will pass through few houses, small temples and schools located at a distance of 70 meters (ROW corridor) from the 765-kV DC line.

Other impacts include deterioration in environmental quality due to construction activities; and increased prevalence of disease arising from the influx of construction workers; and

Existing Mitigation Measure

During construction being undertaken in agricultural season, the landowners were pre-informed a week prior to the start of any construction of the activities and were warned to keep distance from the tower foundation pits. The impact from construction works to the local community is limited.

Additional Mitigation Measures

- Local community and schools located near to the construction area to be informed about heavy machine movement & construction work
- Proper barricading during excavation work should be undertaken
- In case village road will be used for movement of vehicles, the local community should be informed in advance for the same
- Placing reflective tapes on the boundary of construction area;
- Undertaking regular health check-ups of the workforce and reporting any major illnesses at the earliest to Block health officer for disease control and surveillance;

Impacts due to deterioration of Environmental quality parameters

During the construction activities a deterioration of the environmental conditions can be experienced by the local community in terms of increased dust, contamination of surface water or ground water and high noise levels due to operation of construction machinery.

Reduction of air quality may potentially lead to health impacts associated with respiratory problems eye irritation and general disturbance to daily activities. Similarly discharges of wastewater from construction and discharge of domestic waste effluent from sanitary facilities for construction workers have the potential to cause contamination of surface water and groundwater resulting in gastro-intestinal problems of the community surrounding the construction sites.

Even though the intensity of the impact is medium the extent of impact is low as there would be isolated houses adjoining the RoW. It may be noted as a design principle transmission line avoids larger settlements. Further, since the impacts would be limited to the construction stage only the significance of the impacts are low.

Chances of increased prevalence of Disease

A total of 150 workers will be employed for the construction phase during the peak construction and commissioning. This influx of workers to the community may cause increase in cases of communicable diseases or pandemic which may put pressures on existing health infrastructure. There is also the possibility of increase in sexually transmitted diseases such as HIV/AIDS as a result of the expected influx of workers to the area. In addition, vector-borne diseases will be sensitivity for settlements closer to campsites for the construction phase labour, particularly due to lack of hygienic conditions.

The impact to community health and safety during the construction phase is evaluated to be of minor significance due to the low density of population in the immediate vicinity of the corridor or campsite.

Intensity of Impact	2	Extent of Impact	1	Duration of Impact	1
Impact Significance = 2 i.e. low					

Mitigation Measures

To reduce Vector- Borne Diseases: The Contractor shall ensure that proper practices are in place to

- Avoid spread of infections and diseases, proliferation of mosquitoes, flies, rodents and other pests:
- No untreated wastewater is discharged from the construction camps.
- Treated discharge from the camp does not accumulates i.e. proper drainage is maintained for the water to flow.
- Solid Waste is not dumped into the adjoining areas but is handed over to the nearest municipal corporation for disposal

Operation Phase

During the operation of the transmission line and substation Electro Magnetic Field (EMF) created by the transmission line can cause inconvenience on the surrounding community. This has been reported during the consultation that the people feel inconvenienced due to this charge especially when working on paddy fields underneath the conductors or passing under the conductors especially during the monsoon season.

There have been some concerns about the possibility of an increased risk of cancer from exposure to electromagnetic radiation from overhead transmission lines. However, a review by the World Health Organization (WHO) held as part of the International EMF Project (1996), concluded that "From the current scientific literature there is no convincing evidence that exposure to radiation field shortens the life span of humans or induces or promotes cancer".

The proposed transmission line would pass away from settlement except for a few isolated cases. Most of the people in the study area are involved in rain-fed agriculture. The electromagnetic field would cause inconvenience. Since the receptors in the vicinity of the transmission line is low and as this is more of a problem with perception of the community even though the impact would exist over the life of the project the impact is identified as low.

Intensity of Impact	3	Extent of Impact	1	Duration of Impact	1
Impact Significance = 3 i.e. low					

Mitigation Measures:

The proposed mitigation measures are as follows:

- Education of the community regarding the effects of the electromagnetic field is important

5.4.14 Potential Impact on Occupational Health and Safety

The impacts envisaged during construction phase on the occupational health and safety of workers is the following:

Construction Phase

- Working at heights during the erection of transmission tower and stringing of the conductor, erection of gantry etc;
- Electrocuting during testing and commissioning

Impact Due to Fall from Height

The occupational risk related to the construction of transmission lines and substation is primarily due to fall from heights which might cause serious injuries. Transmission towers would be of different heights and minimum height of the tower would be 45 m in case of 765 kV transmission line. A review of the incident database (OSHA's Integrated Management Information System (IMIS) database) ¹⁵ indicate most of the incidents are due to fall from height while some incidents reported also include being struck by loads or falling objects during the erection of tower. Similarly, there are risks of fall in the excavation created for tower footing.

Impacts of electrocution during the testing and charging

It has also been reported (OSHA's Integrated Management Information System (IMIS) database) that there has been fatalities due to electrocution. This occurs primarily during the testing and charging of the transmission lines if proper safety procedures are not followed.

The duration and extent of the construction phase will be short but the any possibility of the occurrence of any hazard will lead to adverse impacts that could range from loss of productive time and even fatalities. Hence the impact significance will be moderate.

Intensity of Impact	3	Extent of Impact	1	Duration of Impact	1
Impact Significance = 3 i.e. Low					

Mitigation Measures:

The measures would be in place to minimise the health and safety impacts to personnel from general construction activities include:

- Measures would be implemented to reduce the likelihood and consequence of the following hazards:
 - falling from height;
 - tripping over long-term obstacles or short-term obstructions;
 - contact with dangerous substances;
 - electric shock;
 - mistakes in operation;
 - variable weather conditions;
 - lifting excessive weights; and
 - traffic operations.
- Competent and adequately resourced sub-contractors would be used where construction activities are to be sub-contracted;
- All persons working on site will be provided information about risks on Site and arrangements would be made for workers to discuss health and safety with the Contractor;
- All workers would be properly informed, consulted and trained on health and safety issues;
- Before starting work all the appropriate safety equipment and the first-aid kit would be assembled and checked as being in working order.
- All lifting equipment and cranes would be tested and inspected regularly. All hoist ways would be guarded;
- All scaffolds will be erected and inspected, and the appropriate records maintained by the Contractor;

¹⁵ <https://www.osha.gov/laws-regs/federalregister/2015-04-15-0>

- Safety hoops or cages would be provided for ladders with a height in excess of two metres;
- The Contractor shall provide appropriate safety barriers with hazard warning signs attached around all exposed openings and excavations when the work is in progress.

Residual Impact

With implementation of the precautionary and the mitigation measures mentioned above impacts would be negligible.

Operation Phase

During the operation phase and maintenance of the electrical equipment at the substation the workers would also be exposed to risk of electrocution unless the standard procedures related to electrical maintenance are followed. Since procedures are existing the impacts are low, but the inexperience and lack of knowledge and training can cause severe impacts. Thus, the impact of occupational Health and safety is of medium significance.

Mitigation Measures:

The following precautions would be taken:

- Induction trainings has to be carried out for each of the new employees (temporary/ permanent/ contractual). They have to undergo refresher training once a year on OHS aspects
- All near misses has to be reported to the system. All injuries and fatalities have to be reported as per the Railway's systems and labour laws.

5.4.15 Potential Impact on Aesthetics

The sources aesthetics and visual impacts can result from:

Construction Phase

- Clearance of vegetation,
- Erection of transmission tower
- Storage of Construction Material and Waste

Impact Due to Erection of Structure at substation and Transmission tower

Potential impacts to aesthetics and visual quality because of setting up transmission tower and substation , may arise primarily due to disruption and degradation of views in the surrounding landscape. Visual impacts from transmission lines are highly variable and depends on several factors like location of the project, lines of sight, scenic vistas and most importantly the perception of individuals. With the study area, not being recognized as a place of natural scenic beauty or a tourist destination, these factors are unlikely to lead to any significant adverse visual and aesthetic impacts. Thus, visual impacts can be rated as negligible

Impacts from Disposal of Waste

The disposal of construction waste and MSW from labour camp may lead to nuisance and visual impact of the nearby settlements, if disposed in non-designated area.

In both the above cases the intensity of impacts is low due to the absence of any receptor near the transmission line. so the impact is considered as negligible

6. Environmental and Social Management Plan

6.1 Introduction

This section presents the Environmental and Social Management Plan (ESMP) for the proposed Project. The purpose of this ESMP is to specify the standards and controls required to manage and monitor environmental and social impacts during different phase of project life cycle, i.e. construction, 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. This is in accordance to IFC Performance Standards 1 that emphasizes the importance of managing social and environmental performance through the lifecycle of the Project.

6.2 Environmental Management Plan

The environmental mitigation measures and plans are presented in form of a matrix according to sequential flow of activities in the project life cycle. The matrix focuses on strategies to be adopted for safeguard of the environment from possible impacts resulting out of the project activities. The ESMP provided in Table 6.1

Table 6-1 : Environmental Management Plan

Sl. No.	Project phase/Activity	Potential impacts	Proposed mitigation plan	Responsibility
Planning and detailed design stage				
1	Planning/pre construct Transmission line through forest/ protected area / precious ecological area	Loss of precious ecological values/ damage to precious species	Careful selection of route alignment to avoid natural habitats (i. g. National Parks, Wildlife Sanctuary, Biosphere Reserves/ Biodiversity Hotspots)	Design Consultant
		Deforestation and loss of biodiversity edge effect	<ul style="list-style-type: none"> • Avoid transmission line/ tower in protected and reserve forest, by careful selection of alignment. • If avoidance is not possible, minimise the land to be taken from forest • Obtain Stage I and Stage II Clearance from the forest department. 	Design Consultant
		Tree felling permission	Permission for felling of trees to be obtained before tree felling	WRSS
2	Line through identified migratory bird path and bird habitats and near water bodies	Risk to the bird population primarily due to collision	<ul style="list-style-type: none"> • Careful selection of route to avoid such areas with known avian populations e.g. nesting grounds, foraging grounds, migration corridors etc. • Provide bird guards and markers [as per the specification provided in IS-5613 (Part-II)] in transmission line when passing through/near nesting grounds, foraging grounds, migration corridors etc. 	Design Consultant
3	Location of transmission line/tower	Diminution of land value in the width of RoW, restriction on use of land	<ul style="list-style-type: none"> • Compensation at the rate of 85% of land value, as determined by District Magistrate or any other authority based on Circle rate/ Guideline value/ Stamp Act rates for tower base area (between four legs); • Compensation at the rate of 15% of land value, as determined based on prevailing Circle rate /Stamp Act rate towards diminution of land value in the width of RoW (27m) corridor 	WRSS
		Exposure to safety related risks	<ul style="list-style-type: none"> • Transmission line will be designed as per IS 5613 (Par 2) to provide setback from dwelling area. 	Design Consultant
		Exposure to electromagnetic interference	<ul style="list-style-type: none"> • Transmission line would be designed considering international guidelines such as Commission on Non-Ionizing Radiation Protection (ICNIRP), US National Council on Radiation, State Transmission Lines Standards and Guidelines in the USA etc. 	Design Consultant
		Damage to private property	<ul style="list-style-type: none"> • Avoid settlement / hamlets within RoW 	Design Consultant
		Impact on Cultural Heritage	<ul style="list-style-type: none"> • Careful selection of route alignment to avoid socially, culturally and archaeological sensitive areas (i. g. sacred groves, graveyard, religious worship place, monuments etc.); and 	Design Consultant

- Maintain minimum distance of 100 m from archaeological monuments

Construction				
4.	Site preparation and construction work	Loss of topsoil	<ul style="list-style-type: none"> • Top soil from the entire tower footing area (approx. 22 sq. m.) will be stripped (10 to 15 cm) before commencement of construction work; • Top soil will be stored in a dedicated top soil storage site, having adequate mitigation measures for preventing erosion due to runoff; • Activities will be scheduled (as far as possible) to avoid extreme weather events, such as heavy rainfall; • After construction work is over, top soil will be reinstated at the construction site. 	Contractor
		Noise and vibrations	<ul style="list-style-type: none"> • All equipment/machineries to be regularly maintained to ensure efficient operation. • DG sets with acoustic enclosure should be used. • Construction work during night time (10 pm to 6 am) to be prohibited. In case of emergency work at night approval of WRSS Division/ Circle is mandatory. 	Contractor
		Air Pollution	<ul style="list-style-type: none"> • Water sprinkling to be carried out twice a day during dry season on exposed surface area. • Vehicles transporting loose construction/excavated materials shall be covered with tarpaulin sheets. • Loose construction material/ excavated material shall be stored against any structure or would be kept covered with tarpaulin sheet at the construction site. • All vehicles utilized in transportation of raw materials and personnel, will have valid Pollution under Control Certificate (PUCC). • Regular maintenance of machines, equipment and vehicles that will be used for construction activities of substation/tower construction. 	
5.		Water/Soil pollution	Soak pits/modular bio-toilets would be provided at all construction camp, laydown area and labour camp	Contractor
6.	Occupational Health and safety	Injury and sickness of workers	<ul style="list-style-type: none"> • Provide safety equipment's (PPEs) for construction workers; • Prevent entry of unauthorised person at construction site; • Provide training on health and safety to all the workers. 	Contractor
7.	Line through areas having vegetation(trimming/cutting of trees/vegetation clearance)	Loss of Vegetation	<ul style="list-style-type: none"> • Avoid felling of trees during stringing unless it becomes absolutely necessary. • After completion of stringing, natural regeneration or dwarf tree/medicinal tree plantation would be allowed to heights as per the standards mentioned in IS: 5613 and Government of India Circular 7-25/2012-FC dated 5th May 2014. 	Contractor
8.	Line through farmland	Disturbance to farming activity	<ul style="list-style-type: none"> • Use existing access roads wherever possible • Repair /reinstate damaged bunds on agricultural field etc after completion of construction work. 	Contractor

			<ul style="list-style-type: none"> • Construction activities and stringing of line to be avoided during cropping season. • Compensation for fruit bearing trees at prevalent market rates, to be calculated as annual net product value multiplied by the number of productive years remaining; • Compensation for timber trees to be calculated based on girth and type of trees; • Compensation for one-year net harvest for seasonal crops at prevalent market rates; 	
9.	Community Health and Safety	Injury and sickness of local people	<ul style="list-style-type: none"> • Coordination with local communities for construction schedules etc; • Barricading construction area; • Placing reflective tapes on the boundary of construction area; • Undertaking regular health check-ups of the work-force and reporting any major illnesses at the earliest to Block health officer for disease control and surveillance; • Creating mass and labour awareness on HIV and STDs; 	Contractor
		Gender issue of local community	<ul style="list-style-type: none"> • Labour Camp should be located away from the village and it should be access control for the local people; • Awareness should be created among the migratory labour that they should not be entered in the village without prior information to the villagers; • Local resource like handpump, bathing ghat should not be used by the labours. 	Contractors
10.	Health, Hygiene, Safety and Security of Workers in Labour Camp	Labour camp related EHS and Hygiene Issues	<p>Facilities would be provided at the labour camp as per provisions of IFC Guidance Note on Worker's Accommodation 2009. Some of the relevant provisions to be complied are as follows:</p> <ul style="list-style-type: none"> • Worker's accommodation; • Provision of safe drinking water; • Appropriate arrangement for cooking; • Management of wastewater and solid waste from the camp site; • Availability of medical facility (first aid); • Security arrangement of the camp site; • Arrangement to register and redress grievance of workers. 	Contractor
		Conflict with local community due to sharing of local resources	<ul style="list-style-type: none"> • Local resource like Handpump, pond, bathing ghat should not be used by the workforce. 	Contractor
11.	Community health and safety during operation	Injury/ mortality to public	<ul style="list-style-type: none"> • Barriers to prevent climbing on transmission towers • Warning signs at transmission towers 	WRSS
12.	Line through farmland	Disturbance to farming activity	<ul style="list-style-type: none"> • Use existing access roads wherever possible • Repair /reinstate damaged bunds on agricultural field etc after completion of construction work. 	Contractor

			<ul style="list-style-type: none"> • Construction activities and stringing of line to be avoided during cropping season. • Compensation for fruit bearing trees at prevalent market rates, to be calculated as annual net product value multiplied by the number of productive years remaining; • Compensation for timber trees to be calculated based on girth and type of trees; • Compensation for one-year net harvest for seasonal crops at prevalent market rates; 	
13.	Community Health and Safety	Injury and sickness of local people	<ul style="list-style-type: none"> • Coordination with local communities for construction schedules etc; • Barricading construction area; • Placing reflective tapes on the boundary of construction area; • Undertaking regular health check-ups of the work-force and reporting any major illnesses at the earliest to Block health officer for disease control and surveillance; • Creating mass and labour awareness on HIV and STDs; 	Contractor
		Gender issue of local community	<ul style="list-style-type: none"> • Labour Camp should be located away from the village and it should be access control for the local people; • Awareness should be created among the migratory labour that they should not be entered in the village without prior information to the villagers; • Local resource like handpump, bathing ghat should not be used by the labours. 	Contractors
14.	Health, Hygiene, Safety and Security of Workers in Labour Camp	Labour camp related EHS and Hygiene Issues	<p>Facilities would be provided at the labour camp as per provisions of IFC Guidance Note on Worker's Accommodation 2009. Some of the relevant provisions to be complied are as follows:</p> <ul style="list-style-type: none"> • Worker's accommodation; • Provision of safe drinking water; • Appropriate arrangement for cooking; • Management of waste water and solid waste from the camp site; • Availability of medical facility (first aid); • Security arrangement of the camp site; • Arrangement to register and redress grievance of workers. 	Contractor
Operational Phase				
15.	Operation of transmission line	Collision of avifauna	Use of power line markers, which reduces of bird collision by increasing the visibility of transmission line to birds.	WRSS
16.	Uncontrolled growth of vegetation	Loss of vegetation	Periodic pruning of vegetation to maintain minimum clearance of 4m between conductor and trees would (As per Government of India Circular 7-25/2012-FC dated 5th May 2014).	WRSS
17.	Occupational health and safety of staff	Injury/ mortality to staff during O&M work	During the testing and charging of electrical line, electricity insulating protective equipment like footwear (ISO 20345: 2004 Part-2), rubber gloves (IS 4770: 1991) would be provided to	WRSS

	workers. In addition, provisions of the "Central Electricity Authority (Measures Relating to Safety and Electric Supply) Regulations 2010" would be adhered to.	
	Induction training to the entire new employee and six monthly refresher training for substation O&M staff would be organised.	WRSS
Injury/ mortality from emergency situation	Preparation of fire emergency action plan and training given to staff on implementing emergency action plan.	WRSS

*** Contractors are imposed with penalties in case of any default of norms during supply & erection phase. During construction phase these activities are monitored by WRSS project team.**

6.3 Environmental Monitoring Plan

The monitoring indicators, frequency for measurement and responsibility for monitoring for each of the migrations proposed the management plan are described Table 6.2. The monitoring of the EMP provisions would be carried out by the respective agencies at a frequency mentioned in the Environment Management Plan.

