Initial Environmental Examination

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IND: Visakhapatnam Chennai Industrial Corridor Development Program (VCICDP)

Visakhapatnam Energy Subproject

Prepared by the Transmission Corporation of Andhra Pradesh (AP-TRANSCO), Department of Industries (DOI), Government of Andhra Pradesh (Government of Andhra Pradesh) for the Asian Development Bank

CURRENCY EQUIVALENTS

(as of 08 March 2016)

Currency unit	–	Indian rupee (Rs)
Rs1.00	=	$0.0149
$1.00	=	INR66.9940

ABBREVIATIONS

ADB	-	Asian Development Bank
AP-TRANSCO	-	Transmission Corporation of Andhra Pradesh Limited
APSEB	-	Andhra Pradesh State Electricity Board
BGL	-	Below Ground Level
BOD	-	Biological Oxygen Demand
BIS	-	Bureau of Indian Standard
CPCB	-	Central Pollution Control Board
DO	-	Dissolved Oxygen
DoE	-	Department of Environment
DISCOM	-	Distribution Company
PMC	-	Project Management Consultant
EA	-	Executing Agency
EIA	-	Environmental Impact Assessment
EMP	-	Environmental Management Plan
EMoP	-	Environmental Monitoring Plan
ESO	-	Environmental and Safety Officer
Government of Andhra Pradesh	-	Government of Andhra Pradesh
Government of India	-	Government of India
IEE	-	Initial Environmental Examination
IMD	-	Indian Meteorological Department
IS	-	Indian Standard
MFF	-	Multi Tranche Financial Facility
MoEF	-	Ministry of Environment and Forests
MSL	-	Mean Sea Level
MW	-	Mega Watt
NSDP	-	Net State Domestic Product
NGO	-	Non - Government Organization
NH	-	National Highway
NOx	-	Oxides of Nitrogen
PMSC	-	Project Management and Supervision Consultant
RF	-	Reserve Forest
ROW	-	Right of Way
SO	-	Safeguards Officer
SPCB	-	State Pollution Control Board
SPM	-	Suspended Particulate Matter
SO2	-	Sulphur Dioxide

SSI	-	Small Scale Industries
SPCB	-	State Pollution Control Board
TA	-	Technical Assistance
TDS	-	Total Dissolved Solids
TSS	-	Total Suspended Solid

NOTES

(i) In this report, "$" refers to US dollars.
(ii) “INR” and “Rs” refer to Indian rupees

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EXECUTIVE SUMMARY

A. Introduction

1. The Visakhapatnam-Chennai Industrial Corridor Development Program (VCICDP) is proposed to support the Government of Andhra Pradesh for infrastructure development, and policy and institutional reforms to stimulate economic growth and employment generation.

2. VCICDP will help boost manufacturing sector growth along the Visakhapatnam-Chennai Industrial Corridor (VCIC), which runs over 800 km from north to south covering almost the entire coastline of the state of Andhra Pradesh covering a population of 49.4 million and an area of 160,205 km^2. The VCIC is part of the East Coast Economic Corridor, which is India's first coastal economic corridor, and is poised to play a critical role in driving India's new "Act East Policy" and "Make in India" initiatives. The "Act East Policy" is a proactive initiative focused on, among others, increasing the integration of the Indian economy with the dynamic global production networks of the Association of Southeast Asian Nations.

3. VCICDP will complement the ongoing efforts of the Government of Andhra Pradesh to enhance manufacturing sector growth and create high quality jobs in the state of Andhra Pradesh.

B. Project Description

4. The present transmission network is proposed to meet the demand in and around the proposed scheme area. The proposed power sub project is to meet the load demand and future growth of the industries coming up under VCIC corridor in the Visakhapatnam node. The proposed subproject will enhance the existing network to meet the future load growth and to maintain reliability. The main thrust and emphasis of the proposed transmission network is to provide security and reliability of power supply, capacity to cope up with future and availability of alternate power supply in case of any outages. VCICDP has three components on energy improvement: (i) transmission system improvement; (ii) distribution system improvement; and (iii) capacity building for the staff of Transmission Corporation of Andhra Pradesh Limited (AP-TRANSCO).

5. The Visakhapatnam Energy Subproject (the subproject) will involve transmission and distribution system improvement which will include augmentation of substation capacity and line lengths and development of new substations at Kapuluppada, Ozone Valley, Achutapuram and Nakapalle around the city of Visakhapatnam.

6. The subproject compliments the existing power sector initiatives taken by the Government of India and the Government of Andhra Pradesh as the State of Andhra Pradesh is one of the three states in the country selected for implementation of 'Power for All'-flagship program of Government of India. The objective of the above program is to supply 24x7 quality, reliable and affordable power supply to all domestic, commercial and industrial consumers within a fixed timeframe. This program covers the entire gamut of power sector, including generation, transmission, distribution, consumer initiatives, renewable energy, energy efficiency measures, financial health of the utilities and support required from Government of India to achieve the

objectives of the program. The program would be implemented jointly by Government of India & Government of Andhra Pradesh as partners. The various ministries of Central Government which would be involved in this program are Ministry of Power, Ministry of Coal, Ministry of Petroleum & Natural Gas, Ministry of New & Renewable Energy, Ministry of Environment and Forests and Ministry of Railways.

7. The Vishkhapatnam Energy Subproject will be funded under Project 1 and will include (i) laying of 132 kV cable from 220 kV substation diary farm to proposed GIS at Kapuluppada (14 km); (ii) laying of 132 Kv cable from 132 Kv substation Anandpuram to proposed GIS at Ozone Valley (8KM), (iii) laying of 220 kV line from Brandix substation to proposed GIS at Achutapuram (8KM); and (iv) laying of 220kV Multi Ckt LILO of Parwada - Samalkota and VSS-Kakinada Line to proposed SS at Nakkapalle/ Chandanada (16 km). The distribution system improvement component will include the construction of three new substations, bifurcation of overloaded feeders, additional/augmentation of power transformers, installation of distribution transformers and capacitor banks.

C. Environmental Requirements

8. The ADB Safeguard Policy Statement 2009 (SPS 2009) sets out the requirements for environmental safeguard that applies to all ADB-financed projects. Under SPS 2009, the project is classified as Category B for environment requiring the preparation of an initial environmental examination (IEE). Following the requirements of SPS 2009, this draft IEE is prepared covering the components of the proposed project on power transmission and distribution system improvement.

9. The Ministry of Environment and Forests (MoEF), Government of India, in its notification in September 2006, has exempted transmission projects from environmental clearances due to the nonpolluting nature of its activities.[1] However, forest clearances under the Forest Conservation Act 1980 will be necessary in the event that transmission line passes through forest areas.

D. Anticipated Environmental Impacts and Mitigation Measures

10. The selection of the substation locations has been done to ensure that no land acquisition is required and potential significant adverse environmental impacts are avoided. Distribution line subprojects traverse mainly along the road alignments. No subproject is located within the areas declared as forest by MoEF, cultural and archaeological sites considered of national importance, and the nine national parks and 25 wildlife sanctuaries in Andhra Pradesh.

11. The subproject is not expected to cause significant adverse environmental impacts but may cause temporary impacts during construction such as increased noise and dust level that may cause inconvenience to local people, accumulation of scrap materials/debris, and

[1] Notification in the Gazette of India, Extra-ordinary part II and section 3, subsection II, 14 September 2006).

increased presence of workers at substation construction sites. Such potential impacts can be readily mitigated by good construction engineering practices and proper planning. An environmental management plan (EMP) and environmental monitoring plan were prepared and shown in **Table E.1** and **Table E.2**, respectively. Part of the capacity building component of VCICDP is safeguards training for the AP-TRANSCO.

E. Information Disclosure, Consultation, and Participation

12. Initial informal consultations were done during the site visits as a part of the preparatory and site selection process. Consultations with project stakeholders in varying degrees will continue throughout the life of the subproject. Concerns of local people were common and they include: (i) load shedding and lack of reliable and stable supply of power affecting their produce and livelihood, and (ii) solid waste, dust and noise management during construction. Local people are aware of the proposed subproject and are generally supportive due to expected long-term benefit of reliable and stable supply of power.

13. This draft IEE will be posted on the ADB website as required by SPS 2009 and Public Communications Policy 2011. A subproject factsheet or a frequently asked questions (FAQ) flyer in Hindi will be made available at the project field offices. Aside from this public disclosure requirement, the Right to Information Act 2005 of Government of India also provides for additional obligation for the executing and implementing agencies to provide information about the subproject.

F. Implementation Arrangements

14. AP-TRANSCO is responsible for the implementation of the subproject. The VCICDP Project Management Unit (PMU) will be responsible for overall project management and safeguards compliance monitoring of contractor(s) during construction. The PMU will recruit an environmental staff (or a consultant), who will be working along with the officer designated by AP-TRANSCO for environmental safeguards, prior to the award of the civil works contract. Both PMU environmental staff and AP-TRANSCO officer will be primarily responsible for ensuring that the EMP is properly implemented and will prepare the environmental monitoring reports for submission to ADB at least twice a year during construction, and annually during operation phase. AP-TRANSCO will inform the contractor(s) of their responsibility to comply with the EMP and the requirements of ADB.

G. Grievance Redress Mechanism

15. A grievance redress mechanism (GRM) will be established by the AP-TRANSCO to deal with complaint(s) from affected persons (APs) during implementation. This would be done in line with the GRM as described in the VCICDP environmental assessment and review framework (EARF) that has been prepared for the VCICDP and this IEE. Affected persons can seek redress of their grievance at three levels: (i) the AP-TRANSCO at implementation level, (ii) the grievance redress committee (GRC) at PMU level, and (iii) the appropriate courts of law. GRC is set up by the PMU as soon as the project commences and will function as such from construction to operation. The PMU will ensure the representation of women on the members of

GRC which will consist of representatives from the local *Panchayat* Head, a District Revenue Commissioner, representative from the contractor(s) only during construction phase, designated staff of AP-TRANSCO on safeguards, Manager/Director of AP-TRANSCO, and a witness of the complainant/affected person.

H. Conclusions and Recommendations

16. The subprojects were selected following criteria and appropriate survey methods with the objectives of avoiding the potential significant adverse environmental impacts and land acquisition. Transmission line routes traverse primarily existing roads. No subproject is located near or within environmentally-sensitive areas such as forest declared by MoEF, archeological and excavation sites of national importance, the nine national parks and 25 wildlife sanctuaries in Andhra Pradesh.

17. None of the subproject locations are expected to cause significant adverse environmental impacts during construction and also during operation. There are no impacts that are significant or complex in nature, or that need an in-depth study to assess the impact. However, vegetation and land clearing within the right of way and the substation sites will be required which can be easily mitigated by proper planning, consultation, and best practices in construction engineering. Mitigation measures are included in the EMP and parameters for monitoring have been identified in the environmental monitoring plan.

18. Consultations with local people that may be potentially affected by the subproject show that their concerns are common as: (i) load shedding and lack of reliable and stable supply of power affecting their produce and livelihood, and (ii) timely compensation to farmers affected during construction of substations, erection of the transmission towers, and stringing of the conductors. Overall, local people are aware of the proposed project and are generally supportive due to expected long-term benefit of reliable and stable supply of power as well as employment opportunities resulting from the project. Consultations will continue throughout the life of the project. A grievance redress mechanism will be set up by the PMU in AP-TRANSCO to properly address complaints and issues that may arise from affected persons during implementation.

19. This draft IEE will be publicly disclosed at the ADB website as required by SPS 2009 and Public Communications Policy 2011. A project brief and/or factsheet will be prepared in local language and made available to the public at the AP-TRANSCO-field offices of each location. A workshop/training on safeguards is included in the component on capacity building. The reliability and stability of power supply resulting from the project is expected to improve the quality of life and the pace of economic development in Andhra Pradesh.

20. Therefore as per ADB SPS 2009, the subproject is classified as environmental Category B and does not require further Environmental Impact Assessment.

I. INTRODUCTION

1. To improve the quality and reliability of service in the power transmission and distribution system networks and to support the growth of industries under the VCICDP program, the Government of Andhra Pradesh has taken initiatives to invest in augmenting the power sector with funding from development partners like the Asian Development Bank (ADB). The investments involve expansion, upgrading and reconfiguration of the existing power transmission and distribution networks. AP-TRANSCO will be the implementing organization for the subprojects under the VCICDP Program.

2. The proposed Visakhapatnam-Chennai industrial corridor is expected to give stimulus to the economic prospects of Andhra Pradesh. Conceived with an investment of over 1 lakh crore, the project is expected to create more than 50,000 jobs, both directly and indirectly, in the first phase alone. It is touted as one of the projects that could potentially transform the industrial landscape of Andhra Pradesh in less than a decade of its commissioning.

3. The Visakhapatnam-Chennai industrial corridor project mentioned by the Union Finance Minister in the Budget has generated interest among investors and raised the hopes of the public. The Union Finance Minister's specific commitment to the project in the budget has triggered hopes, as the major corridor running through the seven coastal districts of AP - Visakhapatnam, East Godavari, West Godavari, Krishna, Guntur, Prakasam and Nellore - and culminating in Chennai would be of immense benefit to the state.

4. Being set up on the lines of the model Delhi-Mumbai Industrial Corridor project, this is also one of the key sops offered by the Central government as part of the special package to Andhra Pradesh in the Reorganization Act and will be developed in two or three phases spanning more than 15 years.

5. It may be noted that Visakhapatnam was recently included in the upcoming Chennai-Bangalore Industrial Corridor, which will essentially give thrust to industrial development in three border districts namely Anantapur, Chittoor and Nellore. As per the project development plan, the Krishnapatnam port region development will be taken in the first phase, while areas around Hindupur-Chittoor-Nellore will be developed in the second phase.