Table 6-2 : Environmental Monitoring Plan and Responsibility

SI No	Project phase/Activity	Potential impacts	Parameter to be monitored/indicator	Monitoring frequency	Responsibility
Pre-construction					
1.1	Location of transmission line/ tower	Diminution of land value in the width of RoW, restriction on use of land	Compensation received by land owner, grievance recorded from land owner	Once before construction work	WRSS
1.2		Exposure to safety related risks	Setback distances to nearest dwelling units	Once during detailed design	WRSS subdivision/Division/Circle
1.3		Exposure to electromagnetic inference	Electromagnetic field strength for proposed line design	Once during detailed design	WRSS subdivision/Division/Circle
1.4		Damage to private property	Distance from nearest dwelling units	Once during detailed design	WRSS subdivision/Division/Circle
1.6	Felling of trees on the land	Permission under the tree felling act	Number of trees felled against the permissible number of trees which can be felled	Once before commencement of construction activity	WRSS subdivision/Division/Circle
1.7	Design of residential quarter and office at substation	Water/ soil pollution	Provision of septic tank with soak pit in substation design	Once during detailed design	WRSS subdivision/Division/Circle
1.8	Securing the land for transmission line/ tower	Loss of forest land	Stage I and Stage II clearance	Once before commencement of construction activity	WRSS subdivision/Division/Circle
Construction					
2.1	Site preparation and construction work for tower foundation and substation construction	Loss of topsoil	Practice adopted to store and reuse topsoil which is removed from the construction site	Every Week	WRSS subdivision/Division/Circle
2.2		Noise and Vibrations	Maintenance log book of vehicle/machinery, Number of equipment/vehicle undergoing regular maintenance	Every Week	WRSS subdivision/Division/Circle

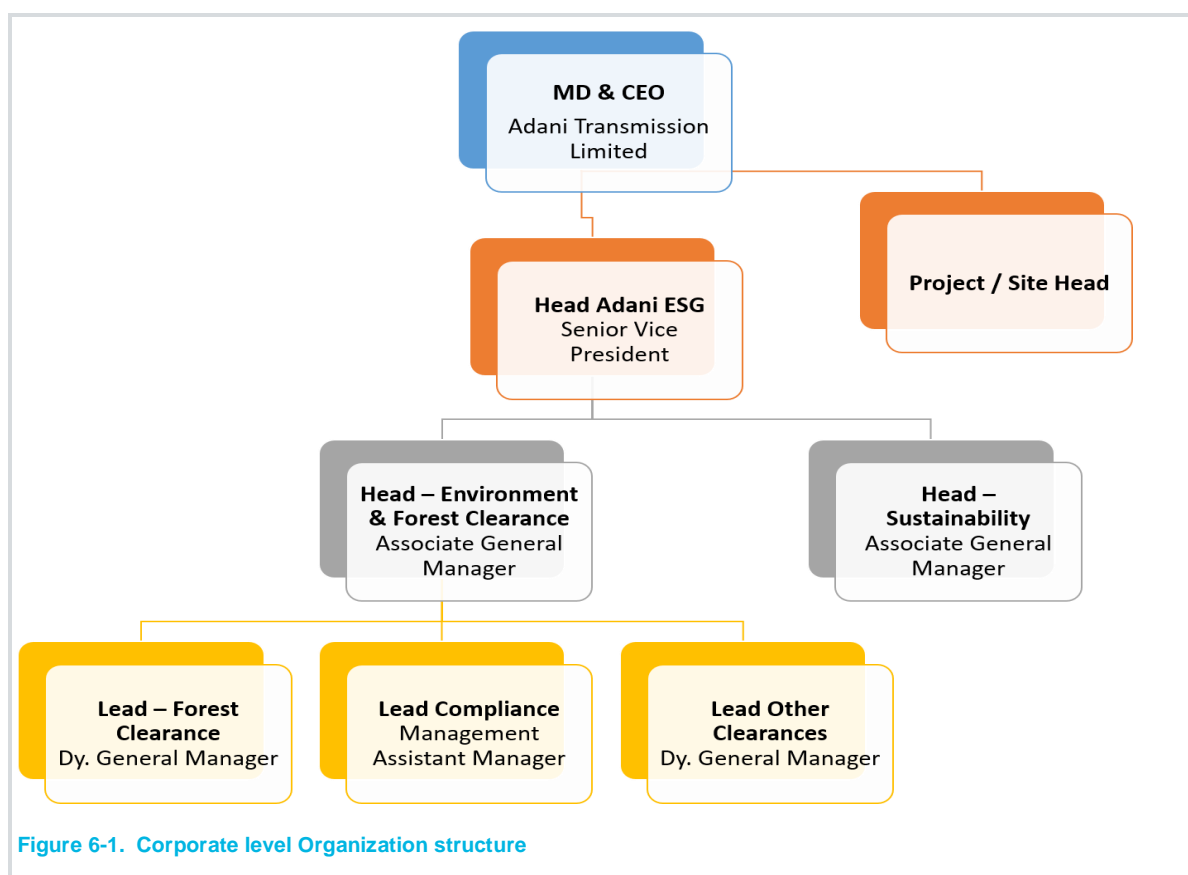
SI No	Project phase/Activity	Potential impacts	Parameter to be monitored/indicator	Monitoring frequency	Responsibility
2.3		Air pollution	Water sprinkling dust generating area	Every Week during tower construction work	WRSS subdivision/Division/Circle
			Tarpaulin cover an vehicle carrying loose construction/excavated material	Every Week during tower construction work	WRSS subdivision/Division/Circle
			Tarpaulin cover on loose construction/excavation materials	Every Week	WRSS subdivision/Division/Circle
			Number of vehicle not having valid PUC certificate	Every Month	WRSS subdivision/Division/Circle
			Maintenance log book of vehicle/machinery, number of equipment/vehicle undergoing regular maintenance.	Every Month	WRSS subdivision/Division/Circle
		Water/soil pollution	Availability septic tanks and soak pits/modular bio-toilets	Every Month	WRSS subdivision/Division/Circle
		Erosion and Sediment	Measures adopted to prevent erosion	Every Month	WRSS subdivision/Division/Circle
			Availability of peripheral site drainage channel, sedimentation tank		
		Depletion of water resource	Water conservation measures adopted at construction and labour camp	Every Month	WRSS subdivision/Division/Circle
2.4	Community Health and Safety	Injury and sickness of local people	<ul style="list-style-type: none"> •Number of accidents of local people (if any) of construction site, number of grievance recorded •Review of document related to regular health check-up of the work force •Review of document related to awareness 	Every Month	WRSS subdivision/Division/Circle

SI No	Project phase/Activity	Potential impacts	Parameter to be monitored/indicator	Monitoring frequency	Responsibility
			camp organised periodically		
		Local women community	Physical observation of the labour camp before commencement of construction and during construction period	Every Month	WRSS subdivision/Division/Circle
2.5	Occupational Health and Safety	Injury and Sickness of workers	Awareness of workers, use of PPE by workers	Every 15 days	WRSS subdivision/Division/Circle
		Labour camp related EHS and Hygiene issues	Condition of labour camp, awareness of workers, compliant register	Every 15 days	WRSS subdivision/Division/Circle
		Conflict with local community due to sharing of local recourse	No of registered grievances and redressal status	Every month	WRSS subdivision/Division/Circle
3.Operation and Maintenance					
3.1	Drainage of storm water	Water /soil pollution	Available of internal and peripheral site drainage channel, sedimentation tank and oil water separator of outfall of peripheral site drainage channel	Every month	WRSS subdivision/Division/Circle
3.2	Handling and disposal of waste	Water /soil pollution	Municipal disposal arrangement for GPS, Availability of composting pit Availability of authorization letter	Annually	WRSS subdivision/Division/Circle
3.3	Occupational health and safety of staff	Injury/mortality to staff during operation and maintenance work	Accident incident register	Monthly	WRSS subdivision/Division/Circle
			Document pertaining to training/awareness programs and mock drills/awareness level of staff engaged in O&M work of substation	Monthly	WRSS subdivision/Division/Circle
		Injury/mortality from emergency situation	Accident-incident list	Monthly	WRSS subdivision/Division/Circle

SI No	Project phase/Activity	Potential impacts	Parameter to be monitored/indicator	Monitoring frequency	Responsibility
3.5	Community health and safety	Injury /mortality to public	Accident-incident list	Monthly	WRSS subdivision/Division/Circle

6.4 Organizational Structure

6.4.1.1 Corporate Level E &S Management System



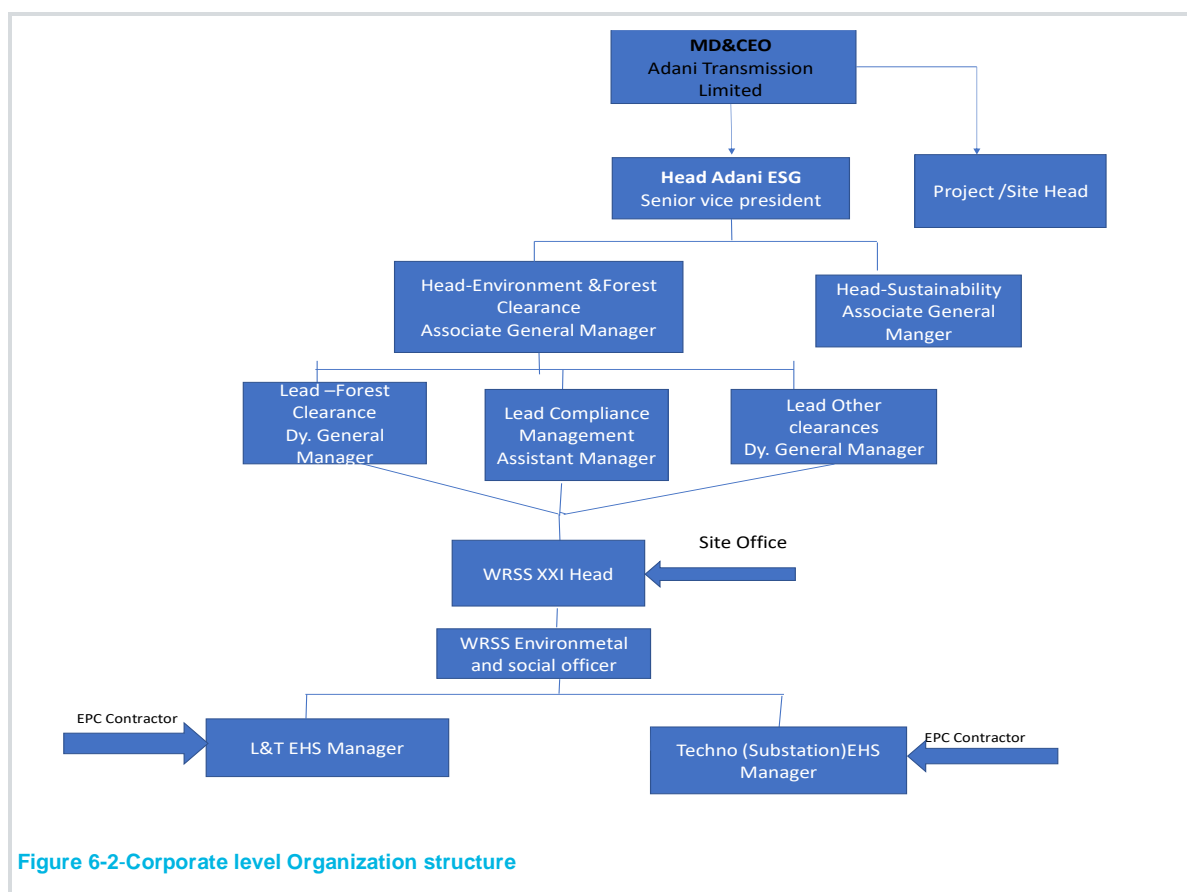
As per the document ESMS Manual, the ESMS applies to project life cycle and associated activities, which includes three sequential phases:

- Construction and development of renewable energy project and electric power transmission infrastructure;
- Renewable energy project operations; and
- Renewable energy project decommissioning, site restoration and closure.

The ESMS has established E&S requirements concerning a) policy level considerations and commitments, b) management programs/ procedures, c) risk and impact identification, d) organizational competency and capacity, e) emergency preparedness, f) monitoring and supervision of implementation of management measures, and g) stakeholder engagement

6.4.1.2 Project level Organization Structure

Project level organization structure given below.



6.5 Inspectional Monitoring and Reporting

Inspection and monitoring of the environmental impacts of the Project activities will increase the effectiveness of ESMP. Through the process of inspection and auditing, ATL will ensure that the conditions stipulated under various permits are followed. The inspections and audits will be done by off role safety officers deployed by ATL (during construction phase), ATL's EHS department and by external agencies/experts. The entire process of inspections and audits should be documented. The inspection and audit findings are to be implemented by the site head and safety office at site.

6.5.1 Roles and Responsibility

Environment, Health and Safety department shall be responsible for monitoring the implementation of the various actions which are to be executed by the agencies specified in the ESMS at the corporate level and ESMP.

In general, the EHS department shall perform the following activities:

- Preparation of required documents on environmental and social management;
- Ensuring availability of resources and appropriate institutional arrangements for implementation of ESMP;
- Implementation of the health and safety measures;
- Collection of the statistics of health of workers;
- Providing support during routine medical check-ups of workers;
- Awareness and implementing safety programmes;
- Providing job specific induction training;
- Compliance of regulatory requirements;
- Carrying out environmental audits;
- Identify unsafe acts and conditions and suggest remedies;
- Develop safety culture and comply with company's EHS policy and standard requirements;

- Encourage and enforce the use of PPE's;
- Educate all employees for the use of PPE's and safe practices;
- Direct, coordinate and orient the safety activities;
- Promulgate the spread of policy, objectives, rules and/or regulations;
- Perform a thorough investigation of all accidents and review the recommendations to avoid any repetition;
- Monitoring the progress of implementation of ESMP; and
- Reviewing and updating the ESMP as and when required for its effective implementation

6.5.2 Reporting and Documentation

ATL will develop and implement a programme of regular reporting through the stages of the project lifecycle. The personnel delegated EHS roles shall be required to fully comply with the monitoring programme in terms of timely submissions of reports as per acceptable level of detail. Reporting will be done in form of environmental check list, incident record register, training records, and Environmental and Social Performance report' (weekly, monthly, quarterly, half yearly, yearly etc.).

6.5.3 External Reporting and Communication

EHS head of ATL and Cluster Safety officer will be responsible for ensuring that communication with regulatory agencies and stakeholders are maintained as per the requirement. All complaints and enquiries are to be appropriately dealt with and records should be maintained in a Complaint/Enquiry Register by the delegated staff of EHS.

6.5.4 Internal Reporting and Communication

Documentation is an important step in the implementation of the ESMP. ATL has a formal monitoring and review procedures in place. Key points of the monitoring and review procedure are as below.

The Monitoring and review procedure mandates ATL SOP No.1 Document and Record Control procedure to be followed at Site.

- The monitoring and review procedure also mandates development of environmental and social monitoring plan to capture all the specific monitoring needs identified in the site specific documents and final project ESIA/DPR.
- Non-conformances noted in monitoring activities will be resolved through the corrective and preventive action process as prescribed in SOP No. 3. Any EHS non-conformance identified at Site should be brought in immediate attention of Site supervisor who will forward such information to the EHS Manager for evaluation.
- An annual regulatory compliance verification audit will also be conducted by EHS manager for detailed verification of project compliance with applicable regulation.
- After initiation of construction phase, project is required to conduct OHS hazards and risks assessment annually and results of the assessment to be shared at Corporate level as part of performance data required by management review process.
- Internal audits are required to be conducted once in six months by the cluster level EHS coordinator.

6.5.5 Documentation

Documentation is an important step in the implementation of the ESMP, ATL will establish a documentation and record keeping system in keeping with their ESMS, to ensure recording and updating of documents as discussed in the ESMP. Responsibilities have to be assigned to relevant personnel for ensuring that the ESMP documentation system is maintained and that document control is ensured through access by and distribution to, identified personnel in form of the following:

- Master Environment Management System document;

- Legal Register;
- Operation control procedures;
- Work instructions;
- Incident reports;
- Emergency preparedness and response procedures;
- Training records;
- Monitoring reports;
- Auditing reports; and
- Complaints register and issues attended/closed.

6.6 ESMP Review and Amendments

The ESMP acts as an environment and social management tool which needs to be periodically reviewed to address changes in the organization, process or regulatory requirements. Following a review, Site in charge in coordination with personnel delegated EHS will be responsible for making the amendments in the ESMP and seeking approval from the Regional and Corporate heads. The amended ESMP will be communicated to all the staff on the project

6.7 Occupational Health Management

The construction phase includes site preparation, tower erection and sub-station construction, access road to towers, construction area for sub-stations, etc. The health hazards associated with these activities are mainly due to dust and noise pollution. Excessive noise contributes to loss of hearing and triggers physiological and psychological body changes. Dust pollution can cause eye and respiratory irritation and, in some cases, allergic reactions. The inhalation of exhaust gases from vehicles and machinery are also harmful for health. Stress can be caused by working in shifts, high workload, poor living condition of workers etc.

Table 6-3 : General Measures for Workers' Health

• Issues	• Requirements
• Health and Hygiene	<ul style="list-style-type: none"> • Cleanliness • Ventilation and temperature • Dust and fumes • Disposal of wastes and effluents • Overcrowding • Illumination • Latrines and urinals • Spittoons and dustbins
• Dust and Fumes	<ul style="list-style-type: none"> • Any dust or fumes or other impurities likely to be injurious to the workers, effective measures shall be taken to prevent its accumulation and its inhalation by workers
• Overcrowding	<ul style="list-style-type: none"> • No work room in any factory shall be overcrowded • At least five hundred cubic feet of space shall be provided for every worker employed in a work room
• Latrines and urinals	<ul style="list-style-type: none"> • Sufficient latrines and urinals shall be provided • Shall be maintained in clean and sanitary condition • Shall be adequately lighted and ventilated
• First aid	<ul style="list-style-type: none"> • Provided and maintained first aid facility • One for every one hundred and fifty workers • Shall be kept with a responsible trained person who shall be available during the working hours • In every facility where five hundred or more workers are employed, a dispensary shall be provided and maintained

- Disposal of wastes and effluents
- Provide with proper disposal system for solid waste and effluents
- In case of a factory where no public sewerage system exists, prior approval of the arrangements should be made for the disposal of wastes and effluents

6.8 Disaster Management

The main risks are related to physical injuries due to fall from heights, objects falling on persons, risk of working in confined environment, fire, electrocution and impact of electromagnetic waves. All the above risks can be life threatening and utmost care should be taken to reduce the risks. The section below gives the details of the mitigation measures to reduce the risks.

Table 6-4 : General Measures for Workers' Safety

Risk of working at heights	<ul style="list-style-type: none"> • Construction workers should wear protective helmets, protective glasses, safety belts and protective shoes. • Installation of fixtures on tower components to facilitate the use of fall protection systems. • A main guardrail at least 1 meter above the edge • 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, among others; • Safety belts and harnesses should be of not less than 16mm two-in-one nylon or material of equivalent strength. • When operating power tools at height, workers should use a second (back-up) safety strap. • Signs and other obstructions should be removed from poles or structures prior to undertaking work.
Risk of falling objects	<ul style="list-style-type: none"> • Putting nets above the ground level in areas where work is in progress so as to avoid falling objects reaching the ground • No loose material shall be left on the platform. Place the tools in toolbox & other items in basket. • <u>Tethering tools</u> and equipment with connectors, connection points, and anchors • Restriction to climb up on the rails of scaffold to overreach job location. • Proper training to workers who are working heights
PRECAUTIONS IN CASE OF FIRE	<ul style="list-style-type: none"> • Shall be provided with means of escape in case of fire • Effective measures shall be taken to ensure that all the workers are familiar with the means of escape • Fire-fighting apparatus should be provided and maintained
WORKING IN CONFINED PLACES	<ul style="list-style-type: none"> • Workers should not be exposed for more than 4 hours • Ear muffs and other PPEs should be provided
ELECTRICAL HAZARDS DURING OPERATION	<ul style="list-style-type: none"> • Consider installation of hazard warning lights inside electrical equipment enclosures to warn of inadvertent energization; • Use of voltage sensors prior to and during workers' entrance into enclosures containing electrical components; • Deactivation and proper grounding of live power equipment and distribution lines according to applicable legislation and guidelines whenever possible before work is performed on or proximal to them; • Provision of specialized electrical safety training to those workers working with or around exposed components of electric circuits. This training should include, but not be limited to, training in basic electrical theory, proper safe work procedures, hazard awareness and identification, proper use of PPE, proper lockout/tagout procedures, first aid including CPR, and proper rescue procedures. Provisions should be made for periodic retraining as necessary.

6.8.1 Disaster Management plan for Natural disaster

The study area is prone to natural disasters such as earthquakes and floods. For transmission projects the main risks due to earthquakes and heavy rainfall/flooding are

- Collapse of structures due to earthquake.
- Road blockage on account of conductor snapping or tower collapse near road crossings or road proximity.
- Conductor snapping due to mechanical failure, wind pressure, insulator failure.
- Insulator failure due to a lightning strike, mechanical damage, sabotage, surge voltages.
- Flooding of cable trench due to heavy rainfall

WRSS will develop plans and procedures to identify the potential for and response to natural disaster such as earthquakes and floods. Emergency preparedness and response will be reviewed by EHS officer on at least an annual basis and after the occurrence of any accidents or emergency situations to ensure that lessons learnt inform continuous improvement. Emergency exercises will be undertaken on a regular basis to confirm adequacy of response strategies. Investigations of damage from natural disasters will follow formal documented procedures associated with them.

The steps to be taken to ensure safety and minimum damage in times of natural disaster are provided below.

Earthquakes

- All maintenance staff should stay away from transmission towers and conductors and remain under cover until the movement subsides
- After the shaking stops, survey your immediate area for trapped or injured persons and ruptured utilities (water, gas, etc.), broken conductors, damaged towers, transformers, etc. If damage has occurred in your area, inform Safety and Security immediately
- Do not evacuate until instructed by emergency personnel
- If out in the open, stay in an open area away from buildings, power lines, trees or roadways.

After an earthquake:

- Put on enclosed shoes to protect against broken glass
- If the power is out use a flashlight. Do not light a match or candle
- Be alert for safety hazards such as fire, electrical wires, gas leaks, etc.
- Check on others. If there are injuries or other urgent problems, report them to Safety and Security
- Give or seek first aid. Assist any disabled persons in finding a safe place for them
- Evacuate if the building seems unsafe or if instructed to do so
- Cooperate with emergency personnel, keep informed, and remain calm

Flooding

Minor or area flooding could occur as a result of a major multiple rainstorms. For imminent or actual flooding, and only if you can safely do so:

- Secure vital equipment, records, and other important papers
- If present in your area, report all hazardous materials, chemicals to security officers.
- Shut off all electrical equipment
- If the building or sub-stations or other installations must be evacuated, follow the instructions on Building Evacuation
- Do not return to sub-stations until you have been instructed to do so by security officers

If you are assisting with flood clean-up, report immediately to Environmental Health and Safety any oil, chemical, or hazardous materials suspected of mixing with flood waters

7. Stakeholder Assessment and Discloser

This section provides the stakeholder identification and analysis as well as a brief understanding of the engagement process for the project.

Stakeholder mapping and analysis is the process of identifying individuals or groups having a stake and influence over the entire cycle of project. The identified stakeholder groups are then assessed according to their impacts on the project and the impact the project will have on them. This information is then used to assess the way the interests of the stakeholders or the project's impact on them should be addressed in the project development plan or its operation.

The identification of stakeholders and their inclusion in the decision-making process is thus crucial in the process of prioritizing, analysing and addressing issues; and in developing management systems and to address the concerns/ expectations of various stakeholders.

The main objective of stakeholder analysis lies in the assessment and understanding of the socio-political environment surrounding the project. It allows for:

- Identification of the interests, concerns and societal risks surrounding the stakeholders, as well as conflicts of interests (if any);
- Identification of relations between stakeholders that may enable “coalitions” of project sponsorship, ownership and co-operation as well as the mechanisms which may influence other stakeholders;
- Key groups/ individuals to be identified who need to be informed about the project during the execution phase;
- Identifying stakeholders (those who might have an adverse impact on the project) and taking appropriate measures to mitigate their influence; and;
- Development of a framework for participatory planning and implementation of various project activities including interventions for community development.

7.1 Stakeholder Assessment

7.1.1 Stakeholder Identification

This section provides an analysis of the stakeholders identified for the project. This stakeholder identification is based on the present understanding of the project context, its footprint, the primary data collected during site visit in November 2020 and the understanding of transmission lines projects in India. This analysis of stakeholders identifies the individuals or groups that are likely to be impacted by the project activities and groups them based on the significance of the impact/influence.

A stakeholder is “a person, group, or organization that has a direct or indirect stake in a project/organization because it can affect or be affected by the Project/organization's actions, objectives, and policies”. Stakeholders thus vary in terms of degree of interest, influence and control they have over the project. Stakeholders who have a direct impact on or are directly impacted by the project are known as **Primary Stakeholders**, those who have an indirect impact or are indirectly impacted are known as **Secondary Stakeholders**. Keeping in mind the nature of the project and its setting, the stakeholders have been identified and listed in the table below.

Table 7-1 : Stakeholder Group Categorisation

Stakeholder Groups	Primary Stakeholders	Secondary Stakeholders
Community	<ul style="list-style-type: none"> • Project Affected Landowners of the Transmission Line (Tower and ROW) • Landowners of the Substation 	<ul style="list-style-type: none"> • Local Community • Vulnerable Community

Stakeholder Groups	Primary Stakeholders	Secondary Stakeholders
Institutional	<ul style="list-style-type: none"> Project Developers 3 Gram Panchayats and Local administration 	
Government Bodies	<ul style="list-style-type: none"> Regulatory Authorities District Administration 	
Other Groups	<ul style="list-style-type: none"> EPC Contractor and Sub Contractors Contractual Workers Migrant Labours 	<ul style="list-style-type: none"> Media Local NGOs

7.1.2 Stakeholder Analysis

Stakeholder Analysis is understood as the process of examining the relative influence that different individuals and groups have over a project as well as the influence of the project over them.

The significance of a stakeholder group is categorized considering the magnitude of impact (type, extent, duration, scale and frequency) or degree of influence (power and proximity) of a stakeholder group and urgency/likelihood of the impact/influence associated with the stakeholder group in the project context. The magnitude of stakeholder impact/influence is assessed taking the power/responsibility and proximity of the stakeholder group and the group is consequently categorized as negligible, small, medium or large. The urgency or likelihood of the impact on/influence by the stakeholder is assessed in a scale of low, medium and high. The overall significance of the stakeholder group is assessed as per the matrix provided below

Table 7-2 : Stakeholder Impact Matrix

		Likelihood of influence on/by stakeholder		
		Low	Medium	High
Magnitude of Influence/ Impact	Negligible	Negligible	Negligible	Negligible
	Small	Negligible	Minor	Moderate
	Medium	Minor	Moderate	Major
	Large	Moderate	Major	Major

Based on such an understanding, the stakeholders are categorized into High Influence/ Priority, Medium Influence/ Priority and Low Influence/ Priority. The stakeholders who are categorized as high influence implies a high degree of influence of the stakeholder/project on the project/stakeholders in terms of participation and decision making or high priority to engage with the stakeholder; Similarly, the stakeholders categorized as medium influence are those who have a moderate influence over the project or even though they are to be impacted by the project, it is unlikely to be substantial and these stakeholders are thus neither high nor low in the project proponent's list for engagement. On the other hand, the stakeholders with low influences are those who have a minimal influence on the decision-making process or are to be minimally impacted by the project and are thus low in the project proponent's engagement list.

The intermediary categorisation of low to medium or medium to high primarily infer that their influence and important could vary in that based on specific conditions and context or also based on the responses of the project towards the community.

The coverage of stakeholders as stated above includes any person, group, institution or organization that is likely to be impacted (directly or indirectly) or may have interest/influence over the project. Keeping this wide scope of inclusion in stakeholder category and the long life of project, it is difficult to identify all potential stakeholders and gauge their level of influence over project at the outset of the project. Therefore, project proponent is advised to consider this stakeholder mapping as a live document which should be revised in a timely manner to make it comprehensive for any given period of time. **Table 7.3** provides details on the stakeholder mapping and analysis.

Table 7-3 : Stakeholder Mapping and Analysis

Stakeholder Groups	Profile	Impact/Influence of the project on this Stakeholder Group	Impact/Influence of the Stakeholder Group on the project	Expectations, Opinions Key Concerns of Stakeholders	Overall Rating of Stakeholder Influence
Primary Stakeholders					
Project Affected Landowners of the transmission Line	This stakeholder group is comprised of approx. 550 private landowners whose land is used for tower footing. The number of projects affected person along the ROW is likely to be finalized as the process of identification of landowners along the TL corridor is still ongoing	The main influence of project on the stakeholder group will be in the form of impact on restriction of land use /depreciation of the land value will be impacted by the project and creation of economic opportunities. The project will also likely to have a minimal reduction in the total land productivity.	The influence of the stakeholder group on the project will pertain to the willingness of the landowners to utilise the land for tower footprint. The stakeholder group may also have a significant role to play in the public opinion formation towards the project, especially since most of these landowners will continue to use their land for agricultural use.	The major concern of the stakeholder is adequate compensation for land under the tower footprint and in the case of crop loss the affected landowners should be provided compensation for damages to crops during laying of tower foundation and stringing.	Influence/Impact of Stakeholder: Large Influence/Impact of the Project: High
Landowner of the Substation	This stakeholder group comprises of landowners, whose land has been procured for the substation. The project has procured land from 41 landowners. The land procurement is undertaken through willing buyer willing seller.	As seen during site visit, land for the proposed substation is an agricultural land and cultivation is undertaken partially inside the land parcel. The land procurement will lead to reduction of agricultural landholding in case of landowners with marginal landholdings.	Non-compliance to the legal requirements; and meeting the community expectations. Leaving behind a legacy of conflict-ridden relationship with local communities	Compensation for the land purchased due to the project at market rates Adequate time to harvest the agriculture produce from the land procured. Timely disclosure of information	Influence/Impact of Stakeholder: High Influence/Impact of the Project: Large
Vulnerable Groups	This stakeholder groups comprises of the ST and SC population, women headed household, elderly, physically handicapped and economically poor households. Along the study area, SC population comprises of 20% and ST 1% of the overall population.	Based on the understanding of the project and its activities, the vulnerable groups are likely to be impacted due to land use. This is critical in the case of economically weaker and marginal category farmer with small landholdings more susceptible to restriction on land use.	This group's influence on the project stems from the group being part of a larger community. However, the level of influence exerted is expected to be lower due to their socio-economic standing in the community	Priority in economic benefits and development opportunities created by the project Access to project CSR activities Minimal disturbance to the community in regard to access issues, pollution and influx of migrant workers	Influence/Impact of Stakeholder: Low Influence/Impact of the Project: High

Stakeholder Groups	Profile	Impact/Influence of the project on this Stakeholder Group	Impact/Influence of the Stakeholder Group on the project	Expectations, Opinions Key Concerns of Stakeholders	Overall Rating of Stakeholder Influence
Gram Panchayat and Local Administration	This stakeholder group comprised of the lowest level of local governance. The gram panchayats consist of one or more revenue villages and are the lowest level of decision-making bodies for development activities in the villages.	The project can play an important role in the development of the villages by undertaking CSR activities in collaboration with the Gram Panchayat.	The influence of the gram panchayat for obtaining NOC for construction of substation in Lakadia. Similarly, this stake holder group plays a crucial role in the smooth functioning of the projects by giving approval for setting up canvass camp for labour during constructions and for dissemination information to the local community. The panchayat member also plays a critical role since the process of ROW procurement is still underway the way the panchayat plays a critical role in identification of landowners, providing NOC for setting up the projects. They also have a significant role to play in the public opinion formation towards the project, In the case of CSR activities, this stakeholder group plays an important role in planning and execution of CSR activities	Consultation with the headmen/ leaders reveal that the expectations and concerns of this group from the project is limited to adequate compensation for the affected farmers. They are willing to extend their support for the project and have no objection with regards to the projects. They also expressed that the project will bring in positive impact to the overall development in their villages such as employment opportunities for the local people.	Influence/Impact of Stakeholder: High Influence/Impact of the Project: Small
Regulatory Authority	This stakeholder group is comprised of the central, state and district level regulatory authorities such as the Ministry of Forest, Pollution control board, Gujarat Electricity Authority etc. These authorities influence the project in terms of establishing policy, granting permits and approvals for the	The influence of the project on the stakeholders pertains to the role the project will play in the development of power evacuation networks in the area. The project should comply with applicable regulatory framework comprising of the guidelines and policies of the state and central bodies	The failure of the project to comply with the various rules and regulations applicable may play a role in the timely implementation of the project. This stakeholder group is also critical for various permits/clearances required for the commissioning of the project	The key expectations and concerns of the regulatory authorities from the project is ensuring the project compliance to all regulatory requirements, timely disclosure of information and provisioning of updates throughout the project life cycle	Influence/Impact of Stakeholder: High Influence/Impact of the Project: Small

Stakeholder Groups	Profile	Impact/Influence of the project on this Stakeholder Group	Impact/Influence of the Stakeholder Group on the project	Expectations, Opinions Key Concerns of Stakeholders	Overall Rating of Stakeholder Influence
	project, monitoring and enforcing compliance with the applicable rules and regulations				
District Administration	<p>This stakeholder groups comprised of government bodies at the district level which influences the decision-making authority throughout the decentralisation process. These includes the District Collector, forest Department, Block Development Officer, Tehsildars, Revenue Officer. These government bodies are responsible for providing approvals (section 164 of the electricity Act) for the project, deciding the compensation rate for the affected landowners, Similarly the revenue and land registry would be responsible for documentation/ registration of land lease, mutation, updating and records</p>	<p>The project is expected to have a positive influence over the local administration by extending support through these authorities or by collaborating to undertake any community development activities. The influence of the project on the stakeholders pertains to the role the project will play in the development of power evacuation networks in the area</p>	<p>This stakeholder group is critical for the obtaining of the various permits/clearances required for the commissioning of the project and its smooth functioning thereafter. Delay in issuance of the relevant permits can adversely impact the timely execution of the project. Similarly, unresolved matters relating to land such as litigation, non-payment of compensation and encroachment might create complications, drag the firm into legal disputes thereby</p> <p>This group serves as important points of contact between the state level authorities and the local community</p>	<p>The overall opinion of the local authorities is positive towards the project and secondly, that the project may bring development and create some local employment and other opportunities in the form of local contractors the local community</p>	<p>Influence/Impact of Stakeholder: High</p> <p>Influence/Impact of the Project: Small</p>
EPC Contractors and Sub-Contractors	<p>WRSS is the project developers and has appointed the L&T as the EPC contractor for project construction. WRSS role is to provide the contractor the land for laying of tower foundation and tower erection.</p>	<p>The influence of the project on the group pertains to the role of the project in business opportunities and the process of contract closure</p> <p>Employment opportunities for local unskilled and skilled labour. As informed during consultation, the EPC contractor has employed local</p>	<p>This stakeholder group is critical for the smooth functioning and timely implementation of the project</p>	<p>The major concern of these stakeholders is, smooth functioning of the project without any litigation or community conflict; Timely payment of their agreed contract amount from developers;</p>	<p>Influence/Impact of Stakeholder: High</p> <p>Influence/Impact of the Project: High</p>