6. Investment regions and industrial areas will be proposed along the stretch covering key places such as Rajahmundry, Kakinada, Nuziveedu, Vijayawada, Bhimavaram, Machilipatnam, Guntur, Ongole, Bapatla, Nellore, Gudur and Naidupeta. Besides, self-sustaining industrial townships with world-class infrastructure, road and rail connectivity for freight movement to and from ports and logistics hubs, domestic/international air connectivity, reliable power and quality social infrastructure have to be created to provide a globally competitive environment that is not only conducive for setting up businesses but also superior compared to the existing hubs.

7. **The Subproject.** The Vishkhapatnam Energy Subproject will be funded under Project 1 and will include (i) laying of 132 kV cable from 220 kV substation diary farm to proposed GIS at Kapuluppada (14 km); (ii) laying of 132 Kv cable from 132 Kv substation Anandpuram to proposed GIS at Ozone Valley (8KM), (iii) laying of 220 kV line from Brandix substation to proposed GIS at Achutapuram (8KM); and (iv) laying of 220kV Multi Ckt LILO of Parwada - Samalkota and VSS-Kakinada Line to proposed SS at Nakkapalle/ Chandanada (16 km). The

distribution system improvement component will include the construction of three new substations, bifurcation of overloaded feeders, additional/augmentation of power transformers, installation of distribution transformers and capacitor banks.

8. The impact of the subproject would be adequate and reliable power supply for sustainable growth of power sector of AP. The project outcome would be increased capacity and improved operational efficiency in electricity transmission and distribution system in VCIC Corridor. The outputs for the distribution system improvement component include the construction of new substations, bifurcation of overloaded feeders, addition/augmentation of power transformers, installation of distribution transformers and capacitor banks.

A. Background of the IEE

9. ADB requires the consideration of environmental issues in all aspects of the Bank's operations, and the requirements for environmental assessment are described in ADB's Safeguard Policy Statement (SPS), 2009. The subproject is considered small-scale and potential environmental impacts have been assessed using ADB Rapid Environmental Assessment Checklist then potential negative impacts were identified in relation to pre-, construction and operation of the improved infrastructure.

10. **Categorization.** Based on results of the assessment and ADB SPS, the subproject is classified as environmental Category B, i.e., the subproject is judged to be unlikely to have significant adverse environmental impacts. An initial environmental examination (IEE) is required to determine whether significant environmental impacts warranting an environmental impact assessment are likely.

11. This IEE aims to (i) provide critical facts, significant finding, and recommended actions; (ii) present the national and local legal and institutional framework within which the environmental assessment has been carried out; (iii) provide information on existing geographic, ecological, social and temporal context including associated facilities within the subproject's area of influence; (iv) assess the subproject's likely positive and negative direct and indirect impacts to physical, biological, socioeconomic, and physical cultural resources in the subproject's area of influence; (v) identify mitigation measures and any residual negative impacts that cannot be mitigated; (vi) describe the process undertaken during project design to engage stakeholders and the planned information disclosure measures and the process for carrying out consultation with affected people and facilitating their participation during project implementation; (vii) describe the subproject's grievance redress mechanism for resolving complaints about environmental performance; (viii) present the set of mitigation measures to be undertaken to avoid, reduce, mitigate, or compensate for adverse environmental impacts; (ix) to describe the monitoring measures and reporting procedures to ensure early detection of conditions that necessitate particular mitigation measures; and (x) identify indicative costs and who is responsible for carrying out the mitigation and monitoring measures.

12. **Scope of IEE.** The IEE was based mainly on secondary sources of information and field reconnaissance surveys; as the subproject is of small scale, construction of the rapid sand filters will involve straight forward construction methods and impacts were assessed to be site-specific, short in duration and limited mostly to construction phase only, no field monitoring (environmental) survey was conducted. However, baseline monitoring on noise and dust levels will be conducted by the contractors prior to start of civil works to activities will be limited within

permissible values, or not above the background values if these are above the permissible limits. Stakeholder consultation was an integral part of the IEE.

II. DESCRIPTION OF THE SUBPROJECT

A. Existing Condition

Existing Condition

13. The total installed capacity of Andhra Pradesh is 10,368 MW as per geographical location and 8,307 MW as per power allocation after state bifurcation w.e.f. 2 Jun 2014. This comprises 2,810 MW of APGenco thermal, 1,671 MW of APGenco hydel, 1,615 MW of CGS Share, 2,875 MW of IPP's & others and 1,396.77 MW of NCE's. The PLF of APGENCO stations during FY 2013-14 was 78%. The present transmission infrastructure consists of 6 Nos. of 400 kV substations, 72 Nos. of 220 kV substations, 167 Nos. of 132 kV substations and 18,907 Ckm of EHT lines. The transmission loss during FY 2013-14 was 4.02%. There are 2,524 Nos. of 33/11 kV substations and 9,264 Nos. of Feeders (Urban - 2,114, Rural/Mixed – 5,375, Dedicated / Express Industrial – 706, others- 1069).

14. Power is being supplied to domestic, commercial and industrial consumers along with agricultural consumers in rural areas through mixed feeders. There are 706 Nos. of dedicated/express industrial feeders. 7 hours three-phase power supply is being given to agricultural consumers mostly in single/two spells and supply timings are rotated every 7 days. Rural areas are given single phase domestic lighting from 6 pm to 6 am. Three phase supply to rural areas for domestic, commercial and industrial consumers is along with agricultural supply only. As a result, most of the consumers, other than agricultural in rural areas on mixed feeders, get between 12-16 hours of supply every day, depending on agricultural supply spell timings. Agricultural feeders have been separated from domestic feeders in 14 *mandals* on a pilot basis during 2011. In these *mandals*, domestic consumers are being extended 3 phase supply depending upon availability of power. However, there is a system in Andhra Pradesh which enables single phase supply to be extended to all domestic consumers through suitable control mechanism at the substations. Depending upon availability of power, rural areas have been extended 24 hours single phase power supply to all domestic, commercial and industrial consumers. The segregation of agricultural feeders would enable extension of 24x7, reliable 3 phase supply to all domestic, commercial and industrial consumers.

B. Proposed Components

15. Project 1 Package APTransco 01 involves construction of 4 substations, 2 of 132kV capacity and 2 of 220kV capacity, and related laying of transmission lines of length 24 km and underground cable of 26 km length. Details of proposed subproject components are given in the following table.

Table 1: Proposed Subproject Components under VCICDP Project 1 Package APTransco 01

Subproject Components	Location	Component Description
132kV Kapuluppada Substation	Kapuluppada, Visakhapatnam District	132Kv GIS[1] Substation (2X80 MVA)
132Kv Ozone Valley Substation	Ozone Valley, (Madhurawada), Visakhapatnam District	132Kv GIS Substation (2x80 MVA)
220kV Achutapuram Substation	Achutapuram,	220kV GIS Substation (2x100 MVA)
220 Nakkapalle Substation	Nakkapalle, (DL-Puram),	220kV Substation (3X100+2x80 MVA)
16 km Transmission line	Parwada, Kakinada to Nakkapalli SS, Visakhapatnam Dist	Laying of 220kV Multi Ckt LILO of Parwada - Samalkota and VSS-Kakinada Line to proposed SS at Nakkapalle/Chandanada (16 KM)
8 km Transmission line	Brandix to Achutapuram SS, Visakhapatnam Dist	Laying of 220 kV Multi Ckt OH Line from 220kV Brandix SS to proposed GIS at Achutapuram (8 KM)
14 km underground cable	Dairy Farm to proposed GIS at Kapuluppada, Visakhapatnam District	Laying of 132kV Double Ckt XLPE Cable from 220 kV SS Diary Farm to proposed GIS at Kapuluppada (14 KM)
12 km underground cable	Dairy Farm to Ozone Valley, Visakhapatnam District	Laying of 132kV Double Ckt XLPE Cable from 220 kV SS Diary Farm to proposed GIS at Ozone Valley (12 KM)

16. A key plan depicting the four proposed substation locations is presented below. Available survey maps depicting the proposed substations and alignments are presented in Appendix 2.

[1] GIS is Gas-Insulated Substation technology which requires only about 10-25% of the land required for a conventional AIS.

Figure 1: Key Plan depicting Proposed Substation Locations

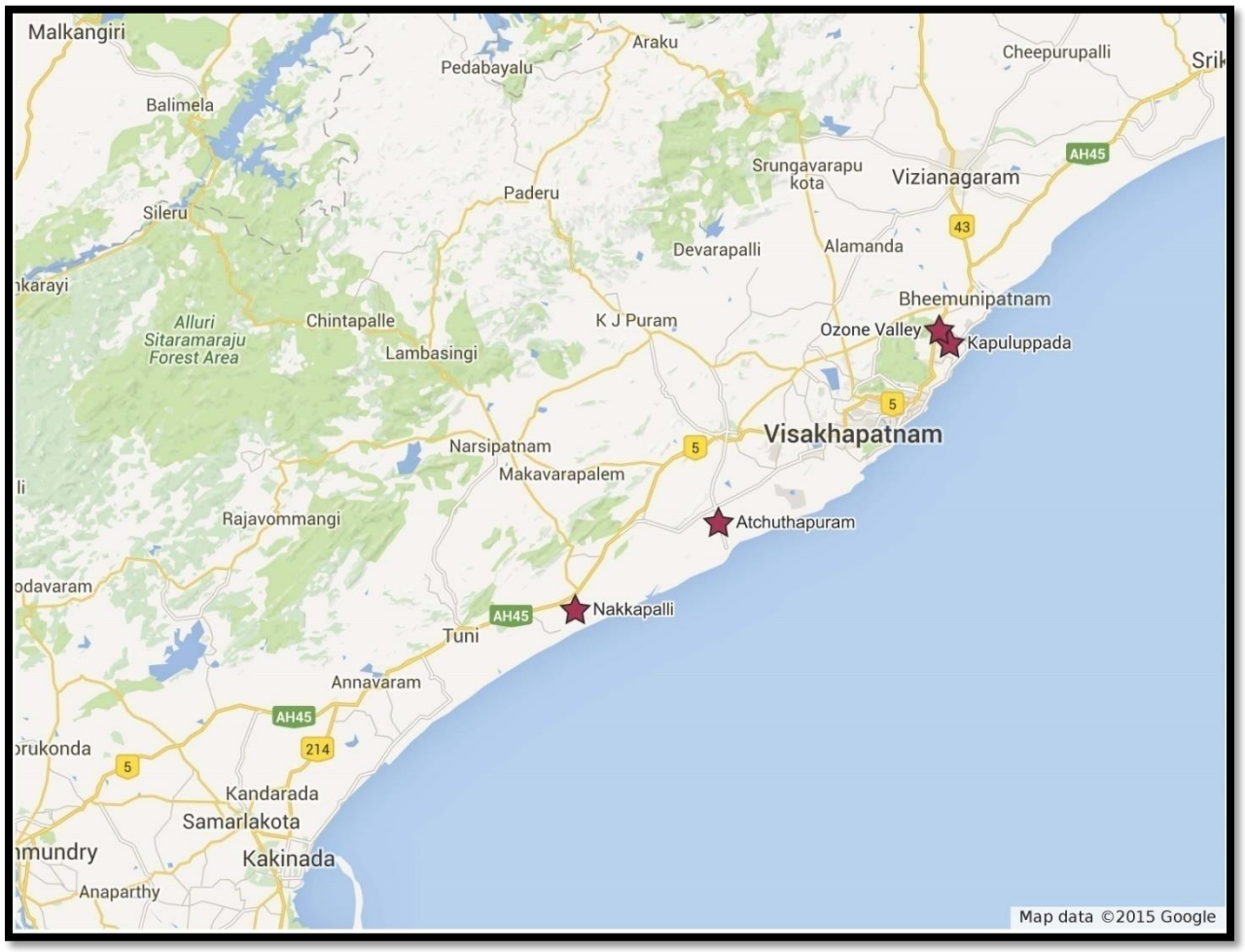


Figure 2: Google Earth Map depicting 220kV Atchutapuram SS and transmission route

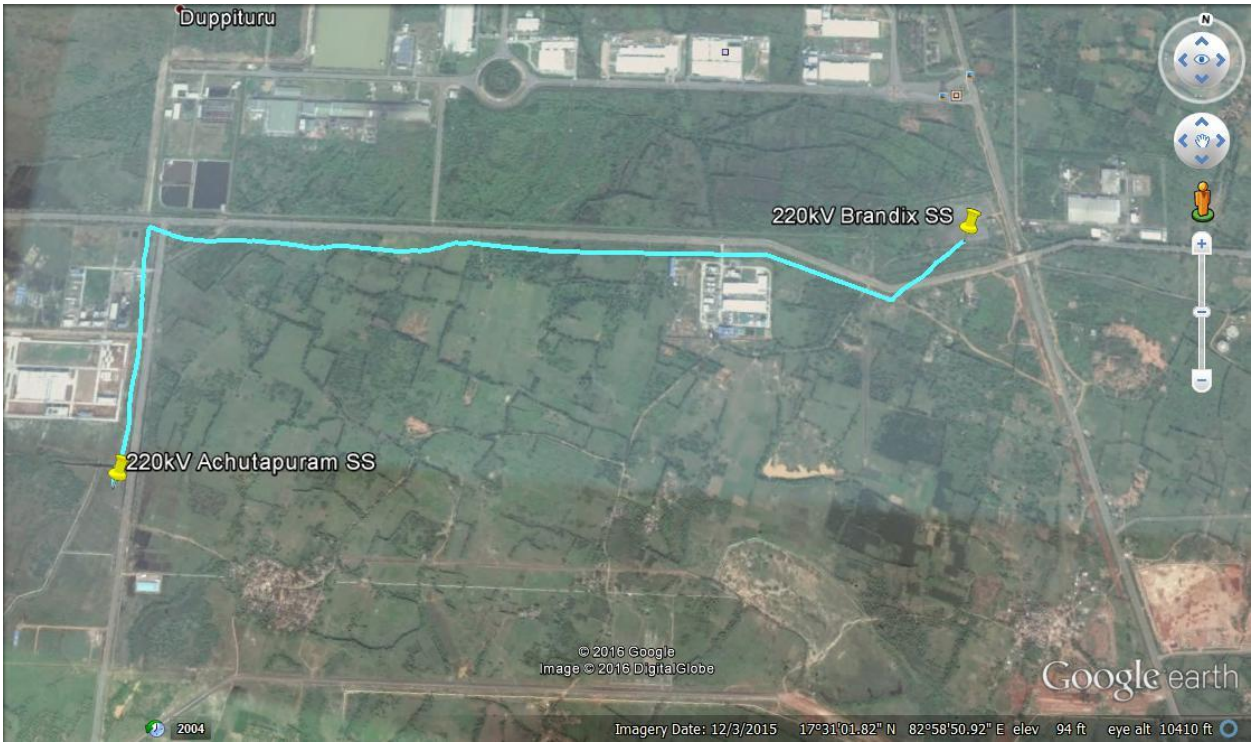


Figure 3: Google Earth Map depicting Kapuluppada and Ozone Valley Substations and transmission routes