Stakeholder Groups	Profile	Impact/Influence of the project on this Stakeholder Group	Impact/Influence of the Stakeholder Group on the project	Expectations, Opinions Key Concerns of Stakeholders	Overall Rating of Stakeholder Influence
	For construction of the Substation at Lakadia, Techno Private Limited has been appointed for construction and WRSS is responsible for providing land for construction. The land procurement was undertaken by the Land Department of Adani Group.	labour for foundation works and security guards.			
Workforce-Migrant Labour/Contractual workers	<p>This stakeholder group comprises of those workers who are to be engaged in the project on a contractual basis through the different phases of project life.</p> <p>These labourers will be primarily semiskilled and unskilled workers. As reported by WRSS team has employed migrant labour from neighbouring states such as Jharkhand and Bihar for the ongoing construction work (tower foundation and erection)</p>	The primary concern of the stakeholder group pertaining to the project will be as following: - the role of the project in continued economic opportunity, work generation and a source of income	These stakeholder group's influence on the project pertains to their role in the smooth functioning of the project and the opinion formation towards the project	The main expectations from the project will be: - timely settlement of dues and payments in keeping with the legal requirements - continued work opportunities - safety at work	<p>Influence/Impact of Stakeholder: High</p> <p>Influence/Impact of the Project: Medium</p>
Workforce: Employees	This stakeholder group comprises of the regular employees of WRSS Team who are to be involved in the various stages of the project	The project is expected to ensure continued economic opportunities and work generation	<p>The influence of these stakeholders pertains to the roles played by them in the overall smooth functioning of the project operations as well as the brand value.</p> <p>They will also serve an extremely important role in the maintenance and improvement of services and facilities</p>	The expectations of this stakeholder group in regards to the project pertain to the following: - Job security, Safe working conditions, Provision of rewards and recognitions for good performances and safe behaviour - Proper work-life balance - Ethical and	<p>Influence/Impact of Stakeholder: High</p> <p>Influence/Impact of the Project: Medium</p>

Stakeholder Groups	Profile	Impact/Influence of the project on this Stakeholder Group	Impact/Influence of the Stakeholder Group on the project	Expectations, Opinions Key Concerns of Stakeholders	Overall Rating of Stakeholder Influence
Secondary Stakeholders					
Local Community along the AOI	The local community is an important stakeholder as the transmission line is being erected on private land. The local community in the study area is comprised of 3 villages along the 500-metre buffer along the TL corridor. The community has an agrarian economy where cultivators and agricultural labours form a major proportion of the economically active population	As informed during consultation, the project has involved local unskilled labour for tower foundation work. Consultation with local community reveal that villages around the project corridor are facing difficulties in accessing clean drinking water. The need-driven CSR activities can play a critical role in the development of the community.	The stakeholder group may have a significant role to play in the public opinion formation towards the project	professional conduct - Employee engagement within & after working hours - Regular updating of rules and regulations Facilitation and maintenance of everyday convenience in regard to facilities such as transport, seating, food, accommodation etc	Influence/Impact of Stakeholder: Medium Influence/Impact of the Project: Small
NGOs/Local Media	Local NGOS based out in Gujarat acts as a social watchdog in matters relating to securing the livelihoods of the	Engagement of local NGOs for any ongoing/upcoming CSR though partnership for local development.	The stakeholder group may have a significant role to play in the public opinion formation towards the project largely by whether the impacts of	NGO They can also play a major role in community mobilization, building trust and	Influence of Stakeholder: Medium Influence of the Project: Small

Stakeholder Groups	Profile	Impact/Influence of the project on this Stakeholder Group	Impact/Influence of the Stakeholder Group on the project	Expectations, Opinions Key Concerns of Stakeholders	Overall Rating of Stakeholder Influence
	<p>rural communities along with their socio-cultural facets</p> <p>Though the number of such NGOs active in the study could be ascertain.</p> <p>Media comprising of print and visual media</p>		<p>setting up of the development venture is being viewed/ perceived in positive light by the local population with special reference to the vulnerable communities or not.</p>	<p>even participate in implementing CSR initiatives.</p>	

Summary of the overall stakeholder influence is presented in the **Table 7.4**

Table 7-4 : Summary of Stakeholder Analysis

Stakeholder Group	Relevant Stakeholders	Magnitude of Influence/Impact	Likelihood of Influence on/by Stakeholder	Overall Rating of stakeholder influence
Primary Stakeholder	Project Affected Person along the ROW and Tower Footing	High	High	Major
	Landowner for land procured for Substation	High	High	Major
	Regulatory Authorities	Small	High	Moderate
	District Administration	Small	Medium	Minor
	EPC Contractor	High	High	Major
	Contractual Labour/Migrant workers	High	High	Major
	Local Gram Panchayat	Small	High	Moderate
Secondary Stakeholder	Local Community	Small	Medium	Minor
	NGO/Media	Small	Medium	Minor

7.1.3 Stakeholder Consultation

As part of the ESIA process, the project team has undertaken consultation with the stakeholder of the project to understand the concern expectation for the projects. The main objective of the consultations was made to develop an understanding of the stakeholder group's key concerns and expectations from the project, the stakeholder group's perception of the project and to triangulate the secondary information available on the area. Table 7-5 provides a summary of the consultations undertaken with different stakeholder. Details regarding the consultation undertaken have been provided as **Appendix A**

Table 7-5 : Consultations undertaken for the Project

Date	Stakeholders Details	Brief Outcome of the consultation
25th November 2020	Consultation with the Project of WRSS	<ul style="list-style-type: none"> The avoidance measure for finalising the route alignment was finalised based on the minimum environmental impacts, avoiding human settlements, forest covers etc. Land procurement for RoW has been undertaken as per the Electricity Act 2003. The project had undertaken negotiation with the affected landowner was undertaken for the land use. About 500 landowners will be impacted due to tower footing, Details of affected landowner along the ROW is yet to be finalised. Compensation for land is paid as per the MoP guideline is 85% of the land value for Tower and 25% for RoW corridor. Compensation for the affected landowners is paid in three phases 3 phase So far 100 landowners have received compensation. The land price for compensation was fixed by the District Collector at the rate of INR 900 for unirrigated and 950 for irrigated land. The project has appointed Larsen & Turbo as the EPC contractor for Transmission line and Techno India for lakadiya Substation.
26th November 2020	Consultation with Local Community in Jawahanagar	<ul style="list-style-type: none"> The village comprises of 2000 population. The primary occupation is agriculture and 90% are into farming. Other occupation id daily wages in nearby villages. Major crops grown are cotton and castor.

Date	Stakeholders Details	Brief Outcome of the consultation
		<p>Horticulture crops are grown in the area such as Guava, pomegranate. Irrigation facilities.</p> <ul style="list-style-type: none"> Government tap water is connected in every household, however due to irregular water supply, the villager is facing issues with access to clean drinking water whole year round. The village is comprised mainly of agriculture land. The market value of land varies from INR 4 lakhs -6 lakhs/acre. Government land rate is INR 2 lakh per acre. The affected landowner received compensation amounting of 8 lakh (land and crop compensation) for tower footing. There is an existing Powergrid transmission line passing through the village. The project took place in the year 2018-19. The villages are aware about the project. The villagers are concern about the land use restriction and secondly fear of getting electrocuted especially during rainy season. Their expectation for a better compensation. No significant cultural heritage/ monuments in the village. People who are impacted by the existing Powergrid TL, undertake cultivation underneath the tower footing. No human fatalities have been reported on account of the existing.
26th November 2020	Consultation with the Headman of Khisra Village	<ul style="list-style-type: none"> Khisra falls under Khisra Gram Panchayat. Total households 500-600. Major community are Muslims, followed by Ahir, Rabari, Harijan. 50% of the population are engaged in agriculture and 50% of the working population works as daily labour in nearby factory of existing solar power plant. Major crop grown are cotton and Castor. Irrigation facilities have their own borewell. The sarpanch is very much aware of the project. 17 towers will pass through Khisra village and 20 landowners will be impacted. None of the affected landowners have received compensation for tower. The issuance of Demand draft is ongoing with the local gram panchayat. Land price in the area varies from 6 lakhs -8 lakh/acre. INR 8 lakhs is compensated for each tower footing (85%, of the land value)
26th November 2020	Consultation with Local Community in Lodiya	<ul style="list-style-type: none"> The village has a population of 400 HH and the total population in the area is 1000. Triple cropped is cultivated in Lodiya village. A similar Transmission line project happens in the year 2017-18. The land was mainly agriculture land and the main occupation of the people of the villages are agriculture and daily wages. The villages practice double cropping and the main food crops are Wheat, Groundnut, Castor, Cotton. The major community found are the muslim, ahir, rajputs. They community are aware about the project and their concern for adequate compensation for land.
26 th November 2020	Discussion with the EPC Contractor	<ul style="list-style-type: none"> 15.6 acre of land was lease by the EPC contractor for stockyard and labour camp is taken on lease from one landowner. The site has 20-30 workers. Of which migrant workers from Bihar and Jharkhand are

Date	Stakeholders Details	Brief Outcome of the consultation
		<p>engaged for tower erection activities. On a peak season, about 300 workers will be engaged.</p> <ul style="list-style-type: none"> • All workers are provided with induction training and safety training. Medical examination has also been conducted for all workers. • Construction camps are set up for tower foundation work. All construction works are carried out during daytime. Labour camps of 3.6 had been set up near to the stockyard.

7.2 Present Status of Stakeholder Engagement by Project

As per consultation with the project team the current status of stakeholder engagement is limited to consultation with the project affected landowners and the local community/gram panchayat related to obtaining consent from landowners for tower footing and Substation. Other engagement activities include engagement with regulatory authority for permit and approvals, suppliers, vendors and contractor for procurement and construction activities. Though these engagements have been undertaken by the project, no documentation has been recorded by the project proponent. A Stakeholder Engagement Plan for the project has been prepared for implementation at the site level.

8. Grievance Redressal Mechanism

8.1 Grievance Mechanism Principal

The Grievance redressal process of the WRSS project has been developed based on the Corporate Grievance structure and has been customised to the requirement of the project. Some additional features have been added keeping in requirement the IFC Performance standards. This system has been purely designed for external stakeholders (e.g Aggrieved parties, project affected people etc). Internal stakeholders e.g. employees, labour,, contractor would use the internal Grievance redressal mechanism of AATL.. The GRM is anchored on the five principles to guide in facilitating and resolving concerns and grievances:

- **Transparency.** The GRM encourages comments and feedback (negative and positive) to improve the project. The community must be aware of all complaints, grievances and problems reported; must be involved in their redress; and must be kept informed on progress made in resolving grievances. Public would be made aware of the grievance redress procedures. The campaign will ensure that the poor, women, indigenous peoples, the vulnerable and the disadvantaged groups are made aware of grievance redress procedures A Project Information Kit containing GRM overview and contact details in the form of brochures/leaflets and written in local dialects. A GRM hotline will be posted in subproject site.
- **Socially Inclusive.** The whole community (and even those outside) is given the opportunity to raise concerns and the right to be accorded a response. The GRM provides an accessible, inclusive, gender-sensitive and culturally appropriate platform for receiving and facilitating resolution of affected persons' grievances related to the project.
- **Simple and Accessible.** Procedures to file complaints and seek redress are kept simple and easy to understand by the affected people, most specially the nonliterate, and their communities. Affected persons will have the flexibility of conveying grievances/suggestions through verbal narration from walk-in affected person, by dropping grievance redress/suggestion forms in complaints/suggestion boxes in accessible locations, through telephone hotlines, through WhatsApp, by e-mail, by post, or by writing in a complaint register in ULB office or PMU or PIU office.
- **Anonymity and Security.** To remain accessible, open and trusted, the GRM ensures that the identities of those complaining are kept confidential. This encourages people to openly participate and file grievance. Careful documentation of the name of the complainant, date of receipt of the complaint, address/contact details of the person, location of the problem area and the grievance detail will be maintained by the project. Project will ensure a system for grievance tracking and monitoring of grievances lodged, response accorded, its resolution status and closure. The Project Manager along with the Environmental and or Social Management Officer will have the joint responsibility for timely grievance redressal on safeguards and gender issues and for registration of grievances, related disclosure, and communication with the aggrieved party. The affected persons will also be encouraged to seek a complaint registration number through the PIU.
- **Institutional Outreach.** Through the GRM, the project can strengthen channels of communication and mechanisms for grievance redress at the community/project area level.

8.2 Approach to Grievance Redressal

The Grievance redressal mechanism developed for Adani Transmission Limited (the parent organisation) would be extended to the project. A common GRM will be in place to redress the environmental and social safeguards concerns in the project and/or subproject related grievances¹⁶ especially during the construction. However, some modification has been planned to consider the project location, socio-economic conditions.

The Grievance Process would include the surrounding community of the project is considered as important stakeholder by the Project. The possible grievances of the community envisaged, and which could be entertained/addressed through this project include:

- Community development, employment and other issues
- Risks to community, health & safety (e.g. traffic, risk during construction of tower or stringing of conductor);

¹⁶ Grievance is defined as any comments/ suggestions, non-contentious questions/ clarifications regarding the project, issues/concerns that resulted to non-performance of obligations of any of the parties involved in project processes particularly safeguards implementation.

- Accidents (e.g. involving livestock, or other property including community property);
- Unethical Behaviour by ADANI personnel or its sub-contractors;
- Noise/dust/air emissions or any other impact on environment caused by project or sub-contractors;
- Demand for development interventions in the community;
- Issues owing to behaviour of the security personnel and general attitude of the local community;
- Issues related to cultural conflicts or opportunity conflict owing to presence of migrant workers in the community or in the nearby areas;
- Any attempts to conceal the above

8.3 Project Level Grievance Mechanism

A three-tier grievance mechanism is proposed for the project arrangement i.e. at Field level, Project level and Corporate level.

8.3.1 Field Level GRM

Field level arrangements will comprise of contractor and their project implementation staff on ground, and field level staff from WRSS/ATL. All minor issues and those that are immediate and urgent in the perception of the complainant will be resolved at the field level itself. The contractor, and supervision personnel from WRSS/ATL will try to successfully resolve them in consultation with the aggrieved person. In case of larger issues, they will seek the advice and assistance of the Project Management. The Contractor will be responsible for documentation and record keeping. A summary of grievance record will be submitted to the Project Management on monthly basis. The EHS Manager / E&S Officer at both the WRSS/ATL and will both monitor and provide input support to the contractors in field level grievance redress and its record keeping.

8.3.2 Project Level GRM.

A Grievance Redress Cell will be established at Project Manager's Office constituting of the EHS Manager / E&S Officer of the respective project, Site in-charge, supported by the project manager /Project In charge of the Contractor. All such grievances that cannot be resolved at the field level and those that are directly registered with the GR cell will be addressed by this body. A proper documentation of grievances (including records of grievances redressed at field level) will be maintained. The Grievance Redressal Cell will also be responsible for conducting periodic community meetings with affected communities to understand their concerns and help them through the process of grievance redressal, recording and registering grievances of nonliterate affected persons and explaining the process of GRM. In cases, where Site Level Management is unable to resolve grievance within the stipulated time period, it shall consult Project Management for advice and implement suggested actions within specified time. Grievance Redressal Cell will also be responsible for follow up for each grievance, periodic information dissemination to complainants on the status of their grievance and recording their feedback (satisfaction/dissatisfaction and suggestions).

8.3.3 Corporate Level GRM.

This Corporate Level arrangement will be led by the Corporate Head with support from the Corporate EHS Manager and other departmental representatives (on invitation). All such grievances that cannot be resolved at the Project level Grievance Redress Cell, will be brought to the notice of this body, seeking its advice or referred for resolution at this level. This Corporate body will specifically, will provide regular monitoring and advisory support to Project in grievance redress functioning and its record keeping. Project Level compilation of grievance redress records and documentation will be done by EHS Manager / E&S Officer.

8.4 Beyond Project Grievance Mechanism

Grievances that cannot be redressed through within/at the project level within stipulated time period will be referred to the District Level Committee. The following will be the people who would be part of the District Level Grievance Committee:

- District Collector
- Additional District Collector
- Corporate Head
- Project Manager
- EHS Manager / E&S Officer.
- Tehsildar/ Local Land Revenue Official
- Representatives of local NGOs (Special Invitees)

8.4.1 Country/State Legal System:

An aggrieved person shall have access to the country's legal system at any stage and accessing the country's legal system can run parallel to accessing the GRM and is not dependent on the negative outcome of the GRM.

Steps for Developing Grievance Redressal Mechanism

The following process would be adopted for the setting up of the Grievance Redressal Mechanism:

8.4.2 Publicizing Grievance Management Procedures

For WRSS Project would ensure suitable public disclosure of its grievance handling and redressal process to its external stakeholders such as the community or the local administration. As discussed earlier a Project Information Kit containing GRM overview and contact details in the form of brochures/leaflets and written in Gujarati and Hindi will be prepared. Awareness campaign publicizing the GRM process and GRM Hotline would be carried out. Person from the company's grievance cell such as onsite personnel for handling and managing grievances, CSR officers, or individuals working in analogous positions, shall be responsible for publicizing the procedure through appropriate methods.

8.4.3 Receiving and Keeping Track of Grievances

This receipt and tracking of grievances primarily involve the following stages:

- Collecting and recording grievances as they come in and recording the following details (including contact details of complainant, date the complaint was received, nature of grievance);
- Registering them in a central place; and
- Tracking them throughout the processing cycle to reflect their status and important details e.g. agreed corrective actions and the date these were taken and final outcome

8.4.4 Maintaining Record of Grievance

Tracking of grievances can be undertaken through a Grievance log maintained both at the Project and Corporate levels. This record maintenance would help track cases, respond to grievances in a timely manner, check the status of complaints and track progress, measure effectiveness, and report on results. A sample tracking format at minimum should contain and maintain the following grievance is presented below.

No.	Grievance Date	Village/ work Site	Areas	Name and gender of Complainant	Details of the issue (Categorization can be done)	Hearing officer	Issue Related to concerned Dept	Present Status	Remarks (Open, Closed, and Pending Status)	Total time taken to close the grievance
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Relevant personnel from respective departments/sections of the project will track the resolution status, coordinate it with the division(s) responsible for corrective actions, and maintain a record of progress (for example- open, pending or closed).

EHS Manager / E&S Officer. of the sites will present to the Management both at the Project and Corporate Level an aggregated monthly report on the status of complaints; the frequency may vary once the construction stage is over. The EHS Manager / E&S Officer may also do a case to case grievance status reporting in case of critical grievances or grievances that may require immediate attention of the management.

8.4.5 Reviewing and Investigating Grievances

The EHS Manager / E&S Officer responsible for grievance handling will organize the process to validate the complaint's legitimacy and arrange for investigation of details. To begin this process, the nature of the grievance shall be established to determine the measures needed for review and investigation. All grievances shall undergo some degree of review and investigation, depending on the type of grievance and clarity of circumstances:

8.4.6 Resolution of Grievance and Preparing a Response

The Rationale for Grievance resolution and closure is as follows:

- The requirements/need specified in the form of grievance by the aggrieved have been effectively addressed to the satisfaction of the complainant
- Grievance to be duly addressed and closed by WRSS.

8.4.7 Monitoring of Grievances

Grievance records will provide the background information for regular monitoring. Some of the monitoring indicators identified that can be a part of the monitoring mechanism may include:

- Tracking the number of grievances received and resolved (by gender, male/female, vulnerable categories);
- Analysing effectiveness and efficiency, using complaints to analyze systemic deficiencies.
- Patterns in the grievances the company receives, and their resolution.
- Communities preference of different channels to submit grievances;
- Any particular subgroup in the community who are aggrieved and raising complaints (for example, women, elderly, a particular locality);
- Trends observed in grievances e.g. particular groups/ particular kind of complaints relating to operations or accessibility or any specific issues;
- Average time taken for resolution of grievances falling under particular category;
- Matters significantly affecting company policy or requiring legal review;
- Issues of cultural appropriateness and transparency;
- Efficacy of the system to meet the company requirements and expectation of stakeholders

8.4.8 Reporting of Grievance

The number of grievances recorded and resolved, and the outcomes will be displayed/disclosed in the Project and Site offices, Panchayat of the concerned notice boards and on the website of the company, as well as reported in the semi-annual environmental and social monitoring reports to be submitted to IFC

8.5 Resource required for Grievance Redressal Mechanism Implementation

Manpower and Budget would be required for the successful implementation of the Grievance redressal ant both the project and Corporate Level.

8.5.1 Manpower

8.5.1.1 Corporate Level

The Corporate EHS Manager would be responsible for day-to-day management of the Grievances. He would be responsible for coordinating with the Project level EHS Manager / E&S Officer at the Project to ensure that all the grievance is redressed in a timely manner. He would also be responsible for analysis of the trends in the grievances received and advising the both the Corporate and Project level management of possible remedial measures.

8.5.1.2 Project Level

A grievance cell headed by the Project Manager is to be formed during the initial inception phase of the project. The grievance coordinator will be responsible for effective implementation of GRM and coordinating day to day functions. Periodic meetings and reviews of the Grievance cell are carried out by them. The grievance cell at project level would keep a grievance log and be reporting back to the Project Head. He would also be responsible for supporting the Corporate EHS Manager in reporting to the Corporate Management and the Funding agency.

8.6 Disclosure of The Grievance Redressal Mechanism

The disclosure for GRM will be done with the community, and other relevant stakeholders. The steps will be disclosed in the Project Information Kit. In addition, leaflets or posters will be made available to villagers at the village/panchayat office, or other public notification boards. The disclosure will be done through website, Project Site Office and other relevant places.

8.7 Present Status of Grievance Redressal Process

As part of the grievance redressal, the project prior to project commencement, had issued notice for the proposed transmission line passing through the villages published in local & national newspaper and Gazette of India. This was carried out before authorization given for section 164 of the Electricity Act 2003, a window period of not less than 60 days from the date of such publication for public/community to raise any objection/clarification on the proposed route. As reported, no objection received for the proposed route alignment of WRSS project.

Presently, WRSS has a well-developed Grievance redressal mechanism as a part of its ESMS system which has been implemented and applicable to all its subsidiaries and SPVs including project site. The project WRSS has a Grievance redressal mechanism overlook by the Project Manager on site. The grievance mechanism has been shared with the local communities during obtaining consent stage. A grievance register as per format are available at site office for recording the grievances of local communities. Reportedly, since the project commencement no grievance was formally submitted or recorded on Standard grievance register.

9. Conclusion and Recommendation

The ESIA has assessed overall acceptability of environmental and social impacts likely to arise as a result of construction and operation of transmission line for WRSS project. The proposed project is categorised as category B as the social or environmental impacts are assessed as limited, few in number, site specific, largely reversible, and readily addressed through mitigation measures.

The project is assessed to generate some environmental and social issue owing to land access and the spread of transmission corridor. The community had raised concern on issues with regards to health and safety and potential exposure to electromagnetic fields during operation especially during rainy season. Besides, the community also had raised concern for adequate compensation for land use along the tower footprint as.

Mitigation measures for potential impacts on Air, Water, land, soil, noise ecology and socioeconomic have been specified through proper


- Follow up of best practice of compensation, public disclosure, grievance management and compensation.
- Planning and designing of tower structure, site preparation and access route, compensation etc.
- Application of standards for Health and safety for construction tower erection and stringing activities
- Clearances and permits (including forest clearance) required for each sub activity


The ESMP provides a delivery mechanism to address potential adverse impacts, to instruct contractors and to introduce standards of good practice to be adopted for project activities taken up during construction and operation phases of the project. Inspection and monitoring of the environmental and social components phase activities will increase the effectiveness of suggested mitigations.


Appendix A Stakeholder Consultation

A	Project Title:	ESIA for Adani Transmission Line	
B	Stakeholder Title:	Consultation with Local Community and Landowner	
C	Basic details:		
	Location:	Jawahar Nagar	
	Date:	25 th November 2020	
D	Attended By:		
	Sr.	Name	Designation
	1.	Bhauji	Farmer
	2.	Devji	Farmer
	3	Arish	Farmer
	4	Mahesh	Farmer
	5	Bhavesb	Farmer
	6	Ramesb	Farmer
E	Purpose of Consultation		
		<ul style="list-style-type: none"> The purpose of the consultation was to understand the village profile To ascertain the impacts caused by the project 	
F	Key Points Inferred:	<ul style="list-style-type: none"> The village has a total population of approx.2000. The primary occupation of the villagers is agriculture whereby 90% are into farming. Other occupation is daily wages. The major crops grown are cotton and castor. Other crops grown in the area such are Guava, pomegranate and berries. The main source of irrigation for agriculture is borewell. The villagers reported that groundwater is unfit for drinking due to soil salinity. For drinking water, two government tanks are there in the village and each household are connected with piped water supply. The villagers reported that the water supply is irregular water (15-20 mins in a day). As a result, the villagers are facing issues in accessing clean drinking water for whole year round. There is one government primary school in the village, for secondary education they have to travel to nearest village in Lodai. Most of the youth (boys and girls) completed their education till 8-10 standard. Post which they are then involve in agriculture. Women are mainly involved in household work and daily labour. Women were allowed to go outside their village for economic activities. Their daily labour involves working in agricultural farms. The village is comprised mainly of agriculture land and the market value of land varies from INR 4 lakhs -6 lakhs/acre. Government land rate in the area is INR 2 lakh per acre. There are no recorded cultural heritage/ monuments in the village The villages are aware about the project. The villagers reported that there is an existing PowerGrid transmission line passing through the village. The project took place in the year 2018-19. People who are impacted by the existing Powergrid TL, do undertake cultivation underneath the tower footing. No human fatalities have been reported on account of the existing. The affected landowner had received compensation amounting as per order (land and crop compensation) for tower footing. The villagers are concern about the land use restriction and secondly fear of getting electrocuted especially during rainy season. Their expectation for a better compensation. 	
	Photos		



A	Project Title:	ESIA for Adani Transmission Line	
B	Stakeholder Title:	Consultation with WRSS Project Team	
C	Basic details:		
	Location:	WRSS project site Office	
	Date:	25 th November 2020	
D	Attended By:		
	Sr.	Name	Designation
	1.	Rajneesh Mahajan	Project Head
	2.	Nilesh Mehta	-
E	Purpose of Consultation		
	<ul style="list-style-type: none"> The purpose of the consultation was to have an overall understanding of the project elements, the status of the ongoing project on site. 		
F	Key Points Inferred: <ul style="list-style-type: none"> The route for the transmission alignment was finalised considering the minimum environmental impacts, avoiding human settlements, large forest covers etc. Out of the three-route alignment surveyed, route 1 was considered as the most feasible for the project and approval for the same has been obtained. Land procurement was undertaken as per section 164 of the Electricity Act 2003. A notification was issued to the affected landowner impacted due to the ROW. Negotiation on the land price was initially undertaken between the project proponent and the affected landowners. However, there has been an appeal from the landowners with regards to the government circle rate. The circle has not been revised since 2011, and the land valuation if carried out as per the circle rate, the land compensation will be much lower than the market rate (<i>INR 50 per sq. for irrigated land and INR 30 unirrigated land as per government circle</i>). The project head of WRSSXXI(A) reported that a committee was formed by the District Collector for determining the land and crop compensation. It was decided that for irrigated land the land value was INR 950/sq.m and unirrigated land 900/sq.m. About ~500 landowners will be impacted due to tower footing. Details of affected landowner along the ROW is yet to be finalised. Compensation for land is paid as per the MoP guideline ie 85% of the land value for Tower and 7.5% for RoW corridor. Compensation for the affected landowners is paid in three phases 3 phase So far 100 landowners have received compensation. The land price for compensation was fixed by the District Collector at the rate of INR 900 for irrigated and 950 for unirrigated land. The project has appointed Larsen & Turbo as the EPC contractor for Transmission line and Techno India for construction of Lakadiya Substation. Total manpower requirement for the project is anticipated to 300 for peak season. All labour and working conditions for the contractor are being monitored on a regular basis. The contractor was reported to have a robust Health and safety policy and procedure in place. 		
	Photos 		

A	Project Title:	ESIA for Adani Transmission Line	
B	Stakeholder Title:	Consultation with Local Community and Landowner	
C	Basic details:		
	Location:	Khirsara	
	Date:	25 th November 2020	
D	Attended By:		
	Sr.	Name	Designation
	1.		Head Man
E	Purpose of Consultation		
		<ul style="list-style-type: none"> The purpose of the consultation was to understand the village profile To ascertain the impacts caused by the project 	
F	Key Points Inferred:	<ul style="list-style-type: none"> Khirsara falls under Khirsara Gram Panchayat. Total households 500-600. Major community are Muslims, followed by Ahir, Rabari, Harijan. 50% of the population are engaged in agriculture and 50% of the working population works as daily labour in nearby existing solar power plant as carpenter and for construction work Double cropped is cultivated and the major crop grown are cotton and Castor. The main source of irrigation facilities is borewell. Majority of the household have their own borewell. The current market value of land varies from 6 lakhs -8 lakh/acre. The sarpanch is very much aware of the project. 17 towers will pass through the village and 20 landowners will be impacted. affected landowners will receive compensation after completion of work and mutual agreement . The Sarpanch is aware that for each tower footing total compensation amount Is being paid to affected land owner. The issuance of Demand draft is ongoing with the local gram panchayat. 	
	Photos		

A	Project Title:	ESIA for Adani Transmission Line	
B	Stakeholder Title:	Consultation with Local Community and Landowner	
C	Basic details:		
	Location:	Lodai	
	Date:	25 th November 2020	
D	Attended By:		
	Sr.	Name	Designation
	1.	Haspinder Singh	Farmer
	2	Devaji	Farmer
E	Purpose of Consultation		
		<ul style="list-style-type: none"> The purpose of the consultation was to understand the village profile To ascertain the impacts caused by the project 	
F	Key Points Inferred:		
		<ul style="list-style-type: none"> The village has a population of 400 HH and the total population in the area is 1000. Triple cropped is cultivated in Lodiya village. The major community found are the Muslim, Ahir, Rajputs. A similar Transmission line project happens in the year 2017-18. The land was mainly agriculture land and the main occupation of the people of the villages are agriculture and daily wages. The villages practice double cropping and the main food crops are Wheat, Groundnut, Castor, Cotton. They community are aware about the project and their concern for adequate compensation for land. Mr Haspinder singh reported that as the land compensation fixed by the government was 18 times higher than the prevailing circle rate, many of the landowners wanted the alignment to pass through their land. 	
	Photos		
			

Appendix B Crop Schedule

કચ્છ જિલ્લા પંચાયત
મેતીવાડી ચાંચા, બુજ
તા. ૦૧/૧૨/૨૦૧૮

અતિ,
શ્રી નીલેશ મહેતા,
એસોસિયેટ, જનરલ મેનેજર-ગ્રોજેસ્ટ, (WRSS XXI(A) TRANS CO LIMITED)
પ્લોટ નં. ૨૨, બોયલ વડવા-૪, મ્યુ સુભની બાજુમાં, એરપોર્ટ રોડ,
બુજ-કચ્છ.

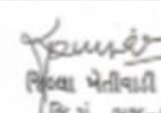
વિષય- પાક ઉત્પાદનની વિગતો મેળવવા અંગે.
સંદર્ભ- શ્રી નીલેશ મહેતા, એસોસિયેટ, જનરલ મેનેજર-ગ્રોજેસ્ટ, બુજના પત્ર
તા. ૨/૧૨/૧૮

જય ભારત સહ ઉપરોક્ત વિષયે જણાવવાનું કે સંદર્ભિત પત્રથી માંગવામાં આવેલ બુજ તાલુકાના અગ્રેના સમગ્ર પાકનો વાવેતર વિસ્તાર (હે.), ઉત્પાદન (મે.ટન) તથા ઉત્પાદકતા (કિ.ગ્રા/હે.) ની માહિતી નીચે મુજબની છે, જે વિકિત થવા વિનંતી. તેમજ વધુમાં આગામી પાકોની માહિતી મેળવવા માટે નામજ આમગ્યત નિવામકશ્રી, બુજ-કચ્છ નો સંપર્ક સાધવા વિનંતી છે.

અ.નં.	તાલુકાનું નામ	પાકનું નામ	વાવેતર વિસ્તાર (હે.)	ઉત્પાદન (મે.ટન)	ઉત્પાદકતા (કિ.ગ્રા/હે.)
૧	બુજ	તલ	૧૮૮૮	૧૫૨૧.૮૪	૭૬૧.૩૦
૨		ધાણ	૩૨૫૮	૧૩૨૩૪.૧૫	૪૦૬૦.૮૦
૩		કેળા	૧૮૭૮૪	૬૪૬૬૦.૦૫	૩૨૬૮.૩૦
૪		મગફળી	૨૧૬૭	૮૬૧૧.૬૬	૩૯૭૪.૦૦
૫		ભાજરા	૦	૦.૦૦	૨૨૧૭.૦૦
૬		કપાસ (ચિ)	૯૯૪૦	૩૪૭૧૫.૪૫	૩૪૯૨.૫૦
૭		જીરું	૪૪૫	૩૬૧.૩૪	૮૧૨.૦૦
૮		રાઈ	૧૩૧૫	૨૮૫૮.૮૧	૨૧૭૪.૦૦
૯		ગુવાર	૧૪૦૩	૧૦૩૩.૩૧	૭૩૬.૫૦

પ્રાપ્તિ સ્થાન:- બુજ રાજ સરકાર, કૃષિ મંત્રી કલ્યાણ અને સહકાર વિભાગના કચ્છ ક્રમાંક-એનએસવાય-૧૦૨૦૧૮-૨૪૨૩-૪-૭ સચિવાલય, માંથી નગર તા. ૦૧/૧૨/૨૦૧૮

ગુવાર-ચાસ હેક્ટર દીઠ લીલાચારાનું સરેરાશ ઉત્પાદન ૩૫૦ થી ૪૦૦ કિલોગ્રામ, જે કાપણી પધ્ધતિમાં ૬૫૦ કિલોગ્રામ પ્રતિ હેક્ટર અને મહીકટમાં ૧૦૦૦ કિલોગ્રામ પ્રતિ હેક્ટર જેટલું મળે છે. (વાવેતર-૧૯૦૭૩ હેક્ટરમાં ચાસચારા તરીકે)	પ્રાપ્તિ સ્થાન:- ચાસચારા પાકોની મેતી પધ્ધતિ, મેતી નિવામકશ્રીની કચેરી, માંથી નગર.
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 નિશુ મેતીવાડી અધિકારી
 જિ.પં., બુજ-કચ્છ

નકલ જય ભારત સહ રવાના:-
 નામજ આગામ્ય નિવામકશ્રી, મહુમાળી ભવન, બુજ-કચ્છ તરફ જાણ તેમજ ઉપરોક્ત વિગતોના આ સાથે સામેલ સંદર્ભ પત્રની વિગતે આપશ્રીના કાર્યલેખમાં આવતાં પાકોની વિગતો સંબંધિતને પરબારે મોકલી આપવા સારું.