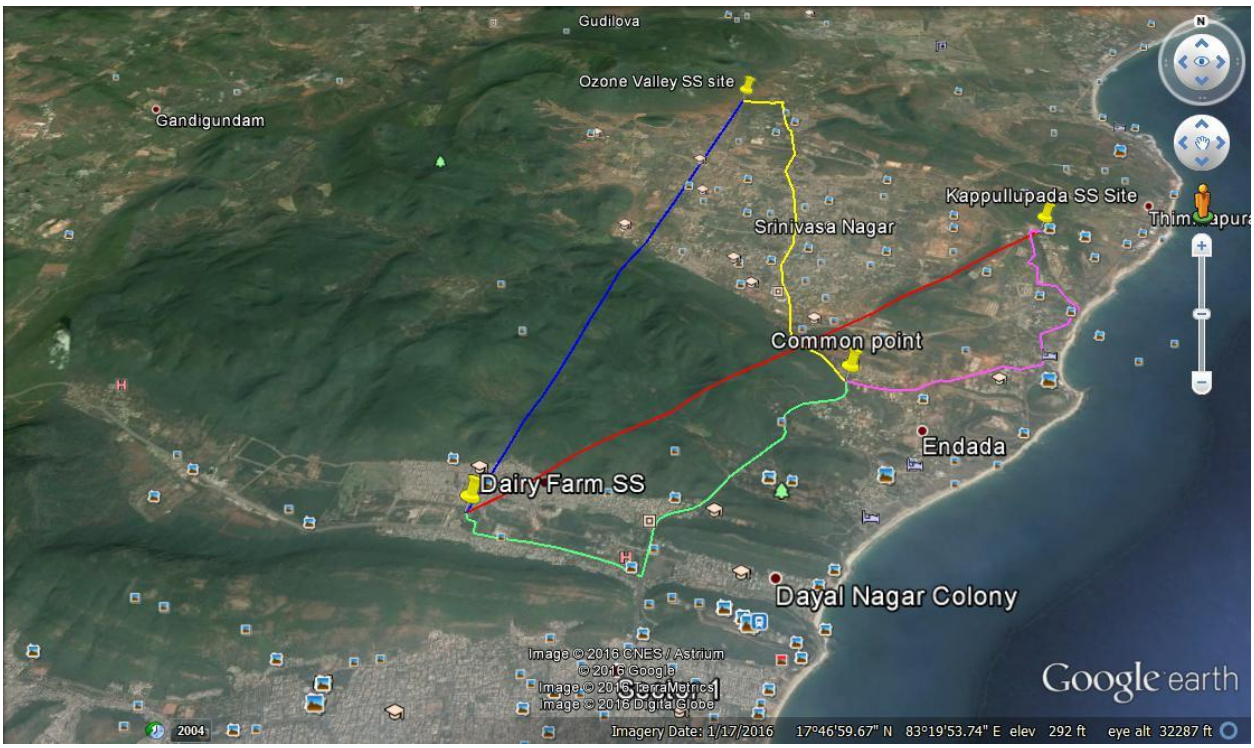


Table 2: List of Substations Under the Project 1 Package APTransco 01

Sl. No	Substation Name, capacity & associated Feeder Bays	Line Work- (route length in km)	Reasons for Construction of the Substations	Benefits due to the Substations
1	132kV GIS SS Kapuluppada (2X80 MVA)	Laying of 132kV Double Ckt XLPE Cable from 220 kV SS Diary Farm to proposed GIS at Kapuluppada (14kM)	To improve the Voltages in and around areas of Kapuluppada in Visakhapatnam District and to meet load growth of existing industries and upcoming industries in Industrial corridor of VCIC	The Voltage profiles of Kapuluppada improve and additional load growth of about 100MW can be met due to the proposed Substation. There will be reduction of System losses of about 452.810 MW to 449.640 MW due to erection of 132kV SS Kapuluppada, 132kV SS Ozone Valley, 220kV Achutapuram, and 132kV AIIMS Substations can also be achieved. Due to the proposed Substation the people of in and around Kapuluppada in Visakhapatnam District and the upcoming industries gets quality and reliable power supply.
2	132 kV SS Ozone Valley (2x80 MVA)	Laying of 132kV Double Ckt XLPE Cable from 220 kV SS Diary Farm to proposed GIS at Ozone Valley (12kMs)	To improve the Voltages in and around areas of Ozone Valley, Madurawada in Visakhapatnam District and to meet load growth of existing and upcoming industries and load requirement of IT hub.	The voltage profiles of Ozone Valley, Madurawada improves and additional load growth of about 100MW can be met due to the proposed Substation. There will be reduction of System losses of about 452.810 MW to 449.640 MW due to erection of 132kV SS Kapuluppada, 132kV SS Ozone Valley, 220kV Achutapuram, and 132kV AIIMS Substations can also be achieved. Due to the proposed Substation the people of Ozone Valley, Madurawada in Visakhapatnam District gets quality and reliable power supply and the industries coming up in the industrial corridor also gets benefited.

Sl. No	Substation Name, capacity & associated Feeder Bays	Line Work- (route length in km)	Reasons for Construction of the Substations	Benefits due to the Substations
3	220/132/33kV GIS SS at Achutapuram (2x100+2x80+1x50 MVA)	Laying of 220 kV Multi Ckt OH Line from 220kV Brandix SS to proposed GIS at Achutapuram (8kM)	To improve the Voltages in and around areas of Achutapuram in Visakhapatnam District and to meet load growth of existing and upcoming industries	The Voltage profiles of Achutapuram improve and additional load growth of about 100MW can be met due to the proposed Substation. There will be reduction of System losses of about 452.810 MW to 449.640 MW due to erection of 132kV SS Kapuluppada, 132kV SS Ozone Valley, 220kV Achutapuram, and 132kV AIIMS Substations can also be achieved. Due to the proposed substation the people of Achutapuram in Visakhapatnam District gets quality and reliable power supply. And also the existing and upcoming industries in the industrial corridor and Brandix SEZ and surround areas get benefitted.
4	220/132/33KV Nakkapalle/ Chandanada (2X100+2x80+1x31.5 MVA)	Laying of 220kV Multi Ckt LILO of Parwada - Samalkota and VSS-Kakinada Line to proposed SS at Nakkapalle/ Chandanada (16 kMs)	To improve the Voltages in and around areas of Nakkapalle, Koruprolu in Visakhapatnam District and to meet load growth of existing and upcoming industries	The Voltage profiles of 132kV SS Koruprolu & 132kV SS Pithapuram. Nakkapalle improves and additional load growth of about 150MW can be met due to the proposed Substation. There will be reduction of System losses of about 638.620MW to 632.927MW. Due to the proposed substation the people of Nakkapalle, Koruprolu, Pithapuram in Visakhapatnam District and industrial loads coming up under VCIC corridor will also get quality and reliable power supply.

Table 3: Distribution lines under the Project 1 Package APTransco 01

Sl. No	Substation Name, capacity & associated Feeder Bays	Line Work (route length in km)
1	132kV GIS SS Kapuluppada (2X80 MVA)	Laying of 132kV Double Ckt XLPE Cable from 220 kV SS Diary Farm to proposed GIS at Kapuluppada (14kM)
2	132 kV SS Ozone Valley (2x80 MVA)	Laying of 132kV Double Ckt XLPE Cable from 220 kV SS Diary Farm to proposed GIS at Ozone Valley (12kMs)
3	220/132/33kV GIS SS at Achutapuram (2x100+2x80+1x50 MVA)	Laying of 220 kV Multi Ckt OH Line from 220kV Brandix SS to proposed GIS at Achutapuram (8kM)
4	220/132/33KV Nakkapalle/ Chandanada (2X100+2x80+1x31.5 MVA)	Laying of 220kV Multi Ckt LILO of Parwada - Samalkota and VSS-Kakinada Line to proposed SS at Nakkapalle/Chandanada (16 kMs)

17. The subproject involves construction of 3 substations, one each of 132kV capacity, 400kV capacity and 220kV capacity, and related laying of transmission lines of length 92 km. Details of proposed subproject components are given in the following table.

Table 4: Proposed Subproject Components under VCICDP Tranche 1 Package APTransco 03

S. No.	Subproject Components	Location	Component Description
1	132kV Yerpedu Substation	Yerpedu, Chittoor District	132kV Substation (2X80 MVA)
2	400kV Rachagunneri Substation	Rachagunneri, Chittoor District	400Kv Substation (2x315 MVA)
3	220kV Naidupeta Substation	Naidupeta, Nellore District	220kV Substation (2x100+2x80+1x50 MVA)
4	9 km Transmission line	Rachagunneri SS to proposed Yerpedu SS	Laying of 9 km of 132kV Double Ckt Line from 220kV Rachagunneri SS to proposed Yerpedu SS
5	20 km Transmission line	LILO of Krishnapatnam - Chittoor Line	Laying of 20 km of 400kV Double Ckt Line from LILO of Krishnapatnam - Chittoor Line
6	63 km Transmission line	Rachagunneri SS to Naidupeta SS, Naidupet to Gudur line and Gudur line to Menakuru SS	Laying of 40 km of 220kV Double Ckt Line from 220kV Rachagunneri SS to proposed Naidupeta SS, Laying of 15 km of 132kV LILO of existing 132kV Naidupet to Gudur line and Laying of 8 km of Gudur line to 220kV Menakuru SS

18. A key plan depicting the three proposed substation locations, and Google Earth maps depicting the proposed substations and alignments are presented below.