E:\MPC\GENERAL\COFFED DATA GENERAL\W

પત્રક નં.-૧૦(૧)

નિર્ધારિત જાણસીઓનું માસિક સરેરાશ ભાવ દર્શાવતું પત્રક ૧૦૦ ડી.(અનાજ)/વિભાગ સંબંધિત તમામ જાણસીઓના માસિક ભાવ
વર્ષ ૨૦૧૮-૧૯



ક્રમ	જાણસીઓના નામ	એપ્રિલ ૧૮	મે ૧૮	જૂન ૧૮	જુલાઈ ૧૮	ઓગસ્ટ ૧૮	સપ્ટેમ્બર ૧૮	ઓક્ટોબર ૧૮	નવેમ્બર ૧૮	ડિસેમ્બર ૧૮	જાન્યુઆરી ૧૯	ફેબ્રુઆરી ૧૯	માર્ચ ૧૯	સરેરાશ
૧	એરંડા	૩૭૧૭	૩૭૧૫	૩૭૫૦	૪૦૪૨	૪૩૯૦	૪૪૬૫	૪૨૫૦	૫૫૫૦	૪૯૭૫	૫૦૦૪	૫૦૧૦	૫૦૩૫	૪૪૯૧
૨	રાયગો	૩૨૬૫	૩૭૫૦	૩૮૭૫	૩૬૦૬	૩૬૦૦	૩૬૫૫	૩૫૦૦	૩૭૫૦	૩૫૨૦	૩૩૦૪	૩૨૫૦	૩૧૭૦	૩૫૨૫
૩	તાલી	૮૦૦૦	૭૬૮૫	૮૫૦૦	૯૧૦૦	૯૫૦૦	૯૩૫૦	૯૦૦૦	૧૨૯૬૨	૧૧૧૨૦	૧૧૬૮૫	૧૧૬૦૦	૧૧૬૫૫	૧૦૦૧૯
૪	ઉસમગુલ	૫૬૮૭	૫૮૧૦	૫૮૦૦	૬૪૪૪	૬૮૫૦	૬૯૫૦	૬૨૫૦	૭૬૫૦	૭૭૧૫	૭૭૮૪	૭૫૫૦	૭૪૬૦	૬૮૪૯
૫	મગફળી	૩૩૭૫	૪૦૦૦	૩૮૧૩	૪૩૭૫	૪૦૬૨	૪૨૫૦	૩૭૫૦	૪૬૨૫	૪૭૫૦	૪૫૦૦	૪૪૦૦	૪૫૦૦	૪૨૦૮
૬	ગુવાર	૩૬૭૫	૩૪૪૨	૩૪૦૫	૩૪૦૦	૩૯૭૦	૩૯૩૫	૩૯૩૫	૩૬૭૪	૪૩૮૦	૩૯૭૫	૩૮૩૫	૩૮૫૦	૩૭૨૨
૭	મગ	૪૨૦૦	૪૮૫૦	૪૮૫૦	૪૬૫૦	૪૮૫૦	૫૦૦૦	૫૦૦૦	૫૮૭૫	૫૭૫૦	૪૯૫૦	૫૫૨૦	૫૭૫૦	૫૧૨૩
૮	કોરંડ	૩૨૦૦	૩૭૫૦	૩૭૫૦	૨૮૫૦	૨૯૦૦	૩૭૫૦	૩૭૦૦	૪૧૦૦	૩૬૫૦	૩૬૯૦	૩૭૨૫	૩૭૫૦	૩૬૬૫
૯	ધાત્રી	૧૮૦૦	૧૮૨૫	૧૭૨૫	૨૦૦૦	૧૭૭૫	૧૮૫૦	૧૭૦૦	૧૮૫૦	૧૯૫૦	૨૧૫૦	૨૦૦૦	૨૦૦૦	૧૮૯૮
૧૦	ભાજર	૧૩૦૦	૧૨૭૫	૧૩૦૦	૧૩૦૦	૧૨૨૫	૧૨૭૫	૧૧૦૦	૧૩૫૦	૧૩૫૦	૧૫૫૦	૧૫૮૦	૧૬૦૦	૧૩૯૪
૧૧	જુવાર	૨૧૦૦	૨૧૫૦	૨૦૫૦	૨૦૫૦	૨૫૦૦	૨૫૦૦	૧૮૦૦	૨૧૫૦	૨૦૦૦	૨૦૦૦	૨૦૦૦	૨૦૦૦	૨૧૬૭
૧૨	શીંગડા	૧૩૨૫૦	૧૨૭૫૦	૧૬૦૦૦	૧૬૮૨૫	૧૭૧૨૫	૧૬૭૫૦	૧૬૫૦૦	૧૭૨૫૦	૧૫૫૦૦	૧૩૧૭૫	૧૩૧૩૦	૧૬૨૫૦	૧૫૩૭૫
૧૩	ધાણા	૩૯૪૦	૩૭૫૦	૩૬૦૩	૩૯૨૦	૩૯૪૫	૪૧૩૦	૩૫૦૦	૪૧૨૦	૪૮૭૫	૪૮૭૫	૪૯૦૦	૪૧૦૦	૪૩૦૫
૧૪	કપાસ	૪૬૨૫	-	-	-	-	-	૫૭૫૦	૫૬૫૦	૫૬૨૫	૫૬૦૦	૫૬૭૫	૫૮૨૫	૫૫૧૭

S. J. ...
સહી
મોડિયો બેન્ક નામર સંબંધી
૧૫-૬૨૭

ગુજરાત સરકાર
વન અને પર્યાવરણ વિભાગ
કસ્ટોડિયન ક્રમાંક: જમન/૧૦૨૦૧૮/૮૪૧/બેફ
સચિવાલય, ગાંધીનગર
તા.૧૧ / ૦૭ / ૨૦૧૯

વંચાણે લીધા:-

૧) કચ્છ જિલ્લામાં નર્મદા યોજનાની સાથા નહેરુના કેનાલ નેટવર્ક અંતે સંપાદીત કરાનાર ખેડૂતોની માલિકીની જમીનમાં આવેલ કુળાઈ વૃક્ષોની વજતરની કિંમત નક્કી કરવા માટે કમીટી રચવા અંગેનો આ વિભાગનો તા. ૧૫/૦૧/૨૦૧૯ નો સમાનગ્રંથી પત્ર.

૨) મુખ્ય વન સંરક્ષકશ્રી (સામાજિક વનીકરણ) ના તા. ૨૭/૦૩/૨૦૧૯ ના પત્રથી ૨૪ કરાચેલ અહેવાલ

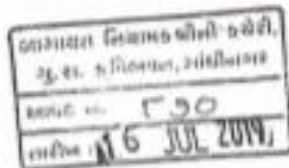
૩) મહેસૂલ વિભાગનો તા. ૦૨/૦૧/૧૯૯૩નો પરિપત્ર ક્રમાંક: એલ.બી.જી-૨૨૭૮-૪૯૪૫-૫

ભાષણ:-

જમીન સંપાદન ધારા, ૧૯૮૪ અન્વયે સંપાદન કરવામાં આવતી જમીનોમાં આવેલા વૃક્ષોની વધુમાં વધુ કેટલી કિંમત આવી શકાય તથા વૃક્ષોની કિંમત નક્કી કરવા માટે કયા પ્રકારની પદ્ધતિ અપનાવવી તેની સુચનાઓ ઉપર વંચાણે લીધેલ ક્રમાંક (૩) બાજુના પરિપત્રમાં આપવામાં આવેલ છે.

કચ્છ કેનાલ નેટવર્ક માટે જમીન સંપાદન કરવાની કાર્યવાહી કરવાની સાથે છે. આ વિસ્તારમાં આવેલ ખેડૂતોની માલિકીની જમીનમાં ખેડૂતો દ્વારા અંબા, ખારેક અને દાડમ જેવા વૃક્ષોનું વાવેતર કરવામાં આવે છે અને આ વાવેતરમાંથી ખેડૂતોને જાર પ્રમાણમાં વજતર મળી રહે છે. આથી આ જમીન સંપાદન કરી કેનાલ નેટવર્કમાં ઉપયોગમાં લેવામાં આવે તો ખેડૂતોને તેઓની જમીનમાં આવક આપતા વૃક્ષોનું વજતર સંતોષકારક મળવું જોઈએ, તે અમલને ધ્યાને લઈ આવી સંપાદન કરેલ જમીનમાં વાવેતર કરાયેલ કુળાઈ વૃક્ષોના ભાવો નક્કી કરવાની આવશ્યક સરકારશ્રીની વિચારણા હેઠળ હતી.

૧૭/૭/૧૯



જા.સ.
મુ.સ.
૧૮/૭

૧૭/૭/૧૯
૧૭/૭/૧૯
૧૭/૭/૧૯

Scanned by CamScanner

સામાન્ય રીતે ઇમારતી વૃક્ષોની કિંમત નક્કી કરવાની કાર્યવાહી વન વિભાગ દ્વારા કરવામાં આવે છે, પરંતુ કચ્છ બ્રાન્ચ કેનાલમાં મોટાભાગે ફળાઉ વૃક્ષો હોવાથી રાજ્યના કૃષિ તથા બાગાયત ખાતા સાથે વન વિભાગના સહયોગથી આ કિંમતો નક્કી કરવામાં આવે, તે માટે ઉપર વંચાણે લીધેલ ક્રમાંક (૧) આગળના પત્રથી અગ્ર મુખ્ય વન સંરક્ષકશ્રી, સામલજી ક વનીકરણના અધ્યક્ષસ્થાને એક સમિતીની રચના કરવામાં આવેલ, જેઓએ તેમના ઉપર વંચાણે લીધેલ ક્રમાંક (૨) આગળના પત્રથી આ અંગેનો અહેવાલ રજૂ કરેલ છે.

અગાઉ કલેક્ટરશ્રી, કચ્છ દ્વારા વર્ષ ૨૦૧૫ માં જમીન સંપાદન કેસના સંદર્ભમાં નાયબ બાગાયત નિયામકશ્રી, કચ્છની અધ્યક્ષતામાં એક કમિટિનું ગઠન કરવામાં આવેલ. કમિટિમાં મહેસૂલ વિભાગના અધિકારીશ્રીઓ, જિલ્લા ખેતીવાડી અધિકારીશ્રી તથા ખેડૂતોનો પણ સમાવેશ કરેલ હતો. આ કમિટિએ ફળાઉ પાકોના વળતર અંગે મહેસૂલ વિભાગના સને ૧૯૯૩ ના પરિપત્ર તથા વિવિધ સંસ્થાઓ દ્વારા અગાઉ આપવામાં આવેલ વળતર મુજબ જે વળતર ચૂકવેલ હતું, તેને ધ્યાનમાં લઈને તથા ખેડૂતો સાથે ચર્ચા કરી વાજબી વળતર બાબતે કલેક્ટરશ્રી, કચ્છને સૂચન કરેલ હતું. જેના આધારે કલેક્ટરશ્રી, કચ્છ દ્વારા તા.૩૦.૦૮.૨૦૧૬ ના હુકમ નં. જસપ/એન.એચ.એવોર્ડ/અપીલ નં. ૧૫/૨૦૧૩ થી આ કમિટિએ સૂચવેલ ફળાઉ વૃક્ષોની કિંમત માન્ય રાખી, સંબંધિત એજન્સીને તે પ્રમાણે વળતર ચૂકવવા હુકમ કરેલ હતો.

કસોટી:

વન અને પશુવરણ વિભાગ દ્વારા ઉપર વંચાણે લીધેલ ક્રમાંક - (૧) આગળના પત્રથી રચવામાં આવેલ કમિટિએ, સને ૨૦૧૫માં કલેક્ટરશ્રી, કચ્છ દ્વારા રચવામાં આવેલ ઉક્ત સમિતિએ વિલિન ફળાઉ વૃક્ષોની સુચવેલ કિંમત અને કલેક્ટરશ્રી દ્વારા તા.૩૦.૦૮.૨૦૧૬ ના હુકમથી તે પ્રમાણે વળતર ચૂકવવાના કરેલ હુકમને આધાર ગણી, વર્ષ ૨૦૧૫ થી વર્ષ ૨૦૧૮ સુધીની મોઘવારી તથા હલની કિંમતો ધ્યાને રાખી, વર્ષ ૨૦૧૮-૧૯ માટે હલની કિંમત સૂચવેલ છે.

સદરજુ કમિટિએ આ અંગે રાજ્યની અલગ અલગ યુનિવર્સિટીઓ તરફથી સૂચવેલ મહત્તમ કિંમત, અગાઉ અન્ય વિકાસના પ્રોજેક્ટોમાં ચૂકવેલ વળતરની કિંમત તથા અન્ય બાબતોને ધ્યાને લઈ, વિલિન ફળાઉ વૃક્ષોના વળતર માટે સુચવેલ કિંમતને ધ્યાને લઈ, આ અંગે કાનૂનપૂર્વકની

Continued on Page 168

વિચારણના અંતે વિલિનિત જાતોના ફળાઉ વૃક્ષોના વળતર માટે આથી નીચે મુજબની કિંમતો ઠરાવવામાં આવે છે.

ક્રમ	ફળાઉ વૃક્ષનું નામ	૩ વર્ષથી નીચે	૩ વર્ષથી ઉપર
૧	આંબા	રૂ.૭,૬૦૦	રૂ.૯,૬૦૦
૨	ખારેકુ • બીજથી તૈયાર થયેલ રોપા • ટીશ્યુ કલ્ચર રોપા	રૂ.૧,૬૦૦ રૂ.૫,૨૦૦	રૂ.૮,૬૦૦ રૂ.૧૨,૨૦૦
૩	દાડમ	રૂ.૨,૩૦૦	રૂ.૩,૫૫૦
૪	નાળીયેર • ઉંચી જાત • ઠીંગણી જાત • હાઉબીડ	રૂ.૧,૩૦૦ રૂ.૧,૧૦૦ રૂ.૧,૬૦૦	રૂ.૨,૧૫૦ રૂ.૩,૨૫૦ રૂ.૪,૩૦૦
૫	જામફળ	રૂ.૧,૫૫૦	રૂ.૨,૨૫૦
૬	ચીકુ	રૂ.૪,૩૦૦	રૂ.૧૧,૦૦૦
૭	બોર	રૂ.૧,૪૫૦	રૂ.૨,૧૦૦

૨. આ ઠરાવ આ વિભાગની સરખા ક્રમાંકની ફાઈલ પર નાણાં વિભાગની તા.૨૦.૦૬.૨૦૧૯ ની નોંધથી મળેલ મંજૂરી અન્વયે બહાર પાડવામાં આવે છે.

ગુજરાતના રાજ્યપાલશ્રીના કુકમથી અને તેમના નામે,

Manish
(મનીષ શી. શાહ)

ઉપ સચિવ

વન અને પર્યાવરણ વિભાગ

નકલ રવાના:

> માન. મંત્રીશ્રી, (મહેસૂલ)ના અંગત સચિવશ્રી, સચિવાલય, ગાંધીનગર.

Scanned by CamScanner

170

જમીનનું મુલ્ય પ્રતિ ચોરસ મીટરે કપીત જમીન માટે પ્રતિ ચો.મી.ના રૂ. ૧૦૦૦ (રૂપિયા નવસો) તથા વિથલ જમીનના પ્રતિ ચો.મી.ના રૂ. ૮૫૦ (રૂપિયા નવસો પચાસ) લેખે તેમજ કાપા પાકનું વળતર સંબંધિત મામલતદારશ્રી દ્વારા નિવેદ કરવામાં આવેલ દરે નિયમોનુસાર ચુકવવાનું રહેશે. WRSS XXI (A) Transco Limited ની અરજી અન્વયે જન કે તો નીચી ભુજ - તાલુકાના રૂપી ટ્રાન્સમિશન લાઇન પ્રસ્થાપિત કરવાની કામગીરીમાં અજાર તાલુકાના માજે અમરાપર ગામના સામાયિકા ખેડૂત ખાતેદારોએ અડચણ ઉભી કરવી નહી તથા આ કામની કામગીરી કરતા/કરાવનારને અટકાવવા નહી તેમ છતાં જરૂર જણાય તો આ કામના અરજદારની માંગણી મુજબ નિયમોનુસાર અરજદારના ખર્ચે પોલીસ રક્ષણ આપવા પોલીસ અધિકશ્રી, પશ્ચિમ કચ્છ ભુજને જણાવવામાં આવે છે.

આજ રોજ તા. ૧૮/૦૮/૨૦૨૦ના મારી સહી તથા સિક્કો કરી બહાર પાડ્યો.



(Signature)
(પ્રવિણા ડી.કે.)
જિલ્લા મેજસ્ટ્રેટ
કચ્છ-ભુજ

નકલ રવાના :-

- (૧) પોલીસ અધિકશ્રી, પુર્વ કચ્છ - ગાંધીધામ તરફ....
- (૨) WRSS XXI (A) Transco Limited, ભુજ-કચ્છ તરફ
- (૩) મામલતદારશ્રી અંજાર તરફ
- (૪) સંબંધિત ખેડૂત ખાતેદાર તરફ....
- (૫) તલાટી સહ મંત્રી અમરાપર, તા.અંજાર-કચ્છ તરફ....

Appendix D Compensation

WRSS XXI (A) Transco Limited (1)

ભારત સરકારના કાર્યક્રમ અંતર્ગત-પશ્ચિમ ક્ષેત્ર વિજ્ઞાપિતપણા પ્રણાલી સુરક્ષાકરણ યોજના
પ્લોટ નં. ૨૨, ઓધવ વેલના-૪, એરપોર્ટ રોડ, ભુજ-૬૨૯, ૩૭૦૦૦૧.