Figure 4: Key Plan depicting Proposed Substation Locations

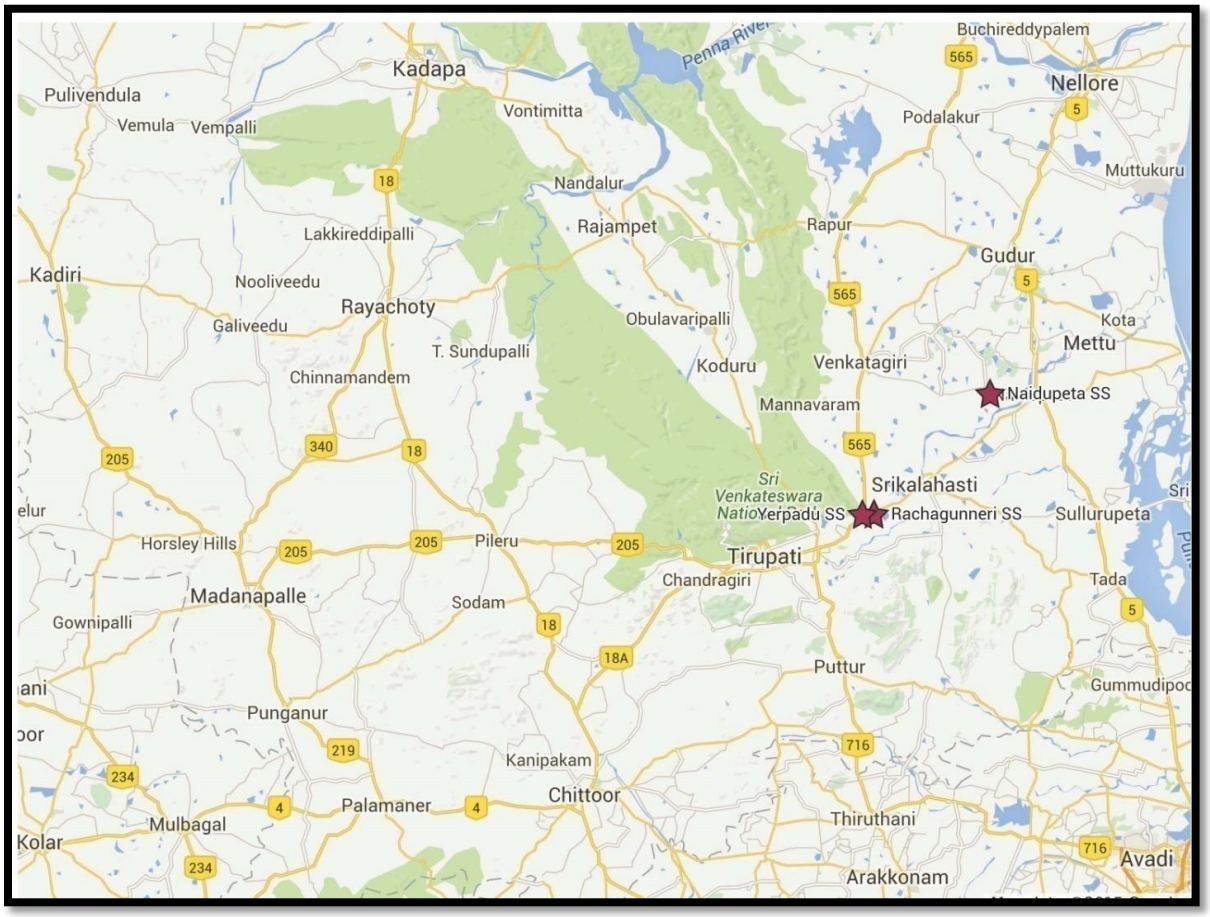
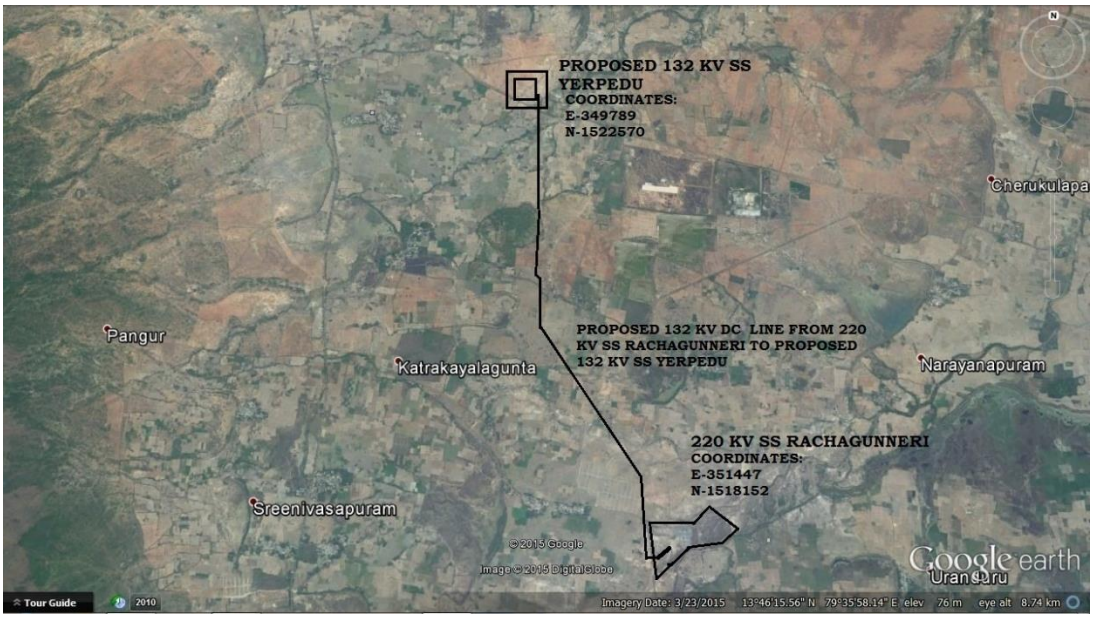
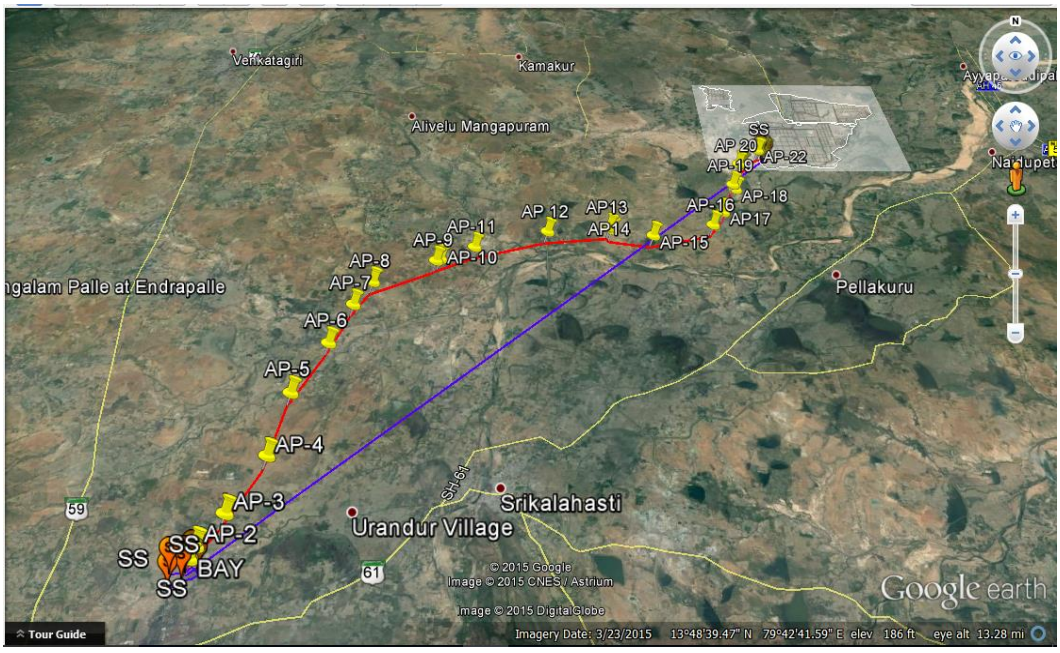


Figure 5: Google Earth Maps depicting proposed subproject components (APTransco/03)

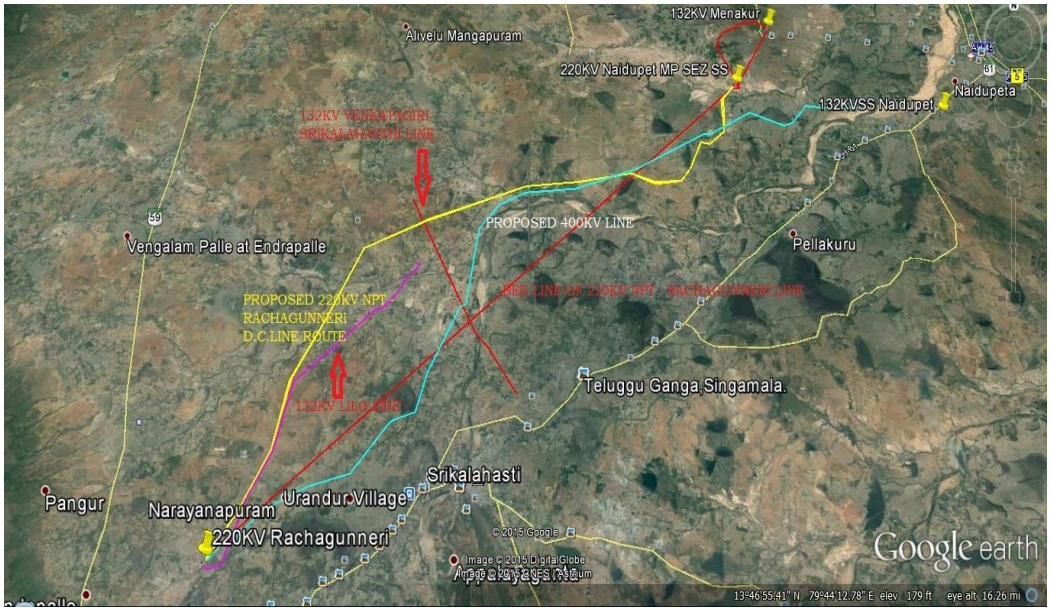
5a: Yerpedu Substation and related transmission line alignment



5b: Naidupeta Substation and related transmission line alignments



5c: Rachagunneri Substation and related transmission line alignments



C. Implementation Activities

19. Broadly, the implementation of distribution and transmission system improvements includes detailed and check survey, excavation, tower site leveling, backfilling (if needed), construction of substations, tower erection and assembly, stringing of conductors and earth wire, pre-commissioning and commissioning. For the erection of transmission lines and construction of substation, the following Government of India standards/codes shown in **Table 5** will be complied with by AP-TRANSCO:

Table 5: Relevant Construction Standards of the Government of India

Government of India standards and/or codes	Title
IS:5613-1995 (Part-II)	Code of practice for design, installation and maintenance of overhead power lines. Section 1 - Designs. Section 2 - Installation and Maintenance
IS:269-1967	Ordinary rapid hardening and low heat Portland cement.
IS:456-2000	Code of practice for plain and reinforced concrete
IS:1786-1966	Cold twisted steel bars for concrete reinforcements
IS:4091-1967	Code of practice for design and construction of foundation for transmission line towers & poles
IS:3072-1975	Code of practice for the installation and maintenance of switchgear
IS: 3043-1987	Code of practice for earthing
IS: 1255-1983	Code of practice for the installation and maintenance of power cables Cable sheaths and armour bonding to the earthing system
IS: 1866	Transformer insulation oil quality analysis • Circulation and filtering of oil, heating of oil, sampling and testing of oil • Inspection, storage, installation of transformers/reactors

Government of India standards and/or codes	Title
IS: 7205-1974	Safety code for erection of structural steelworks

D. Analysis of Alternatives

20. During the planning stage and preliminary design, alternatives were considered in the selection of the substation site and transmission line routes to ensure that they are economically and financially feasible, at the same time, potential environmental impacts are minimized. The following selection criteria guided AP-TRANSCO:

(i) availability of a suitable right of way (ROW) and access to site by overhead
(ii) transmission and distribution circuits;
(iii) location of existing transmission and distribution lines for potential interconnection;
(iv) distance to all weather roads, accessibility of heavy equipment under all weather conditions and access roads to the site;
(v) site maintenance requirements, water supply and storage;
(vi) soil resistivity, drainage, and soil conditions;
(vii) cost of earth removal, earth conditions and earth moving;
(viii) atmospheric conditions and potential contamination from industry;
(ix) available space for future expansion and current requirements;
(x) land ownership, avoidance of private land acquisition;
(xi) topographical features of the site, avoidance of flood plains, wetlands, forests and other environment-sensitive areas;
(xii) consideration of public safety and concern, avoidance of schools, playgrounds, hospitals, and structures of worship;
(xiii) avoidance of waterways and existing utilities, railway, road crossings, etc.; and,
(xiv) total costs including transmission and distribution lines with due consideration of environmental factors.

21. The following considerations for site planning have been included:

(i) "Whether any *Nallah*, water tank, canal, etc. is within the proximity of the proposed land should be clearly mentioned. In case of the existence of the above, the extent of water spread during maximum flood level should be indicated."
(ii) "In the detailed map, give the orientation of the EHT lines (existing or proposed) and the distance of lines from the proposed site."

22. Preliminary site assessments conducted by AP-TRANSCO are based on the walk-over survey. During field works or walkover surveys, locations of forests, railways, schools, waterways, utilities, road crossings, structures of worship, etc. are identified along the alignments under consideration (or a "bee-line"). Soil characterization and land use evaluation are also carried out during the walk-over survey or inventorization.

23. From the outputs of preliminary assessment, the alignment that will be selected for further evaluation is determined.

24. AP-TRANSCO have taken steps to make alternatives to the proposed project sites. Certain sites the land available is not sufficient to construct conventional SS due to shortage of

land. And hence instead of going for suitable land, AP-TRANSCO have gone for technology of constructing Gas Insulated Switchgear SS. which occupies one fifth of land required for construction of conventional SS by which the impacts of acquiring large extent land will be reduced. Similarly underground cables are proposed where there is no right of way.

25. **Table 6** provides a comparison of the general situation in case of "with project" and "without project" scenario.

Table 6: "With Project" and "Without Project" Scenario

No.	Parameter	With Project Scenario	Without Project Scenario
1	Electricity Environment	Major effect, improved voltage, less fluctuation, increased availability	Unstable power supply, energy not served to users
2	Effect on protected, sensitive, or forest areas	No effect, avoids protected, sensitive or forest areas	No effect
3	Effect on endangered species	No effect, avoids protected, sensitive or forest areas	No effect
4	Tree cutting	Minor effect, no forest will be involved but shall comply with environmental safeguards provision of ADB, Government of India national laws and regulations	No effect
5	Air emissions	Minor effect; improvement due to reduced usage of diesel generators currently employed for water abstraction from surface/ground water sources for agricultural purposes	May increase use of diesel generators for agricultural purposes
9	Water supply Social	Improved water accessibility for agricultural purposes	No improvement in access to water for agricultural purposes
10	Disturbances of people/communities	During construction phase, short and temporary impact	No issue
11	Effect of business	Construction activities may employ local people generating economic and livelihood opportunities.	Opportunity cost
12	Status of living Economic	Improved access to electricity will reduce domestic load for women such as for cooking purposes, education, etc.	No change
13	Economic development	Greater rate of economic development expected	Slow development

III. POLICY, LEGAL, AND ADMINISTRATIVE FRAMEWORK

A. Environmental Legislation (National and State Laws)

26. Implementation of VCICDP will be governed by environmental acts, rules, policies, and regulations of the Government of India. These regulations impose restrictions on the activities to minimize/mitigate likely impacts on the environment. Many of these are cross sector and several

of them are directly related to environmental issues. The most important of these is the "Environmental Impact Assessment (EIA) Notification, 2006".

27. The EIA Notification, 2006, sets out the requirement for environmental assessment in India. This states that prior environmental clearance (EC) is mandatory for the development activities listed in its schedule, and must be obtained before any construction work or land preparation (except land acquisition) may commence. Projects are categorized as A or B depending on the scale of the project and the nature of its impacts.

(i) Category A projects require EC from MoEF. The proponent is required to provide preliminary details of the project in the prescribed form, after which an Expert Appraisal Committee (EAC) of the MoEF prepares comprehensive terms of reference (ToR) for the EIA study within 60 days. On completion of the study and review of the report by the EAC, MoEF considers the recommendation of the EAC and provides the EC if appropriate.

(ii) Category B projects require EC 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.

28. Relevant to VCICDP, common effluent treatment plant (CETP) development (new or modification) will attract EIA Notification, 2006 and has been classified as Category B. None of the transport, power, urban/industrial water supply and sewerage infrastructure proposed under VCICDP attracts EIA Notification Schedule, and therefore EC is not required.

29. In addition to the EIA Notification, 2006, there are a number of other acts, rules and regulations currently in force that could apply to VCICDP. Salient features and applicability of these legislations are provided in Table 7. This presents specific requirements for the project. Appendix 2 provides the Government of India environmental standards for air, surface water, groundwater, emissions, noise, vehicular exhaust and disposal to land/agricultural use of sludge and bio-solids.[2]

[2] During the design, construction, and operation of the project the PMU and PIUs will apply pollution prevention and control technologies and practices consistent with international good practice, as reflected in internationally recognized standards such as the World Bank Group's Environment, Health and Safety Guidelines. These standards contain performance levels and measures that are normally acceptable and applicable to projects. When Government of India regulations differ from these levels and measures, the PMU and PIUs will achieve whichever is more stringent. If less stringent levels or measures are appropriate in view of specific project circumstances, the PMU and PIUs will provide full and detailed justification for any proposed alternatives that are consistent with the requirements presented in ADB SPS.

Table 7: Applicable Government of India Environmental Legislations and Specific Requirements

No.	Legislation	Requirements for the Project	Applicability
1	National Environment Policy (NEP), 2006	Project should adhere to the NEP principle of: enhancing and conservation of environmental resources and abatement of pollution	Applicable to all VCICDP subprojects.
2	EIA Notification, 2006	Environmental clearances (EC)	Not required for this subproject.[3]
3	Water (Prevention and Control of Pollution) Act, 1974 amended 1988 and its Rules, 1975	• Consent for establishment (CFE) and consent for operation (CFO) from APPCB • Compliance to conditions and disposal standards stipulated in the CFE and CFO	Applicable to all VCICDP subprojects.
4	Air (Prevention and Control of Pollution) Act, 1981, amended 1987 and its Rules, 1982	• CFE and CFO from APPCB as applicable • Compliance to conditions and emissions standards stipulated in the CFE and CFO.	Applicable if to be used in the subproject: (i) diesel generators; (ii) hot mix plants; and (iii) vehicles emitting air pollutants.
5	Environmental (Protection) Act, 1986 amended 1991 and the following rules/notifications: • Environment (Protection) Rules, 1986 including amendments • Municipal Solid Wastes (Management and Handling) Rules, 2000 • Noise Pollution (Regulation and Control) Rules, 2000 • Environmental Standards of Central Pollution Control Board (CPCB) • Notification of Eco Sensitive Zones • Wetland (Conservation	• CETPs/STPs should be designed and operated to meet disposal standards. Inlet effluent at CETP should also meet the standards - compliance with emission and disposal standards during construction. • Solid waste and sludge generated at proposed facilities shall be disposed in accordance with the MSWM Rules. • Compliance with noise standards • Compliance to environmental standards	Applicable to all VCICDP subprojects. When Government of India regulations differ from internationally recognized standards such as the World Bank Group's Environment, Health and Safety Guidelines, the PMU and PIUs will achieve whichever is more stringent. Project 1 subprojects are not located in or adjacent to any eco-sensitive zones, Ramsar sites, UNESCO heritage sites, high altitudes, and

[3] The Government of India considers power transmission projects as environment friendly compared to other power development projects since they do not generate and dispose of hazardous waste to land air and water, thus, they are not included within the realm of the Environment Protection Act 1986. In Notification in the Gazette of India, Extra-ordinary part II and section 3, subsection II, dated 14 September 2006, the Ministry of Environment and Forests (MoEF) has issued a notification exempting power transmission projects from environmental clearances due to its non-polluting nature . Therefore, no environmental clearances for the proposed project will be required from the MoEF or from the Andhra Pradesh State Pollution Control Board (APPCB).

No.	Legislation	Requirements for the Project	Applicability
	and Management) Rules, 2010 • Hazardous Waste (Management, Handling and Transboundary Movement) Rules, 2009	(discharge of effluents) • Restriction of activities (including construction, tree cutting, etc.) in the notified zones. There are no eco sensitive zones in or near the subproject locations • Applies to protected wetlands (Ramsar sites, wetlands in eco sensitive areas and UNESCO heritage sites & in high altitudes, and wetlands notified by Government of India) - Prohibits/ regulates activities within and near the wetlands. None of the subproject locations has protected wetlands • Rules defines and classifies hazardous waste provides procedures for handling hazardous waste • Requires Pollution Control Board's consent for handling hazardous waste • Procedure for storage of Hazardous wastes and provides procedures for recycling, reprocessing or reuse, important and export of hazardous waste • Rules for development of treatment, storage, disposal facility (TSDF) for hazardous wastes such that TSDF shall be developed following guidelines issued by CPCB	wetlands notified by Government of India.
6	Indian Wildlife (protection) Act, 1972 amended 1993 and Rules 1995 Wildlife (Protection) Amendment Act, 2002	• Covers wildlife sanctuaries, national parks, biosphere reserves, etc. • Specifies required permission from Chief Wildlife Warden/ State Wildlife Board/National Board of Wildlife	Applicable to subprojects located within core or buffer zone of protected areas. Project 1 subprojects are not located in or adjacent to any protected areas.
7	Indian Forest Act, 1927 • Forest (Conservation) Act, 1980 amendment 1988 and the following rules/notifications	• Declaration of forest areas (reserved, protected and village forests), and regulation of activities within the forests	Applicable to all subprojects located in forest lands. Subproject located in forests requires prior permission to take up the works.

No.	Legislation	Requirements for the Project	Applicability
	• Forest (Conservation) Rules, 1981 amended 1992 and 2003 • Guidelines for diversion of forest lands for non-forest purpose	• Restricts use of forest lands for non-forest purposes; • Prior permission for use of forest land for project proposes from Ministry of Environment and Forest (MoEF) • Approval of Ministry of Environment and Forest (MoEF) for any acquisition of forest land • Application for use of forest of land to be made to Forest Department, GoAP • Project proponent to identify non-forest land which is to be transferred to Forest Department for taking up afforestation program. • Net Present Value (NPV) of the forest land to be used, cost of afforestation, tree cutting, etc., as determined by Forest Department, is to be paid to the Forest Department.	Project 1 subprojects are not located in or adjacent to any forest land.
8	Ancient Monuments and Archaeological Sites and Remains Acts, 1958, its Rules,1959 and notification, 1992	• No excavation/construction work is allowed within 300 m boundary of the protected monument • Requires prior permission of Archaeological Survey of India (ASI) for taking works within 500 m of boundary of the Protected Monuments	Applicable to subprojects located in proximity of protected monuments/sites. Project 1 subprojects are not located in or adjacent to any protected monuments or sites.
9	Contract Labour (Regulation and Abolition) Act, 1970; • The Inter-State Migrant Workmen (Regulation of Employment and • Conditions of Service) Act, 1979	• Department of Labour, GoAP as principle employer • Contractor shall register with Labour Department, GoAP if inter-state migrant workmen are engaged • Adequate and appropriate amenities and facilities shall be provided to workers including housing, medical aid, traveling expenses from home and back, etc.,	• Applicable to all construction/civil works. • PIUs to obtain Certificate of Registration. • Contractors to obtain license from designated labour officer
10	The Building and Other	• Cess should be paid at	Applicable to any building or

No.	Legislation	Requirements for the Project	Applicability
	Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996 and the Cess Act of 1996	rate not exceeding 2% of the cost of construction as may be notified • The employer 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 has to obtain a registration certificate from the Registering Officer	other construction work and employ 10 or more workers
11	The Child Labour (Prohibition and Regulation) Act, 1986	• No child below 14 years of age will be employed or permitted to work in all the subprojects.	No child below 14 years of age will be employed or permitted to work in all the subprojects.
12	Minimum Wages Act, 1948	• All construction workers should be paid not less than the prescribed minimum wage	Applicable to all subprojects.
13	Workmen Compensation Act, 1923	• Compensation for workers in case of injury by accident	Applicable to all subprojects.
14	Equal Remuneration Act, 1979	• Equal wages for work of equal nature to male and female workers	Applicable to all subprojects.
15	AP State Environment Policy	• Follows the National Environment Policy, 2006 • Project implementation should adhere to the policy aims	Applicable to all subprojects.
16	The Motor Vehicles Act, 1988	• Standards for vehicular pollution and prevention control. The authority also checks emission standards of registered vehicles, collects road taxes, and issues licenses. • In August 1997, the Pollution under Control Certificate (PUC) program was launched in an attempt to crackdown on the vehicular emissions in the States. • All the vehicles that will be used in construction of the subprojects will have to comply with the PUC	Applicable to all subprojects.

No.	Legislation	Requirements for the Project	Applicability
		norms set down under this act.	
17	Coastal Regulation Zone (CRZ) Notification 6th January 2011 • Central Government have declared the coastal stretches of seas, bays, estuaries, creeks, rivers and back waters which are influenced by tidal action (in the landward side) up to 500m from the High Tide Line (HTL) and the land between the Low Tide Line (LTL) & High Tide Line (HTL) as "Coastal Regulation Zone" (CRZ), as per the provisions of the CRZ Notification 6th January 2011.	The main objectives of the Coastal Regulation Zone Notification, 2011 are: • to ensure livelihood security to the fishing communities and other local communities living in the coastal areas; • to conserve and protect coastal stretches and; • to promote development in a sustainable manner based on scientific principles, taking into account the dangers of natural hazards in the coastal areas and sea level rise due to global warming.	Applicable to all subprojects.
18	Minor Mineral and concession Rules	For opening new quarries. Regulate use of minor minerals like stone, soil, river sand etc.	Applicable to all subprojects.
19	The Mining Act(1952)	The mining act has been notified for safe and sound mining activity. The construction of road subprojects will require aggregates. These will be procured through mining from riverbeds and quarries	Applicable to all subprojects.
20	Notification for use of fly ash from thermal power plants within 100km reaches of the project.	The MoEF had issued in 2009 a notification that all brick units within 100km radius of thermal power plants were required to use fly ash for making bricks as well as using it for construction activities like building or roads.	Applicable to all subprojects within 100km reaches of thermal power plants.
21	Public Liability and Insurance Act 1991	Protection from hazardous materials and accident.	Applicable to all subprojects.
22	National Environment Appellate Authority Act (NEAA) 1997	Grievances process and how they will be dealt with.	Applicable to all subprojects.
23	Explosive Act 1984 - For transporting and storing diesel, bitumen etc.	Safe transportation, storage and use of explosive material.	Applicable to all subprojects.
24	The Factories Act, 1948 - The Andhra Pradesh Factory Rules	The Act lays down the procedure for approval of plans before setting up a factory, health and safety provisions, welfare provisions, working	Applicable to all subprojects.

No.	Legislation	Requirements for the Project	Applicability
		hours and rendering information-regarding accidents or dangerous occurrences to designated authorities.	
26	Chemical Accidents (Emergency Planning, Preparedness and Response) Rules, 1996.	The Rules provide for mandatory preparation of On-Site Emergency Plans by the industry and Off-Site Plans by the district collector and the constitution of four tier crisis groups at the center, district, and local levels for the management of chemical disaster.	Applicable to all subprojects.
27	Permission for extraction of ground water for use in road construction activities from State Ground Water Board.	Extraction of groundwater.	Applicable to rehabilitation and improvement of water supply. To be obtained prior to initiation of any work involving abstraction of groundwater
28	Permission for use of water for construction purpose from irrigation department	Use of surface water for construction	Applicable to all subprojects. To be obtained prior to initiation of any work involving use of surface water for construction

30. Substations and power distribution lines in forest lands will be avoided. However, in unavoidable cases like non-availability of suitable non-forest lands, for power distribution lines passing through any designated forest area, the forest land conversion will follow the "Guidelines for Diversion of Forest Lands for Non-Forest Purpose" under Forest (Conservation) Act, 1980[4]. The proposal for conversion and compensatory afforestation should be submitted by project proponent to Forest Department, Government of Andhra Pradesh which will then forward it to the MoEF for approval. The following guidelines will be adhered to in the process:

(i) An equivalent area of non-forest land will be made available for afforestation

(ii) As far as possible, the non-forest land for compensatory afforestation should be identified contiguous to or in the proximity of a reserved Forest or protected forest. If non-forest lands are not available in the same district other non-forest land may be identified elsewhere in the state.

(iii) Where non-forest lands are not available, compensatory afforestation may be carried out over degraded forest twice in extent to the area being diverted.

[4] (i) Forest land involving up to 5 hectares (ha) will cleared by MoEF Regional Office; and (ii) Forest land involving more than 5 ha and up to 40 ha will be cleared by the MoEF Regional Office after referring the case to Central MoEF

31. No subproject is located within the areas declared as forest by MoEF, cultural and archaeological sites considered of national importance, and the nine national parks and 25 wildlife sanctuaries in Andhra Pradesh.

32. Cutting of trees in non-forest land, irrespective of land ownership, also requires permission from local administration. Afforestation to the extent of two trees per each tree felled is mandatory.

B. International Environmental Agreements

33. India is a party to the following international convention that may apply to this project, especially in selection and screening of subprojects under restricted/sensitive areas. Table 8 provides the list of international agreements as per EARF and applicability to the subproject.

Table 8: International Agreements and Applicability to the Subproject

No.	Agreement	Requirements for the Subproject
1	Ramsar Convention on Wetlands of International Importance, 1971. The Convention on Wetlands of International Importance, called the Ramsar Convention, is an intergovernmental treaty that provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. According to the Ramsar list of Wetlands of International Importance, there are 25 designated wetlands in India which are required to be protected.	There is one Ramsar Site[5] in Andhra Pradesh however it is not located within or adjacent to the subproject sites.
2	Convention on the Transboundary Movements of Hazardous Wastes and Their Disposal, 1989 To protect human health and the environment against the adverse effects of hazardous wastes. This aims at (i) reduction of hazardous waste generation, promotion of environmentally sound management (ii) restriction of transboundary movements, and (iii) a regulatory system for transboundary movements.	Not applicable for this subproject.
3	Convention Concerning the Protection of the World Cultural and Natural Heritage (Paris 1972) This Convention defines and provides for the conservation of the world`s heritage by listing the natural and cultural sites whose value should be preserved.	Not applicable for this subproject.
4	Convention on International Trade in Endangered Species of Wild Fauna and Flora (Washington 1973)	Not applicable for this subproject.