બુક નં. **06** કમ્પાઇ નં. **022** નોટીસ

તારીખ : ૦૧/૧૦/૨૦૨૨
ટાપર નં. : ૮૭૭/૦
સર્વે નં. : ૪૬૭
ફાઉન્ડેશન/ઈરિક્શન/રફીંગીંગ


પ્રતિ,
શ્રીમાન / શ્રીમતી,
MITHIBEN KANTJ GADJA 458140
JUNA KATKIA ૬૦૦૦૪૧૬૪૬૬

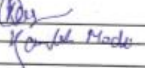
વિજ્ઞાપિત અધિનિયમ-૨૦૦૩ની કલમ ૬૮(૧) ભારત સરકારના કુદરતી કેન્દ્ર સરકારે વીજળીના પ્રવહન માટે ટેલિફોનિક ટેલિગ્રાફિક સંદેશા વ્યવહાર માટે જરૂરી વીજળી લાઇનો નાખવા અને તેની જાળવણી કરવા માટે તથા ભવિષ્યમાં આ પ્રકારના લાઇનો નાખવા અને જાળવણી માટેના યોગ્ય સંકલન માટે ભારતીય ટેલિગ્રાફ અધિનિયમ ૧૮૮૫ના ભાગ-૩ અનુચિત કેન્દ્રીય ઉપ મંત્રાલય, ભારત સરકારના ૧૭-૦૫-૨૦૧૬ File No. CEA-PS-11-23(20)/1/2018-PSPA-1 DIVISION (4876/2019 ના આદેશ અનુસાર વિભાગ 400 kv D/C ભવાઈ-ઈપીકુએલ LLO લાઇન નિર્માણની કામગીરી કરવાની સત્તા WRSS XXI (A) Transco Limited ને આપેલ છે.

આથી નોટીસ આપવામાં આવે છે કે 400 kv D/C ભવાઈ-ઈપીકુએલ LLO લાઇન નીચે દર્શાવેલ આપની મિલકતમાંથી પસાર થશે. આ સ્થળ પર આવેલ આપની જમીનનો ઉપયોગ ટાપર નિર્માણના બંધકામ અંગે કરવામાં આવશે. સરકાર જમીનના ઉપયોગ બાબતે ટાપરની સાર્વજિક મુજબ ટાપરના બંધકામમાં ઉપયોગમાં લેવાયેલ જમીનનો વિસ્તાર માપી તેના વળતર બાબતે સક્ષમ સત્તા ભારત સરકાર/ગુજરાત સરકારના કેન્દ્રીય ઉર્જા મંત્રાલય દ્વારા જારી કરાયેલ ગાઈડ લાઇન અંતર્ગત જે આકારણી કરશે તે નુકસાનીની ભરપાઈ WRSS XXI (A) Transco Limited દ્વારા કરવામાં આવશે.

અનુ. નં.	જમીન માલિકનું નામ	સર્વે નં./ બ્લોક નં.	જમીનનું સ્તરફળ (SQ. Mtr.)		ટિપ્પણી
			ટાપર માટે	વિજ્ઞાપિત માટે	
૦૧	MITHIBEN KANTJ GADJA	૪૬૭	For foundation	Foundation at ૮૭૭/૦	

નોંધ :- ઉપરોક્ત ટાપર નિર્માણ તેમજ લાઇનનાં વિજ્ઞાપિત માટે ઉપયોગમાં લેવાયેલ જમીન માત્ર જમીનનાં ઉપયોગ બાબતે છે. જમીન સંપાદન કરવાની છતી નથી. જેથી જમીનની માલિકી જે તે જમીન માલિકની જ રહેશે. લાઇન નિર્માણનાં કાર્ય વખતે થયેલ પાકનું વળતર અલગથી આપવામાં આવશે. નોટીસ મળેલ છે.

જમીન માલિકની સહી : 
નામ : _____
સ્થળ : _____
તારીખ : _____

WRSS XXI (A) Transco Limited
તેમના વતી,
સહી : 
નામ : K. J. Modi
પદનામ : _____

ભારત સરકારના કાર્યક્રમ અંતર્ગત-પશ્ચિમ ક્ષેત્ર વિજ્ઞાપિતપણા પ્રણાલી સુરક્ષાકરણ યોજના
પ્લોટ નં. ૨૨, ઓધવ વેલના-૪, એરપોર્ટ રોડ, ભુજ-૬૨૯, ૩૭૦૦૦૧.

પાકના કાપવા/ખંડવા/પાકને કટાવવાના સંબંધમાં
નુકસાનીનું પ્રમાણપત્ર/પંચનામું

બુક નં. : _____ તારીખ : ૦૧/૧૦/૨૦૨૨
WRSS/BHUJ 400kv BHARAU-EPAL L.L. ટાપર નં. : ૮૭૭/૦
સર્વે નં. : ૪૬૭
ફાઉન્ડેશન/ઈરિક્શન/રફીંગીંગ

(૧) હું/અમે/શ્રી/શ્રીમતી MITHIBEN KANTJ GADJA આશ્રિત/પત્નિશ્રી JUNA KATKIA આમ JUNA KATKIA ઓ મારા BHARAU ઓ KATKIA એમના દ્વારા જણાવવામાં અને જાહેર કરવામાં આવે છે કે પાક ખેતર સર્વે નં. ૪૬૭ આમ JUNA KATKIA ઓ BHARAU ઓ KATKIA માં ઉપસ્થિત છે. જે મારા/અમારા માલિકીની છે. કાપવામાં આવેલ/નુકસાન પામેલ પાકના સંબંધમાં પાસ્ટિયક નુકસાનની (રકમ) જેનું મુદ્દાકન એક્ટ્રિકલુટીય મેટ્રફાઈડ/રાષ્ટ્ર વિભાગ/સમુદાય સરકાર દ્વારા નિયુક્ત અધિકારી દ્વારા કરવામાં આવેલ અને WRSS XXI (A) TRANSOCO LIMITED દ્વારા મળેલ. મને/અમને મંજૂર છે.

(૨) આ પ્રમાણિત કરવામાં આવે છે કે નીચે જણાવેલ પાક WRSS XXI (A) TRANSOCO LIMITED ના એન્ટ્રાન્સિયરના આઉટરાઈ પડાવેલ/નુકસાનનીત કોલ છે. અને તેનો કલને મને/અમને ચોખી દેવામાં આવેલ છે.


(૩) 765 KV D/C ભુજ-લાકડીયા ટ્રાન્સમીશન લાઇનના ફાઉન્ડેશન/ટાપર ઈરિક્શન/રફીંગીંગ કામ દરમ્યાન કાપવામાં આવેલ કાપેલ કે સતિસરત થયેલ પાકની વિગત નીચે દર્શાવેલ છે.

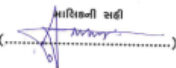
ક્રમ નં. (૧)	પાકનો પ્રકાર (૨)	પાકની વિગત (૩)	ટિપ્પણી (૪)
૦૧	Cactus (Aonardy)	ઉંચાઈ : _____ જાડાઈ : _____ = [૮૭૦x૦.૩૨૬x૪.૭૬] = 11,430.	

(૪) ફરી આ પ્રમાણીત કરી વાચન આપવામાં આવે છે કે ઉપર દર્શાવેલ પાકના સંબંધ કોઈ અન્ય વ્યક્તિ નો કોઈપણ દાવો કરે તો તે માટે હું/અમે તેના માટે વ્યક્તિગત રીતે જવાબદાર છું. તેમજ આ સંબંધમાં નો વે.ટી.સી.એ.ટી.વી.ને કોઈ નુકસાન થાય તો હું/અમે તેની નુકસાનની પૂર્વિ કદીશું.

(૫) વધુમાં આ પાક જાહેર કરવામાં આવે છે કે ઉપરોક્ત પેરા-(૩)માં દર્શાવવામાં આવેલ પાકના નુકસાન સીવાયના મને/અમને અન્ય કોઈ નુકસાન કે હાનિ થઈ નથી.

તારીખ : ૦૧/૧૦/૨૦૨૨
WRSS XXI (A) TRANSOCO LTD. નું અનુમોદન

WRSS XXI (A) TRANSOCO LTD.
ના માટે અને તેના વતી,
સહી : 
નામ : K. J. Modi
કોડો : _____

માલિકની સહી
()

Appendix E Receipt

HOME / RURAL LAND RECORD (/LandRecordRural.aspx) / VF-7

ગામ નમૂના નંબર - ૭ ની વિગતો

૧) બહોલકાસવિલ જમીનની વિગતો ફક્ત આપની જાણ માટે જ છે જેને સત્તાવાર નકલ તરીકે ગણવામાં આવશે નહીં.
૨) આ વિગતો અંગે કોઈ પણ વધારાની માહિતી મેળવવી હોય તો જે તે મામલતદાર કચેરી અથવા કવેક્ટર કચેરીનો સંપર્ક કરવો.

* તા.15/01/2018 02:04:57 ની સ્થિતિએ

District (જિલ્લો)
કચ્છ

Taluka (તાલુકો)
ભચાઉ

Village (ગામ)
કટારીયા જુના

Survey/ Block Number (સરવે/ બ્લોક નંબર)
૮૬૬

Land Details (જમીનની વિગતો)
Total Area (H.Are.SqMl.) (કુલ ક્ષેત્રફળ હે.અ(રે.ચોમી.) :
૧-૮૫-૧૪

Total Assessment Rs. (કુલ અંકિર રૂ.) :
૬.૧૨

Tenure (સંતોષકર) :
જુની શરત (જુ.શ)

Land Use (જમીનનો ઉપયોગ) :
ખેતીભણક ઉપયોગ

Name of farm (ખેતરનું નામ) :
જાગડ

Other Details (રીમાર્ક્સ) :

Top

Ownership Details (ખાતેદારની વિગતો)

https://myor.gujarat.gov.in/information_page/info712Details.aspx

11/25/2020

Any Field @ Anywhere :

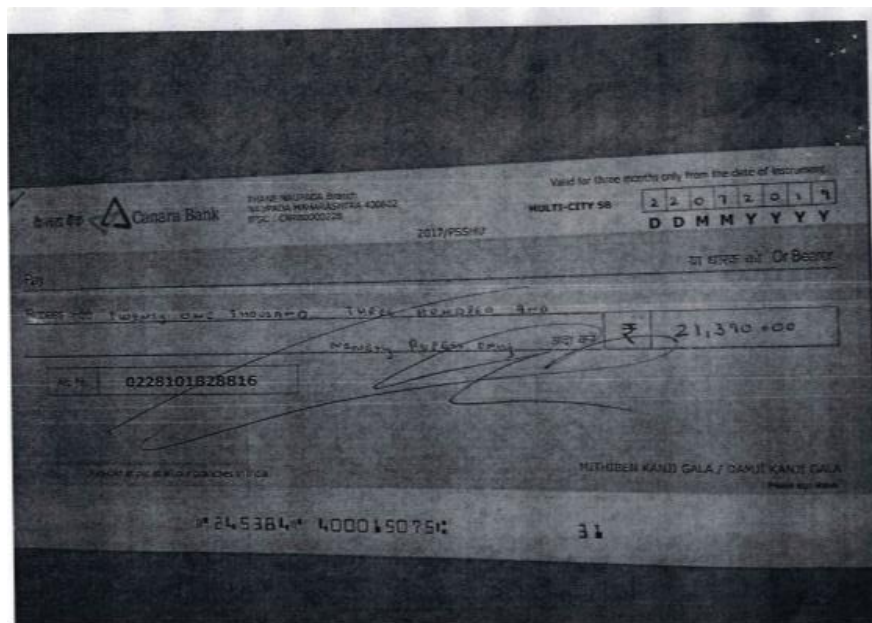
ખાતા નંબર ક્ષેત્રક્રમ અકાદર	નોંધ નંબરો તથા ખાતેદાર
	૪૭,૧૯૦૩,૨૪૭૬,૨૭૫૭,૩૭૯૬,
૧૩૭૪ ૧-૮૫-૧૪ ૬.૧૨	મીઠીબેન કાનજી ગાથા(૩૭૯૬)

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- ૧) અહીં દર્શાવેલ જમીનની વિગતો ફક્ત આપની જાણ માટે જ છે જેને સત્તાવાર નકશ તરીકે ગણવામાં આવશે નહીં.
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❀ એડવાન્સ સ્ટેમ્પ રીસીપ્ટ ❀

નં. **785** : પહોંચ : તા. **25/11/2020**

આથી હું શ્રી MUTHUBEN KANDALA રહેવાસી ગામ JUNNA KANDALA
 તાલુકો RAJAHMUNDRU ને 400 KV R.M. KANDALA SFL LINE
 લાઇનનું લોકેશન LT2/10 નું કામ મારા સર્વે નં. 869 માં કરવાથી થયેલા ઉભા
 પાકની/જમીનને નુકસાનીના વળતર પેટે રૂ. 11,430 ચેક નં. 536456
 તા. 25/11/2020 થી અગેલ છે તેની પહોંચ આપું છું.


લી. આનો વિશ્વાસુ

Appendix F Mammals of the Study Area

SN	Scientific Name	Common Name	IUCN Status *	WPA Schedule**
1	<i>Equus hemionus khur</i>	Asiatic Wild Ass	NT	I
2	<i>Boselaphus tragocamelus</i>*	Blue Bull	LC	III
3	<i>Gazella bennettii</i>	Indian Gazelle	LC	I
4	<i>Antelope cervicapra</i>	Blackbuck	LC	I
5	<i>Felis caracal</i>	Caracal	LC	I
6	<i>Felis silvestris</i>	Asiatic Wild Cat	LC	I
7	<i>Felis chaus prateri</i>*	Jungle Cat	LC	II
8	<i>Viverricula indica</i>	Small Indian Civet	LC	II
9	<i>Herpestes edwardsii</i>	Grey Mongoose	LC	II
10	<i>Herpestes auropunctatus</i>	Small Indian Mongoose	LC	IV
11	<i>Hyaena hyaena</i>	Striped Hyaena	NT	III
12	<i>Canis lupus pallipes</i>	Indian Wolf	LC	I
13	<i>Pteropus giganteus</i>*	Indian Flying Fox	LC	IV
14	<i>Vulpes bengalensis</i>*	Indian Fox	LC	II
15	<i>Sus scrofa</i>*	Wild pig	LC	III
16	<i>Mellivora capensis</i>	Honey Badger	LC	I
17	<i>Canis aureus</i>	Jackal	LC	II
18	<i>Lepus nigricollis dayanus</i>*	Indian Hare	LC	IV
19	<i>Manis crassicaudata</i>	Indian Pangolin	EN	I
20	<i>Suncus murinus</i>	House Shrew	LC	-
21	<i>Scotophilus heathii</i>	Greater Asiatic Yellow House Bat	LC	-
22	<i>Scotophilus kuhli</i>	Lesser Asiatic Yellow bat	LC	-
23	<i>Paraechinus micropus</i>	Indian Hedgehog	LC	IV
24	<i>Hystrix indica</i>	Indian Crested Porcupine	LC	IV
25	<i>Funambulus pennantii</i>	Palm Squirrel	LC	IV
26	<i>Tatera indica</i>	Indian Gerbil	LC	-
27	<i>Meriones hurrianae</i>	Indian Desert Jird	LC	-
28	<i>Mus musculus</i>	House Mouse	LC	V
29	<i>Mus booduga</i>	Little Indian Field Mouse	LC	V
30	<i>Millardia meltada</i>	Soft-furred Field Rat	LC	V
31	<i>Golunda ellioti</i>	Indian Bush Rat	LC	V
32	<i>Bandicota indica</i>	Large Bandicoot Rat	LC	V
33	<i>Rattus rattus</i>	House Rat	LC	V

*Status assigned by the International Union for Conservation of Nature and Natural Resources, where –CR – Critically Endangered; EN – Endangered; LC – Least Concern, NA – Not Assessed; NT – Near Threatened; and VU - Vulnerable.

**Schedules I to VI: Indian Wildlife (Protection) Act, 1972.

Sources: Vivek Menon (2014), *Indian Mammals: A Field Guide*. Hachette Book Publishing India Pvt. Ltd., Gurgaon, India, pp 1-522; *The IUCN Red List of Threatened Species*. Version 2019-3; Schedules I to VI: *Indian Wildlife (Protection) Act*, 1972.