[5] Kolleru Lake

No.	Agreement	Requirements for the Subproject
	– also known as CITES was signed on 20 November 1981. This Convention provides a framework for addressing the overharvesting and exploitation patterns that threaten species of flora and fauna. Under the Convention, the governments agree to restrict or regulate trade in species that are threatened by unsustainable patterns.	
5	Convention on Biological Diversity (1992) This provides for a framework for biodiversity and requires signatories to develop a National Biodiversity Strategy and Action Plan.	Not applicable for this subproject.
6	Convention on the Conservation of Migratory Species of Wild Animals (Bonn 1979) This sets the framework for agreements between countries important to the migration of 8 threatened species.	Not applicable for this subproject as sites are not known to be habitat of migratory species of wild animals. The subproject locations are not expected to alter bird migration and will not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction.
7	United Nations Framework Convention on Climate Change (UNFCCC), 1993 The UNFCC is an international environmental treaty with the main objective to stabilize greenhouse gas concentrations in the atmosphere at a level that will prevent dangerous human interference with the climate system. India signed the UNFCC on 10 June 1992 and ratified it on 1 November 1993.	The project will ensure that all construction activities will not significantly increase the GHG emissions and ensure that design of all infrastructure are resilient climate change impacts

C. ADB Policy

34. ADB requires the consideration of environmental issues in all aspects of ADB's operations, and the requirements for environmental assessment are described in ADB SPS, 2009. This states that ADB requires environmental assessment of all ADB investments.

35. **Screening and categorization.** The nature of the environmental assessment required for a project depends on the significance of its environmental impacts, which are related to the type and location of the project; the sensitivity, scale, nature, and magnitude of its potential impacts; and the availability of cost-effective mitigation measures. Projects are screened for their expected environmental impacts, and are assigned to one of the following four categories:

(i) **Category A.** Projects could have significant adverse environmental impacts. An EIA is required to address significant impacts.

(ii) **Category B.** Projects could have some adverse environmental impacts, but of lesser degree or significance than those in category A. An IEE is required to determine whether significant environmental impacts warranting an EIA are likely. If an EIA is not needed, the IEE is regarded as the final environmental

assessment report.

(iii) **Category C.** Projects are unlikely to have adverse environmental impacts. No EIA or IEE is required, although environmental implications are reviewed.

(iv) **Category FI.** Projects involve a credit line through a financial intermediary or an equity investment in a financial intermediary. The financial intermediary must apply an environmental management system, unless all projects will result in insignificant impacts.

36. ADB Rapid Environmental Assessment (REA) Checklist for energy (Appendix 1) has been used for the screening and categorization. Result of the screening shows the potential impacts are site-specific, short duration, not significant and few if any of them are irreversible. Thus this subproject is classified as Category B as per ADB SPS. This IEE has been prepared and covers the general environmental profile of the sub project area, an assessment of the potential environmental impacts on physical, ecological, economic, and social and cultural resources within the project's influence area during design and/or pre-construction, construction, and operation stages. An environmental management plan and an environmental monitoring plan are integral part of the IEE. The IEE followed a number of steps:

(i) Conduct field visits to collect primary or secondary data relevant to the project area to establish the baseline environmental condition;

(ii) Assess the potential impacts on environmental attributes due to the location, design, construction and operation of the Project through field investigations and data analysis;

(iii) Explore opportunities for environmental enhancement and identify measures;

(iv) Prepare an environment management plan (EMP) outlining the measures for mitigating the impacts identified including the institutional arrangements;

(v) Identify critical environmental parameters required to be monitored subsequent to the implementation of the Project and prepare an environmental monitoring plan;

(vi) Compare the environmental safeguard requirements of Government of India, Government of Andhra Pradesh and ADB, and identify measures to bridge the gap, if any;

(vii) Carry out consultation with affected stakeholders, local administrative bodies to identify perception of the Project, introduce project components and anticipated impacts; and

(viii) Disclose the draft IEE at ADB website and prepare project brief and/or FAQs in local language to be made publicly available at the offices of AP-TRANSCO.

37. A number of field visits were done during the project preparatory phase from March – August 2015. Field visits were done to conduct ocular inspection and to assess the existing condition of the physical and biological environment of selected subproject sites, consult with local people that may be potentially affected by the subprojects, coordinate with AP-TRANSCO, executing agency and local authorities, and to conduct secondary data collection. .

38. **Environmental Management Plan.** An EMP, which addresses the potential impacts and risks identified by the environmental assessment, has been prepared and included in this IEE. The level of detail and complexity of the EMP and the priority of the identified measures and actions are commensurate with the subproject's impact and risks.

39. **Public disclosure.** ADB will post this IEE, or any update and environmental monitoring reports submitted by the Project Management Unit (PMU) during project implementation upon

receipt on its website as well as disclose relevant information in accessible manner in local communities:

A. Government Regulatory Body

40. The Andhra Pradesh Pollution Control Board (APPCB) is the main state-level regulatory agency that is responsible environment protection and pollution control. APPCB through its 19 Regional Offices (RO) across the state regulates environmental protection related activities. Subproject locations in the Visakhapatnam Chennai Industrial Corridor are under the jurisdiction of different Regional Officer's and they will monitor the Subprojects operation and compliance with the standards.

41. APPCB monitors the environmental parameters to check whether or not it meets the standards stipulated in its consent order. Surveillance monitoring by APPCB staff, at least once a year, by visiting the subproject sites and collecting the sample and testing at APPCB laboratory, and specific monitoring in case of public complaints.

IV. DESCRIPTION OF THE ENVIRONMENT

A. Physical Resources

1. Topography, Geology, and Soils

42. The subproject locations are all around the city of Visakhapatnam. Visakhapatnam is strategically located midway between Howrah and Chennai, the two of the four metropolis of the country. The city is rated as the fastest growing city on the East. The industrialization and the accompanying urbanization is responsible for the rapid growth of the city. Visakhapatnam is the second largest city in Andhra Pradesh, a sprawling industrial city and one of the emerging metropolises.

43. Visakhapatnam is located on the east coast of India, in 17 degree 42' North latitude and 82 degree 02' East range of hills. Based on topographical conditions, the city and its environs can be divided into four categories viz. Hilly region, Upland tracks, Rolling plains and Plains. The Kailasa and Yarada are the major hill ranges in the city. The Kailasa hill range stretches from Simhachalam to MVP Colony on the north flank of the city. The city, which appears like a small basin, is surrounded by the Yarada hill popularly known as Dolphin's nose (358m) on the side of the Kailasgiri hills on the north, with the Bay of Bengal forming the eastern wall. The coastal line runs from north- east to south west over a distance of six kilometers (kms). On the west there is an extensive tidal basin called Upputeru now under reclamation. Beyond Yarada there is a valley followed by another range of hills.

2. Meteorology and Climate

44. **Climate:** The city area falls under semi-arid type of climate.

45. **Rainfall:** Annual rainfall in the area has an average of 953 millimeters (mm). In the Bay of Bengal, depressions are likely to be encountered in all seasons of the year with a gradual fall in pressure. On an average 4 to 5 cyclones per year occur. However, at particular locations the average frequencies may be lower. Hind casting studies indicated that the Coast is mainly affected by waves generated by Cyclones from the South East to South East direction. The

highest waves are experienced in the period April September when the winds are more intense and consistent. The deep sea waves with the highest and lowest period frequent from the South West quadrant. Waves of over 1.5 meters (mtrs) in the height may be expected approximately 14% of the time. The daily record of tidal levels shows two highs and two lows. There is published evidence to indicate that strong tides as much as 60 centimeters (cms) in excess of the predicted tides may occur during the cyclones.

46. **Temperature:** Ambient air temperature ranges between 45 degrees to 12 degrees C. Sea surface temperature range is from 33 degrees maximum to 20 degrees C minimum. Monthly mean relative humidity is between100% to 4%.

3. Air Quality and Noise

47. Air quality in the subproject locations is considered to be good. The air quality in and around the proposed substations is better when compared to the main city area due to the absence of industries in and around the area. Primary air quality data for all subproject sites will be gathered and monitored by the contractor during implementation. Table 9 below provides air quality data for Atchutapuram industrial area and standards per Government of India rules and regulations. However ADB SPS requires that the subproject applies pollution prevention and control technologies and practices consistent with international good practice, as reflected in internationally recognized standards such as World Bank Group's EHS Guidelines. Table 10 provides the WHO ambient air quality guidelines.

Table 9: Air Quality Test Results for Atchutapuram Industrial Area (May 2016)

TEST RESULT

Samples are analyzed "as is where basis is"

S. No	Parameter	Method	Units	Result	Standards
1	PM_{10}	CPCB Guidelines for the measurement of Ambient Air Pollutant, Volume –I,2012-13	$\mu g/m^3$	72.5	100
2	$PM_{2.5}$	CPCB Guidelines for the measurement of Ambient Air Pollutant, Volume –I,2012-13	$\mu g/m^3$	28.3	60
3	SO_2	CPCB Guidelines for the measurement of Ambient Air Pollutant, Volume –I,2012-13	$\mu g/m^3$	15.8	80
4	NO_2	CPCB Guidelines for the measurement of Ambient Air Pollutant, Volume –I,2012-13	$\mu g/m^3$	21.8	80
5	Ammonia *	CPCB Guidelines for the measurement of Ambient Air Pollutant, Volume –I,2012-13	$\mu g/m^3$	23.6	400

Table 10: WHO Ambient Air Quality Guidelines

Table 1.1.1: WHO Ambient Air Quality Guidelines[7,8]		
	Averaging Period	Guideline value in µg/m³
Sulfur dioxide (SO_2)	24-hour 10 minute	125 (Interim target-1) 50 (Interim target-2) 20 (guideline) 500 (guideline)
Nitrogen dioxide (NO_2)	1-year 1-hour	40 (guideline) 200 (guideline)
Particulate Matter PM_{10}	1-year 24-hour	70 (Interim target-1) 50 (Interim target-2) 30 (Interim target-3) 20 (guideline) 150 (Interim target-1) 100 (Interim target-2) 75 (Interim target-3) 50 (guideline)
Particulate Matter $PM_{2.5}$	1-year 24-hour	35 (Interim target-1) 25 (Interim target-2) 15 (Interim target-3) 10 (guideline) 75 (Interim target-1) 50 (Interim target-2) 37.5 (Interim target-3) 25 (guideline)
Ozone	8-hour daily maximum	160 (Interim target-1) 100 (guideline)

48. Noise in the area is normally low as the locations are not close to any industrial or main city areas. Monitoring by APSCB has not been conducted in the area. The contractors will be required to conduct noise monitoring prior to start of construction activities to determine the baseline level. Table 11 below provide different noise levels that need to be maintained in different class of areas as per Government of India rules and regulations. However ADB SPS requires that the subproject applies pollution prevention and control technologies and practices consistent with international good practice, as reflected in internationally recognized standards such as World Bank Group's EHS Guidelines. Table 12 provides the noise level guidelines.

Table 11: Noise Standards, Ministry of Environment and Forests

Code		Day Time (6 am – 9 pm)	Night Time (9 pm – 9 am)
A	Industrial	75	70
B	Commercial	65	55
C	Residential	55	45
D	Silence Zone	50	40

Table 12: World Bank Group's EHS Noise Level Guidelines

Table 1.7.1- Noise Level Guidelines[54]		
	One Hour L_{Aeq} (dBA)	
Receptor	Daytime 07:00 - 22:00	Nighttime 22:00 - 07:00
Residential; institutional; educational[55]	55	45
Industrial; commercial	70	70

4. Natural Hazards

49. **Seismicity:** Earlier the city fell under the seismic zone of Category II, where earthquakes of magnitude 5.6 and above do not occur. But in recent revised seismic map by National Geophysical Research Institute the zone has been elevated to Category III which suggests that earthquakes of magnitude greater than 5.6 are possible.

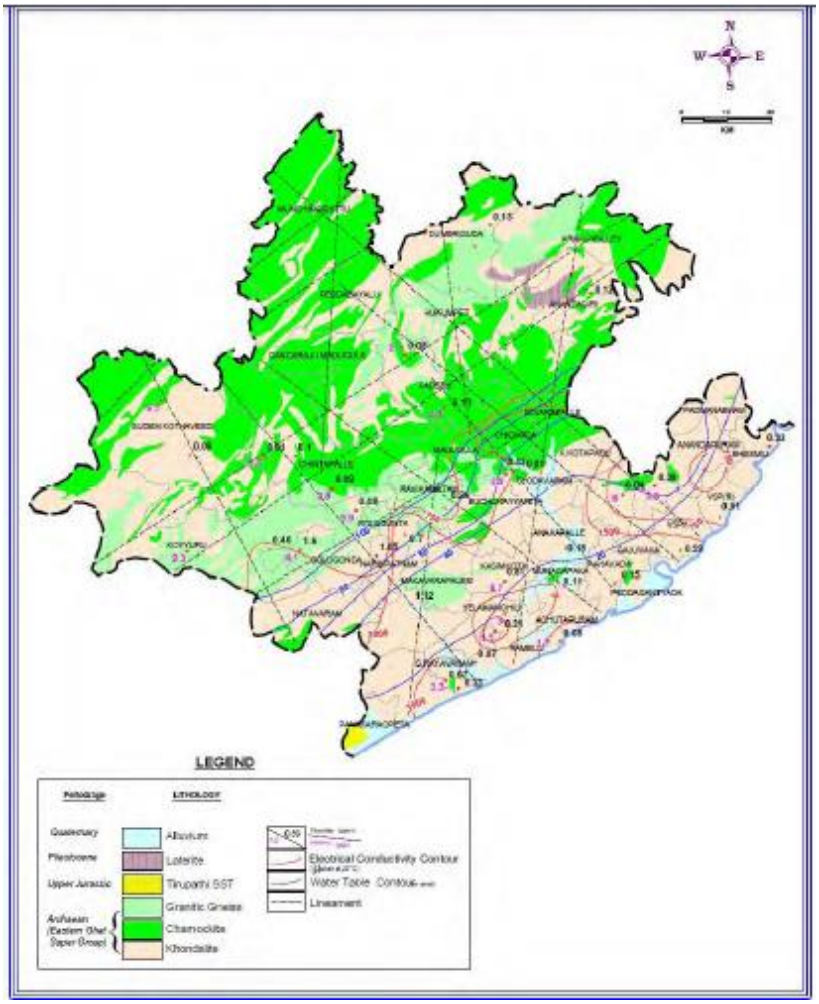
5. Water Resources

50. The water sources around the project location areas are as below:

Table 13: Water Resources – Water Availability

Reservoir	Distance (in Km)	Water Supply (in MGD)
Godavari	156/212	15.20
Raiwada	67	15.60
Tatipudi	62	8.00
Mehadrigedda	20	8.50
Gosthani	30	5.10
Mudasarlova	10	0.50
Gambheeram (few months	20	0.40
MGR Filtration	25	1.20
WS Schemes (lift) (Villages)		3.00
Total Supply		57.50

Figure 6: Hydrology of Visakhapatnam District



B. Biological Resources

(i) Vegetation: The areas around the canals are paddy fields, and some isolated areas having vegetation cover of trees like palm trees, coconut trees, mango trees, papaya trees etc. also some coffe plantations are found around the subproject locations.

(ii) Wildlife: Milch animals, sheeps, goats, buffaloes, wild boars and bisons are found in the vicinity of the subproject locations.

(iii) Migratory birds: Andhra Pradesh attracts a number of migratory birds. Andhra Pradesh also has a number of bird sanctuaries. Atapaka Bird Sanctuary, also known as Kolleru Wildlife Sanctuary, is a largest freshwater lake located in West Godavari district of Andhra Pradesh. The sanctuary falls under Kaikalur Forest Range. It is one of the Ramsar convention wetland sites, spread over an area of 308.55 km^2 (119.13 sq mi). Telineelapuram and Telukunchi Bird Sanctuaries are located in Srikakulam district of Andhra Pradesh. Every year, over 3,000 pelicans and painted storks visit from Siberia to these villages during September and stay until March. Pulicat Lake Bird Sanctuary is a famous 481 km^2 Protected area in Nellore District of Andhra Pradesh state. Pulicat Lake is the second largest

brackish-water ecosystem in India. Central location is: 13°34′N 80°12′E. 327.33 km² is managed by the Andhra Pradesh Forest Department and 153.67 km² is managed by the Tamil Nadu Forest Department. 108 km² is national park area. Rainfall ranges from 800 to 2000 mm. Temperature varies from 14 °C to 33 °C. Altitude ranges from 100' MSL to 1200' MSL

C. Socioeconomic Profile

51. **Demography**: Andhra Pradesh is one of the southern state of Indian sub-continent. There are a total of 13 districts in the two regions of Coastal Andhra and Rayalaseema. The new river-front capital in between Vijayawada and Guntur of the state was named as Amaravati, which is under the jurisdiction of APCRDA. The capital of the state is the Vijayawada alongside, Hyderabad being the common capital of both Andhra Pradesh and Telangana. It shares borders with states like Tamil Nadu, Orissa, Telangana and Karnataka. The official language of the state is Telugu.

52. **Target Population Details:** As of 2011 Census of India, the state had a population of 49,386,799 with a population density of 308/km^2. The total population constitutes 70.4% of rural population with 34,776,389 inhabitants and 29.6% of urban population with 14,610,410 inhabitants. Visakhapatnam district has the largest urban population of 47.5% and Srikakulam district with 83.8%, has the largest rural population, among others districts in the state. Spread over an area of 160,205 km^2, the state has a population density of 308 as against 277 in 2001 Census, which is below the national average. Registered growth rate of the population is 11.10 as against 14.59 recorded in the 2001 census. Literacy rate in 2011 was 67.77% as against 60.47% recorded in 2001 census. It is an increase of 7.19%. Andhra Pradesh ranks tenth of all Indian States in the Human Development Index scores with a score of 0.416. The National Council of Applied Economic Research district analysis in 2001 reveals that Krishna, West Godavari and Chittoor are the three districts in rural AP with the highest Human Development Index scores in ascending order.

53. **Economic Profile of Andhra Pradesh:** Andhra Pradesh has a very diverse geography which led to a very diverse economy. As many as 9 of the 13 districts have sea coast along the Bay of Bengal, which has created manufacturing and export centric industry. The fertile river plains in the delta regions of major peninsular rivers of Godavari and Krishna are rich with agriculture-based industries and the mineral deposits found in the districts of Rayalaseema, Eastern Ghats and neighboring states has led to large-scale ore exports. Visakhapatnam is an important commercial hub of the state and also IT hub of Andhra Pradesh.

54. The gross state domestic product (GSDP) of Andhra Pradesh was Rs 1.45 lakh crore in the previous fiscal year 2014-15. AP targets 18.2pc GSDP in 2015-16 i.e., Rs 1.65 lakh crore Andhra Pradesh government targets to achieve 18.2% Gross State Domestic Product (GSDP) in the current fiscal by focusing on agriculture and allied sectors. Though AP has been facing many financial constraints post bifurcation, AP has managed to achieved 1% higher Gross Domestic Product (GDP) in the last financial year than the national average. In 2015-16 financial year, the state aims to achieve 18.2% GSDP to Rs.1.65 lakh crore from 1.45 lakh crore in the previous fiscal. Agriculture and its allied sectors in the state alone contribute 27% of GSDP, and particularly aqua sector's (includes fisheries, shrimp) share in it is 6%. The industrial sector of the state include some of the key sectors

like Pharma, Automobile, Textiles etc. Sricity located in Nellore district is an integrated business city which is home to many multinational firms.

55. Andhra Pradesh is one of the storehouses of mineral resources in India. Andhra Pradesh with varied geological formations, contain rich and variety of industrial minerals and building stones. The state is well connected to other states through road and rail networks. It is also connected to other countries by means of airways and seaports as well. With a long seacoast along the Bay of Bengal, it also has many ports for sea trade. The state has one of the largest railway junctions at Vijayawada and one of the largest seaports at Visakhapatnam. Roads in Andhra Pradesh consist of National Highways and state highways with district roads as well. NH 5, with a highway network of around 1,000 km in the state, is a part of Golden Quadrilateral Project undertaken by National Highways Development Project. It also forms part of AH 45 which comes under the Asian Highway Network.

56. Andhra Pradesh has a railway network of 5,046 km and have played a significant role in boosting the economy of the state alongside developing the industrial and the tourism sectors. Visakhapatnam Airport, is the only airport in the state with international connectivity. The state has five domestic airports, Vijayawada Airport at Gannavaram, Rajahmundry Airport at Madhurapudi, Tirupati Airport at Renigunta, Cuddapah Airportand a privately owned, public use airport at Puttaparthi. There are also 16 small air strips located in the state.

57. Andhra Pradesh has one of the country's largest port at Visakhapatnam in terms of (cargo handling). The other famous ports are Krishnapatnam Port (Nellore), Gangavaram Port and Kakinada Port. Gangavaram Port is a deep seaport which can accommodate ocean liners up to 200,000–250,000 DWT. There are 14 notified non-major ports at Bheemunipatnam, S.Yanam, Machilipatnam, Nizampatnam, Vadarevu etc.

58. There are many auto component manufacturing companies in the state, manufacturing components such as grey-iron castings, precision aluminium castings, leaf springs, oils and lubricants, diesel fuel injection equipment, electronics and auto electronics and auto electrical, front axles, gears, forging, machined components, pressed metal components, pistons, cylinder liners, nozzles, delivery valves, starter motors, alternators, electronic regulators, high pressure die castings, clutch covers, fuel filters ,etc. The ideal places to locate companies in the Auto Sector are Visakhapatnam-Kakinada, Krishnapatnam-Tada-Sathiveedu and Vijayawada-Guntur corridors.

59. Andhra Pradesh is the second largest store house of Mineral Resources in India. The State has identified the Mining Sector as one of the growth engines for the overall development of industry and infrastructure. Andhra Pradesh has been producing good quality cotton with a comparatively higher output per hectare in India. The average production of medium and superior long staple cotton has crossed 2.6 million bales. With cotton in abundance, Textile Industry in the State is flourishing. Andhra Pradesh has a significantly growing IT industry.

60. **Cultural and Archaeological Resources:** The following are the major cultural and archaeological resources in AP that are ascertained as protected areas by the Archaeological Survey of India, and hence of national importance.

61. **Climate change impacts:** AP is highly dependent on agriculture for livelihood and thus, vulnerable to climate change. Some of the projected climate risks for AP are increase in natural disasters such as cyclones, maximum and minimum temperatures, changes in spatial and temporal distribution of monsoon, increase in frequency and intensity of rains, loss of rainy days, extended summers etc. Climate change will not only affect the natural resources but would also impact upon human health and availability of safe habitats in the future. These climate change risks may affect the envisioned sustainable development of AP.

V. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

62. ADB Rapid Environmental Assessment (REA) Checklist for energy (Appendix 1) has been used for the screening and categorization. Result of the screening shows the potential impacts are site-specific, short duration, not significant and few if any of them are irreversible. Thus this subproject is classified as Category B as per ADB SPS. This IEE has been prepared and covers the general environmental profile of the sub project area, an assessment of the potential environmental impacts on physical, ecological, economic, and social and cultural resources within the project's influence area during design and/or pre-construction, construction, and operation stages. An environmental management plan and an environmental monitoring plan are integral part of the IEE. The IEE followed a number of steps:

(i) Conduct field visits to collect primary or secondary data relevant to the project area to establish the baseline environmental condition;
(ii) Assess the potential impacts on environmental attributes due to the location, design, construction and operation of the Project through field investigations and data analysis;
(iii) Explore opportunities for environmental enhancement and identify measures;
(iv) Prepare an environment management plan (EMP) outlining the measures for mitigating the impacts identified including the institutional arrangements;
(v) Identify critical environmental parameters required to be monitored subsequent to the implementation of the Project and prepare an environmental monitoring plan;
(vi) Compare the environmental safeguard requirements of Government of India, Government of Andhra Pradesh and ADB, and identify measures to bridge the gap, if any;
(vii) Carry out consultation with affected stakeholders, local administrative bodies to identify perception of the Project, introduce project components and anticipated impacts; and
(viii) Disclose the draft IEE at ADB website and prepare project brief and/or FAQs in local language to be made publicly available at the offices of AP-TRANSCO.

63. A number of field visits were done during the project preparatory phase from March – August 2015. Field visits were done to conduct ocular inspection and to assess the existing condition of the physical and biological environment of selected subproject sites, consult with local people that may be potentially affected by the subprojects, coordinate with AP-TRANSCO, executing agency and local authorities, and to conduct secondary data collection. .

64. The subproject activities during the design, construction and operation phases may have environmental impacts associated with them. A summary of key environmental impacts is as given below:

Table 14: Summary of Anticipated Environmental Impacts for Visakhapatnam Energy Subproject

Impact field	Anticipated impact on the environment
Design Phase	
Environmental Clearance	No Environmental clearances required for the subproject. No land needs t be acquired for the subproject transmission lines or substations. Necessary permits for construction and relocation of utilities will be taken as required from the concerned administration.
Utilities	Telephone lines, electric poles and wires, water pipe (old) existing within right-of-way (ROW) may require shifting without disruption to services.
Water Supply	Health risk due to temporary closure of existing water supply.
Asbestos cement pipes	Risk of contact with carcinogenic materials
Social and Cultural Resources	Ground disturbance can uncover and damage archaeological and historical remains. Access to sites of cultural/religious importance may be affected during civil constructions (especially during pipe laying type of works).
Traffic	Traffic flow will be disrupted if routes for delivery of construction materials and temporary blockages during construction activities are not planned and coordinated.
Construction Phase	
Air Quality	Emissions from construction vehicles, equipment, and machinery used for excavation and construction resulting to dust and increase in concentration of vehicle-related pollutants such as carbon monoxide, sulfur oxides, particulate matter, nitrous oxides, and hydrocarbons. Sensitive receptors (e.g. hospitals, schools, churches) may be affected temporarily by increased traffic and related impacts during the construction phase (from the proposed detour). Fugitive dust can also impact on roadside air quality during construction. Exhaust fumes from construction machinery, and potential smoke from cooking fires. Burning of waste and cleared vegetation Odors from use of toilet facilities other than provided facilities.
Drainage and Hydrology	The proposed development will occur within the road ROW and is situated within an existing built up area where the water supply infrastructures already exist. Due to the nature and locality of the subproject there is unlikely any significant impacts on water resources within the immediate area.
Noise and Vibration	Sensitive receptors (hospitals, schools, churches) may be affected temporarily by increased traffic and related impacts Use of heavy vehicles and equipment may generate high levels of noise. Vibrations resulting from blasting, bulk earthworks, micro-tunneling, and compaction may create significant disturbances to nearby people and businesses. Disturbance from afterhours work.
Biodiversity Flora and Fauna	No areas of ecological diversity occur within the subproject location. Due to the nature and locality of the subproject there is unlikely to any significant impacts on biodiversity within the area.
Ecological resources	Felling of the trees are not expected to be significant. Compensatory tree plantation / compensation will be made as per government norms.
Existing infrastructure	There is likely to have temporary disruption of infrastructure and services

Impact field	Anticipated impact on the environment
and facilities	during the laying of the transmission lines. There are a few existing infrastructure and services (roads, telecommunication lines, power lines and various pipelines within the vicinity of the subproject.
Accessibility	Due to the location and nature of the subproject, there will be no interference with access Existing public transport facilities and operations will not be affected by the road closure and detours. Shops and establishments are not located along the proposed alignments therefore will not need to be relocated during construction. There is no impact on livelihoods. There will be no disruptions to health services, education services, local businesses, transport services, pedestrian movements, due to traffic and construction related noise, visual, and air pollution.
Socio-economic income	There will be no impact on the access of residents and customers to nearby shops and any loss to business is not expected.
Occupational Health and Safety	Danger of construction related injuries. Safety of workers and general public must be ensured. Poor waste management practices and unhygienic conditions at temporary ablution facilities can breed diseases. Standing water due to inadequate storm water drainage systems, inadequate waste management practices, pose a health hazard to providing breeding grounds for disease vectors such as mosquitoes, flies and snails. The use of hazardous chemicals and materials during construction can pose potential environmental, health and safety risks. Road safety may be affected during construction, especially when traffic is detoured.
Employment generation	The subproject will provide employment opportunities for local people during construction. Expectations regarding new employment will be high especially among the unemployed individuals in the area. Labor gathering at the site for work can be a safety and security issue, and must be avoided. The training of unskilled or previously unemployed persons will add to the skills base of the area.
Community health and safety	Community hazards which can arise during construction (e.g., open trenches, air quality, noise, falling objects, etc.). Trenching on concrete roads using pneumatic drills will cause noise and air pollution. Traffic accidents and vehicle collision with pedestrians during material and waste transportation.
Construction waste	Trenching will produce additional amounts of waste soil. And also accumulation of debris waste materials and stockpiling can cause environmental visual pollution.
Work camps	Local workers will be employed and no workers camps are expected for these construction works.
Social and cultural resources	The proposed development will not require demolition of ASI- or state-protected monuments and buildings however there is risk of archaeological chance finds. Sites of social/cultural importance (schools, hospitals, religious place, tourism sites) may be disturbed by noise, dust, vibration, and impeded access.
Clean up operations,	Impacts on social or sensitive receptors when post construction

Impact field	Anticipated impact on the environment
restoration and rehabilitation	requirements are not undertaken, e.g. proper closure of camp, disposal of solid waste, and restoration of land after subproject construction.
Operation & Maintenance Phase	
General Maintenance	Maintenance activities particularly at substations may cause disturbance to sensitive receptors, dusts, and increase in noise level.
Land Uses	Due to the location and nature of the subproject, there will not be interference with access during maintenance works.
Health and Safety	Danger of operations and maintenance-related injuries. Safety of workers and general public must be ensured. Poor waste management practices and unhygienic conditions at the improved facilities can breed diseases. The use of hazardous chemicals in the substation / transformer oils, etc. can pose potential environmental, health and safety risks.
Solid and Hazardous waste	Solid waste residuals which may be generated by the substations and include used filters, used cloth, used oils and miscellaneous wastes.