Appendix G Resident Birds of the Study Area

SN	Scientific Name	Common Name	IUCN Status*	WPA Schedule**
1	<i>Ephippiorhynchus asiaticus</i>	Black-necked Stork	NT	IV
2	<i>Sarkidiornis melanotos</i>	Knob-billed Duck	LC	IV
3	<i>Nettapus coromandelianus</i>	Cotton Pygmy Goose	LC	IV
4	<i>Anas poecilorhyncha</i>	Indian Spot-billed Duck	LC	IV
5	<i>Tachybaptus ruficollis</i>	Little Grebe	LC	IV
6	<i>Podiceps cristatus</i>	Great Crested Grebe	LC	IV
7	<i>Mycteria leucocephala</i>	Painted Stork	LC	IV
8	Anastomus oscitans	Asian Openbill	LC	IV
9	Threskiornis melanocephala	Black-headed Ibis	LC	IV
10	<i>Pseudibis papillosa</i>	Black Ibis	LC	IV
11	<i>Platalea leucorodia</i>	Eurasian Spoonbill	LC	I
12	<i>Ardea purpurea</i>	Purple Heron	LC	IV
13	Ardeola grayii	Indian Pond Heron	LC	IV
14	Bubulcus ibis	Cattle Egret	LC	IV
15	Egretta garzetta	Little Egret	LC	IV
16	Casmerodius albus	Great Egret	LC	IV
17	<i>Mesophoyx intermedia</i>	Intermediate Egret	LC	IV
18	<i>Microcarbo niger</i>	Little Cormorant	LC	IV
19	<i>Elanus caeruleus</i>	Black-winged Kite	LC	IV
20	Milvus migrans	Black Kite	LC	IV
21	<i>Haliastur indus</i>	Brahminy Kite	LC	IV
22	<i>Pernis ptilorhynchus</i>	Oriental Honey Buzzard	LC	IV
23	<i>Butastur teesa</i>	White-eyed Buzzard	LC	IV
24	Amaurornis phoenicurus	White-breasted Waterhen	LC	IV
25	Porphyrio porphyrio	Purple Swamphe	LC	IV
26	Gallinula chloropus	Common Moorhen	LC	IV
27	<i>Grus antigone</i>	Sarus Crane	VU	I
28	Vanellus indicus	Red-wattled Lapwing	LC	IV
29	<i>Charadris dubius</i>	Little Ringed Plover	LC	IV
30	<i>Charadrius alexandrinus</i>	Kentish Plover	LC	IV
31	<i>Fulica atra</i>	Common Coot	LC	IV
32	Columba livia	Common Pigeon	LC	IV
33	Streptopelia decaocto	Eurasian Collared Dove	LC	IV
34	Stigmatopelia senegalensis	Laughing Dove	LC	IV
35	Psittacula krameri	Rose-ringed Parakeet	LC	IV

SN	Scientific Name	Common Name	IUCN Status*	WPA Schedule**
36	<i>Eudynamis scolopaceus</i>	Asian Koel	LC	IV
37	<i>Caprimulgus asiaticus</i>	Indian Nightjar	LC	IV
38	<i>Apus affinis</i>	Little Swift	LC	IV
39	<i>Coracias benghalensis</i>	Indian Roller	LC	IV
40	<i>Halcyon smyrnensis</i>	White-throated Kingfisher	LC	IV
41	<i>Alcedo atthis</i>	Common Kingfisher	LC	IV
42	<i>Ceryle rudis</i>	Pied Kingfisher	LC	IV
43	<i>Merops leschenaulti</i>	Chestnut Headed Bee-eater	LC	IV
44	<i>Megalaima haemocephala</i>	Coppersmith Barbet	LC	IV
45	<i>Aegithinia nigrolutea</i>	Marshall's Iora	LC	IV
46	<i>Pericrocotus erythropygius</i>	White-bellied Minivet	LC	IV
47	<i>Pericrocotus cinnamomeus</i>	Small Minivet	LC	IV
48	<i>Lanius vittatus</i>	Bay-backed Shrike	LC	IV
49	<i>Lanius schach</i>	Long-tailed Shrike	LC	IV
50	<i>Dicrurus macrocercus</i>	Black Drongo	LC	IV
51	<i>Dendrocitta vagabunda</i>	Rufous Treepie	LC	IV
52	<i>Corvus (corax) subcorax</i>	Punjab Raven	LC	IV
53	<i>Corvus splendens</i>	House Crow	LC	V
54	<i>Ammomanes phoenicurus</i>	Rufous-tailed Lark	LC	IV
55	<i>Ammomanes deserti</i>	Desert Lark	LC	IV
56	<i>Calandrella raytal</i>	Sand Lark	LC	IV
57	<i>Eremopterix nigriceps</i>	Black-crowned Sparrow Lark	LC	IV
58	<i>Galerida cristata</i>	Crested Lark	LC	IV
59	<i>Alauda gulgula</i>	Oriental Skylark	LC	IV
60	<i>Pycnonotus leucotis</i>	White-eared Bulbul	LC	IV
61	<i>Pycnonotus cafer</i>	Red-vented Bulbul	LC	IV
62	<i>Orthotomus sutorius</i>	Common Tailorbird	LC	IV
63	<i>Turdoides caudata</i>	Common Babbler	LC	IV
64	<i>Turdoides malcolmi</i>	Large Grey Babbler	LC	IV
65	<i>Acridotheres tristis</i>	Common Myna	LC	IV
66	<i>Sturnia pagodarum</i>	Brahminy Starling	LC	IV
67	<i>Saxicoloides fulicatus</i>	Indian Robin	LC	IV
68	<i>Cinnyris asiaticus</i>	Purple Sunbird	LC	IV
69	<i>Passer domesticus</i>	House Sparrow	LC	IV
70	<i>Ploceus philippinus</i>*	Baya Weaver	LC	IV
71	<i>Anthus rufulus</i>	Paddyfield Pipit	LC	IV
72	<i>Rostratula bengalensis</i>	Greater Painted-snipe	LC	IV
73	<i>Pterocles exustus</i>	Chestnut-bellied sandgrouse	LC	IV
74	<i>Centropus parroti</i>	Southern Coucal	LC	IV
75	<i>Athene brama</i>	Spotted Owlet	LC	IV

SN	Scientific Name	Common Name	IUCN Status*	WPA Schedule**
76	<i>Francolinus francolinus</i>	Black Francolin	LC	IV
77	<i>Francolinus pondicerianus</i>	Grey Francolin	LC	IV
78	<i>Hirundo smithii</i>	Wire-tailed Swallow	LC	IV
79	<i>Emberiza striolate</i>	Striolated Bunting	LC	IV

*Status assigned by the International Union for Conservation of Nature and Natural Resources, where –CR – Critically Endangered; EN – Endangered; LC – Least Concern, NA – Not Assessed; NT – Near Threatened; and VU - Vulnerable.

**Schedules I to VI: Indian Wildlife (Protection) Act, 1972.

Sources: R. Grimmett, C. Inskipp & T. Inskipp (2011). *Birds of the Indian Subcontinent*. Oxford University Press, pp 1-528; IUCN (2019). *The IUCN Red List of Threatened Species*. Version 2019-3.; Schedules I to VI: Indian Wildlife (Protection) Act, 1972.

Appendix H Migratory Birds of the Study Area

SN	Scientific Name	Common Name	IUCN Status*	WPA Schedule**	Type of Migrant
1	<i>Coturnix coturnix</i>	Common Quail	LC	IV	Winter
2	<i>Coturnix coromandelica</i>	Rain Quail	LC	IV	Summer
3	<i>Phoenicopterus roseus</i>	Greater Flamingo	LC	IV	Winter
4	<i>Phoeniconaias minor</i>	Lesser Flamingo	NT	IV	Winter
5	<i>Plegadis falcinellus</i>	Glossy Ibis	LC	IV	Winter
6	Ardea cinerea	Grey Heron	LC	IV	Winter
7	<i>Tadorna ferruginea</i>	Ruddy Shelduck	LC	IV	Winter
8	<i>Marmaronetta angustirostris</i>	Marbled Duck	LC	IV	Winter
9	<i>Anas strepera</i>	Gadwall	LC	IV	Winter
10	<i>Anas penelope</i>	Eurasian Wigeon	LC	IV	Winter
11	<i>Anas platyrhynchos</i>	Mallard	LC	IV	Winter
12	<i>Anas clypeata</i>	Northern Shoveler	LC	IV	Winter
13	<i>Anas acuta</i>	Northern Pintail	LC	IV	Winter
14	<i>Anas querquedula</i>	Garganey	LC	IV	Winter
15	<i>Anas crecca</i>	Common Teal	LC	IV	Winter
16	<i>Netta rufina</i>	Red-crested Pochard	LC	IV	Winter
17	<i>Ciconia nigra</i>	Black Stork	LC	IV	Winter
18	<i>Ciconia ciconia</i>	White Stork	LC	IV	Winter
19	<i>Pelecanus onocrotalus</i>	Great White Pelican	LC	IV	Winter
20	<i>Pelecanus crispus</i>	Dalmatian Pelican	NT	IV	Winter
21	Phalacrocorax fuscicollis	Indian Cormorant	LC	IV	Winter
22	<i>Phalacrocorax carbo</i>	Great Cormorant	LC	IV	Winter
23	<i>Falco tinnunculus</i>	Common Kestrel	LC	IV	Winter
24	<i>Falco cherrug</i>	Saker Falcon	EN	IV	Winter
25	<i>Falco peregrinus</i>	Peregrine Falcon	LC	IV	Winter
26	<i>Falco (peregrinus) peregrinoides</i>	Barbary Falcon	NA	IV	Winter
27	<i>Milvus (migrans) lineatus</i>	Black-eared Kite	NA	IV	Winter
28	<i>Pandion haliaetus</i>	Osprey	LC	I	Winter
29	<i>Circus aeruginosus</i>	Eurasian Marsh Harrier	LC	IV	Winter
30	<i>Aquila clanga</i>	Greater Spotted Eagle	VU	IV	Winter
31	<i>Aquila heliaca</i>	Eastern Imperial Eagle	VU	IV	Winter
32	<i>Gyps fulvus</i>	Griffon Vulture	LC	IV	Winter
33	<i>Aegypius monachus</i>	Cinereous Vulture	NT	IV	Winter
34	Hieraetus pennatus	Booted Eagle	LC	IV	Winter
35	<i>Chlamydotis macqueenii</i>	Macqueen's Bustard	VU	I	Winter
36	<i>Turnix sylvaticus</i>	Small Buttonquail	LC	IV	Summer

SN	Scientific Name	Common Name	IUCN Status*	WPA Schedule**	Type of Migrant
37	<i>Turnix tanki</i>	Yellow-legged Buttonquail	LC	IV	Summer
38	<i>Grus virgo</i>	Demoiselle Crane	LC	IV	Winter
39	<i>Grus grus</i>	Common Crane	LC	IV	Winter
40	<i>Recurvirostra avosetta</i>	Pied Avocet	LC	IV	Winter
41	<i>Gallinago gallinago</i>	Common Snipe	LC	IV	Winter
42	<i>Lymnocyrtus minimus</i>	Jack Snipe	LC	IV	Winter
43	<i>Limosa limosa</i>	Black-tailed Godwit	NT	IV	Winter
44	<i>Numenius arquata</i>	Eurasian Curlew	NT	IV	Winter
45	<i>Tringa erythropus</i>	Spotted Redshank	LC	IV	Winter
46	<i>Tringa totanus</i>	Common Redshank	LC	IV	Winter
47	<i>Tringa nebularia</i>	Common Greenshank	LC	IV	Winter
48	<i>Tringa ochropus</i>	Green Sandpiper	LC	IV	Winter
49	<i>Tringa glareola</i>	Wood Sandpiper	LC	IV	Winter
50	<i>Actitis hypoleucos</i>	Common Sandpiper	LC	IV	Winter
51	<i>Calidris minuta</i>	Little Stint	LC	IV	Winter
52	<i>Cursorius cursor</i>	Cream-coloured Courser	LC	IV	Winter
53	<i>Pterocles alchata</i>	Pin-tailed Sandgrouse	LC	IV	Winter
54	<i>Pterocles senegallus</i>	Spotted Sandgrouse	LC	IV	Winter
55	<i>Pterocles orientalis</i>	Black-bellied Sandgrouse	LC	IV	Winter
56	<i>Streptopelia orientalis</i>	Oriental Turtle Dove	LC	IV	Winter
57	<i>Clamator jacobinus</i>	Jacobin Cuckoo	LC	IV	Winter
58	<i>Upupa epops</i>	Common Hoopoe	LC	IV	Winter
59	<i>Coracias garrulus</i>	Eurasian Roller	LC	IV	Passage
60	<i>Lanius phoenicuroides</i>	Red-tailed Shrike	LC	IV	Passage
61	<i>Hirundo rustica</i>	Barn Swallow	LC	IV	Winter
62	<i>Calandrella brachydactyla</i>	Greater Short-toed Lark	LC	IV	Winter
63	<i>Acrocephalus stentoreus</i>	Clamorous Reed Warbler	LC	IV	Winter
64	<i>Phylloscopus collybita</i>	Common Chiffchaff	LC	IV	Winter
65	<i>Phylloscopus neglectus</i>	Plain Leaf Warbler	LC	IV	Winter
66	<i>Sylvia curruca</i>	Lesser Whitethroat	LC	IV	Winter
67	<i>Sylvia (curruca) minula</i>	Desert Whitethroat	LC	IV	Winter
68	<i>Sylvia althaea</i>	Hume's Whitethroat	LC	IV	Passage
69	<i>Sylvia hortensis</i>	Orphean Warbler	LC	-	Winter
70	<i>Sylvia nana</i>	Asian Desert Warbler	LC	IV	Winter
71	<i>Cercotrichas galactotes</i>	Rufous-tailed Scrub Robin	LC	IV	Winter
72	<i>Phoenicurus ochruros</i>	Black Redstart	LC	IV	Winter
73	<i>Oenanthe isabellina</i>	Isabelline Wheatear	LC	IV	Winter
74	<i>Oenanthe chrysopygia</i>	Red-tailed Wheatear	LC	IV	Winter
75	<i>Oenanthe deserti</i>	Desert Wheatear	LC	IV	Winter
76	<i>Oenanthe picta</i>	Variable Wheatear	LC	IV	Winter

SN	Scientific Name	Common Name	IUCN Status*	WPA Schedule**	Type of Migrant
77	<i>Monticola solitarius</i>	Blue Rock Thrush	LC	IV	Winter
78	<i>Passer hispaniolensis</i>	Spanish Sparrow	LC	IV	Winter
79	<i>Motacilla flava</i>	Yellow Wagtail	LC	IV	Winter
80	<i>Motacilla citreola</i>	Citrine Wagtail	LC	IV	Winter
81	<i>Motacilla cinerea</i>	Grey Wagtail	LC	IV	Winter
82	<i>Motacilla alba</i>	White Wagtail	LC	IV	Winter
83	<i>Emberiza buchanani</i>	Grey-necked Bunting	LC	IV	Winter

*Status assigned by the International Union for Conservation of Nature and Natural Resources, where –CR – Critically Endangered, EN – Endangered, LC – Least Concern, NA – Not Assessed; NT – Near Threatened; and VU - Vulnerable.

**Schedules I to VI: Indian Wildlife (Protection) Act, 1972.

Sources: R. Grimmett, C. Inskipp & T. Inskipp (2011). *Birds of the Indian Subcontinent*. Oxford University Press, pp 1-528; IUCN (2019). *The IUCN Red List of Threatened Species. Version 2019-3*; Schedules I to VI: Indian Wildlife (Protection) Act, 1972.

Appendix I Reptiles of the Study Area

SN	Scientific Name	Common Name	IUCN Status*	WPA Schedule**
1	<i>Eryx johnii</i>	Indian Sand Boa	LC	-
2	<i>Boiga trigonata</i>*	Common Cat Snake	LC	-
3	<i>Lycodon aulicus</i>	Indian Wolf Snake	LC	-
4	<i>Oligodon arnensis</i>	Banded Kukri Snake	LC	-
5	<i>Ptyas mucosa</i>*	Indian Rat Snake	LC	II
6	<i>Bungarus caeruleus</i>*	Common Krait	LC	-
7	<i>Bungarus sindanus</i>*	Sind Krait	NE	-
8	<i>Naja naja</i>*	Indian Cobra	LC	II
9	<i>Echis carinatus</i>	Saw-scaled Viper	LC	-
10	<i>Cyrtopodion kachhense</i>	Kutch Bent-toed Gecko	NE	-
11	<i>Calotes minor</i>	Dwarf Ground Lizard	DD	-
12	<i>Calotes versicolor</i>	Indian Garden Lizard	LC	-
13	<i>Hemidactylus frenatus</i>	Asian House Gecko	LC	-
14	<i>Saara hardwickii</i>	Indian Spiny-tailed Lizard	NE	II
15	<i>Cyrtopodion scabrum</i>	Rough Bent-toed Gecko	LC	-
16	<i>Hemidactylus flaviviridis</i>	Northern House Gecko	LC	-
17	<i>Cyrtodactylus kachhensis</i>	Banded Rock Gecko	LC	-
18	<i>Ophisops kutchensis</i>	Kutch Small-scaled Snake-eye	NE	-
19	<i>Eutropis macularia</i>	Bronze Grass Skink	LC	-
20	<i>Varanus bengalensis</i>	Bengal Monitor	LC	I
21	<i>Varanus griseus</i>	Desert Monitor	NE	-
22	<i>Geochelone elegans</i>	Indian Star Tortoise	VU	IV

*Status assigned by the International Union for Conservation of Nature and Natural Resources, where – DD – Data Deficient; LC – Least Concern; NE – Not Evaluated and VU - Vulnerable.

**Schedules I to VI: Indian Wildlife (Protection) Act, 1972.

Sources: Patel, H., Vyas, R. (2019) Reptiles of Gujarat, India: Updated Checklist, Distribution, and Conservation Status. Herpetology Notes, Vol. 12 pp. 765-777.; The IUCN Red List of Threatened Species. Version 2019-3.; Schedules I to VI: Indian Wildlife (Protection) Act, 1972.

Appendix J Amphibians of the Study Area

SN	Scientific Name	Common Name	IUCN Status*	WPA Schedule**
1	<i>Duttaphrynus melanostictus</i> *	Asian Common Toad	LC	IV
2	<i>Duttaphrynus stomaticus</i>	Indian Marbled Toad	LC	IV
3	<i>Euphlyctis hexadactylus</i>	Indian Green Frog	LC	IV
4	<i>Hoplobatrachus tigerinus</i> *	Indian Bullfrog	LC	IV
5	<i>Microhyla ornata</i>	Ant Frog	LC	IV
6	<i>Sphaerotheca breviceps</i>	Indian Burrowing Frog	LC	IV

*Status assigned by the International Union for Conservation of Nature and Natural Resources, where –CR – Critically Endangered and EN - Endangered.

**Schedules I to VI: Indian Wildlife (Protection) Act, 1972.

Sources: Vyas, R. (2008) Review of the current diversity and richness of amphibians of Gujarat, India. Indian Forester Vol 134 (10) pp 1381-1392.; The IUCN Red List of Threatened Species. Version 2019-3.; Schedules I to VI: Indian Wildlife (Protection) Act, 1972.