65. The Ministry of Environment and Forests (MoEF) of Government of India, in its notification in September 2006, has exempted transmission projects from environmental clearances due to the nonpolluting nature of its activities. However, forest clearance under the Forest Conservation Act 1980 will be necessary in the event the transmission line passes through forest areas.

66. One of the factors considered in selecting the best and optimum transmission line route is avoidance of potential significant environmental impacts. In power transmission projects, potential environmental impacts are confined in the right of way (ROW) for while substations, they are site specific.

67. Appropriate survey methods and good engineering practice have been used to select the best alignment but residual impacts associated with the project cannot be entirely avoided resulting from varying topographical locations that will be traversed by the transmission line. An environmental management plan (EMP) and an environmental monitoring plan (EMoP) will help ensure that these residual impacts are mitigated and/or enhanced.
Details of some of the environmental impacts and mitigation measures for different phases of the subproject are provided in the below sections.

A. Pre-construction and Design Phase

1. Location of substations and transmission line routes

68. As discussed in Sect. 4.2 (Analysis of Alternatives), criteria for site selection will guide the selection of transmission line route and substations, among others, to avoid significant adverse environmental impacts.

69. Based on these criteria and checklist, forest, cultural and archaeological sites, sanctuary, protected, and other ecologically-sensitive areas were avoided.

70. Aside from the criteria and checklist used by AP-TRANSCO, the walkover survey/transect, which involves setting up of temporary tracks, helps determine the type and

number of trees and plants that may be affected (if any), type of structures and settlements within the ROW, and natural physical features and public utilities that may be traversed by the transmission line. Walkover surveys may cause short and temporary disturbance to local people within the ROW.

71. Some of the locations selected will not require erection of towers as they mainly involve underground cabling for laying of distribution lines.

2. Land acquisition for the substations

72. All the AP-TRANSCO substation sites are on government land or land already acquired by APIIC and transferred to AP-TRANSCO. There is no need for land acquisition from private owners. Substation sites that were initially evaluated as technically suitable but located on private lands that would entail land acquisition, physical and economic displacement of local people were not considered.

3. Construction Phase

73. During this phase, some activities include clearing of ROW, setting up of temporary access tracks, setting up of materials storage areas along the route and substation work sites, transport of material and equipment to the site, excavation for substations and towers foundation, cementing/concreting of tower foundation, erection of the towers, and conductor stringing. AP-TRANSCO will ensure that the contract of the Engineering, Construction and Procurement (EPC) Contractor(s) will include the obligation to compensate for any temporary damage, loss or inconvenience as result of the project during the construction phase.

a. Prepare construction management plan

74. The construction management plan (CMP) will help in avoiding the unplanned activities of EPC Contractor(s) and will guide the smooth implementation of earth-moving works, civil and electrical works. The CMP will cover temporary pedestrian and traffic management, community and safety, spoils or muck disposal, noise and dust control, drainage and storm water management, material management, and waste management. The CMP will also include designate sites/areas for monitoring such as workers facilities, work areas, and materials warehouse/storage.

b. Hiring of project staff and workers

75. The implementation of several subprojects will be opportunities for local employment. While this is beneficial, it may also be a cause of conflict due to migration of workers and dispute over transparency of hiring particularly if migrant workers are recruited over local people. The EPC Contractor(s) will be required to use local labour for manual work and eligible local workforce for technical and administrative jobs. AP-TRANSCO will monitor the compliance to priority of local hiring.

c. Orientation for EPC contractor(s) and workers

76. AP-TRANSCO will conduct briefing and/or orientation for EPC Contractor(s) on the environmental management plan (EMP), grievance redress mechanism, consultation, and

reporting. This will provide an understanding of their responsibility in implementing and compliance to the EMP as well as agreement on critical areas that needs monitoring. The briefing will also include strict compliance against child labour, bonded or forced labour, and awareness about socially transmitted disease such as HIV/AIDS to prevent potential incidence. Aside from relevant national and state labour regulations, ADB's core labour standards will provide guidance for compliance. EPC Contractor(s) will provide training/drills on emergency preparedness and exercises before start of work will be encouraged to maintain health and fitness.

d. Presence of workers at construction sites

77. **The presence of workers and staff at the new substation construction sites may** increase demand for services such as housing, food, etc. This localized demand may be an opportunity for local people to have temporary small-scale business in providing services such as food, temporary lodging, etc. This will be a beneficial impact to local economy.

e. Site preparation and construction of substations and transmission towers

i. Impacts on land and vegetation

78. Clearing of land and vegetation, excavation and earthmoving will be done and some mature trees of economic value (i.e., firewood, timber, furniture, etc.) may be cleared in some locations such as in 220/132/33KV **Nakkapalle/ Chandanada**. Cut trees owned by the Government will be sold and revenue turned over to Revenue Authority.

79. Vegetation clearing may not cause loss of habitat. Most of the substation sites are on clear land and transmission line routes will traverse mainly existing road alignments. No protected area, sanctuary or forest will be affected. Construction works will not be scheduled during harvest time in rural areas to minimize damage to cash crops.

Figure 7: Vegetation in Substation sites

7a: OZONE VALLEY SS SITE

7b: KAPULUPPADA SS SITE

7c: ATCHUTAPURAM SS SITE

7d: NAKAPALLE / CHANDANADA SS SITE

80. Earthmoving works in substation sites may cause potential erosion and localized flooding. Adequate erosion control measures will be provided in areas located in sloping terrain (or as needed) and spoils disposal plan will be strictly implemented to prevent localized flooding. For transmission towers, earthworks will be isolated to tower sites only. Tower

foundations involve small-scale excavations and the excavated topsoil will be used for backfilling.

81. For substations, wherever necessary, downhill slopes will be provided with revetments, retaining walls or sow soil binding grass around the sites to contain soil erosion. Landscaping/replanting/re-vegetation will be done as soon as earthworks are completed to stabilize the soil.

82. For transmission towers, only the exact amount of construction materials (i.e., sand, gravel, concrete, etc.) will be brought on-site to avoid stockpiling that may cause localized flooding during the monsoon season and to minimize any inconvenience to local people. At substation sites, adequate storage for materials needed for construction works will be provided.

83. During the erection of transmission towers, a four- legged steel lattice type will be used. Following the Forest Conservation Act 1980 and the Indian Standard (IS) 5613-1993, the ROW for the 400 kV transmission line is 52 m from the centreline, 35 m for 220 kV transmission line, and 27 m for 132 kV transmission line.

84. The two subproject locations that will involve towers are Atchutapuram SS and Nakkapalli / Chandanada site, while the other will have underground cabling. Atchutapuram has no land acquisition requirement. Nakkapalli location is still to be finalized by AP-TRANSCO.

85. Crops and trees along the ROW that may be affected or damaged during the erection of towers and stringing of conductors will be compensated based on entitlements following the national laws and SPS 2009. Payments to affected farmers cover at least three phases (i.e., if there are crops during each phase): (i) preparing the foundation for towers, (ii) erection of towers, and (iii) stringing of conductors.

86. There will be no access road construction for erection of towers and stringing of conductors but access tracks will be created to reach the location of the towers. All the substation locations are accessible by road. In case if any additional access is required, access tracks will be created that would just be wide enough to accommodate the machinery needed to erect the towers and to maintain them. Materials required for the erection of towers will be carried manually to minimize disturbance.

ii. Impacts on people

87. The erection of towers and poles as well as stringing of conductors may potentially interfere with road crossings that may pose safety risks to the public and construction workers. To minimize the risks, adequate danger and clearly visible warning signs will be posted at designated sites while scaffoldings will be placed over road crossing points. EPC Contractor(s) will be required to instruct drivers of construction vehicles to strictly follow road regulations and to implement the temporary pedestrian and traffic management plan. Security personnel will be assigned to prevent trespassing and accidents at the substation sites.

88. Local hiring will be given priority so workers can come home after work every day. However, if required, EPC Contractor(s) will provide construction camps with sanitary facilities, wash areas, safe drinking water, garbage bins, and designated security personnel. Designated

staff will be provided with communication device to facilitate communication particularly during emergency.

89. Site engineers will find the location of the nearest hospital and will make arrangements in case of accidents in the worksites. First aid treatment will be set up within the construction sites and field offices. Workers will be provided with hard hats, safety shoes, and safety belts while designated staff will be provided with communication devices. A health personnel (or a nurse) will be assigned by EPC Contractor(s) to visit the construction sites once a week to broadly check the sanitary conditions of the construction sites and overall health condition of workers to minimize outbreak of diseases. Good housekeeping will be enforced at all times and will be monitored by MP Transco-PMU. The Contractor(s) will comply with relevant safety measures required by law and best engineering practices.

iii. Impacts on air quality, noise and vibration

90. The use of heavy equipment and construction vehicles may increase vehicular emissions. Vehicular emissions, land clearing, earthmoving works and transport of construction materials may increase levels of suspended particulate matter affecting air quality. Opened and exposed land areas at the substation sites and transmission towers will be sprayed with water to suppressed dust level particularly during the summer season. Construction sites for substations will be temporarily enclosed to contain dust dispersion. EPC Contractor(s) will be required to maintain construction vehicles regularly to minimize the contribution of vehicular emissions to poor air quality. Warehouse for construction materials will be provided onsite to reduce the trips of material delivery while construction vehicles transporting materials that generate dusts will be covered.

91. Aside from vehicular emissions, the use of heavy equipment, construction vehicles and civil works may increase the noise levels while excavation works at the substation sites may induce vibration. Increase in noise levels and potential vibration may inconvenience local people living at and around these sites. Machineries and construction areas will be covered with acoustic screens and/or temporary enclosures. Drivers will be required to observe low speed wherever necessary and no blowing of horns. EPC Contractor(s) will ensure that the traffic management plan as well as air quality and noise control plans are implemented. AP-TRANSCO will monitor compliance.

iv. Impacts on water quality

92. Presence of workers at construction sites will generate sewage that may affect water quality while earth moving works may cause localized flooding during monsoon season and in other low-lying areas. EPC Contractor(s) will provide workers with sanitary facilities and safe drinking water. The site selection of subprojects avoided waterways to minimize the costs of mitigating the associated environmental impacts. To avoid localized flooding, construction works will be scheduled during summer in areas potential to flooding and during the monsoon season, drainage and storm water management plan will be implemented by EPC Contractor(s). AP-TRANSCO-PMU will monitor compliance to these measures.

4. Operation Phase

a. Presence of transmission towers and substations

i. Impacts on land and vegetation

93. The availability of a stable and reliable power supply will attract and promote local economic development and thus, may actually enhance property values.

94. There will be restrictions on height of plants/crops that will be allowed within the ROW to keep its integrity. This is to ensure that the required vertical spacing between the conductors and the vegetation is maintained for safety reasons. Height restrictions on vegetation will be: (i) 5.5 m for the 400 kV, (ii) 4.6 m for the 220 kV, and (iii) 4 m for the 132 kV

95. While no subproject location is adjacent to the national parks and wildlife sanctuaries, birds and other wildlife may be attracted to the presence of substations and transmission towers particularly migratory birds. Transmission lines are designed to have ground wire spacing and lightning arresters as safety features to generally protect the public (and birds). Spot checks/ocular inspection of wildlife crossing and bird electrocution (if any) will be included as part of maintenance work along the transmission line. Maintenance workers will be trained to create awareness on this monitoring.

96. No bird study is anticipated as the tower height is small and past data also supports very few cases of bird falls due to electric towers.

ii. Impacts on noise

97. Substations may cause disturbance to settlements adjacent to it due to noise generated by its operation. To minimize the impact, noise-generating equipment will be enclosed (if needed) and periodic maintenance of equipment such as transformers will be conducted.

iii. Impacts on people

98. The presence of transmission line and substation may pose potential hazards such as electrocution, lightning strike, etc. due to accidental failure of power transmission. To ensure safety, transmission towers are equipped with danger boards, barbed wire, and galvanized ground wire for earthing purposes.

99. Aside from these measures, security and inspection personnel will be deployed to avoid vandalism of equipment and pilferage of cables which may cause accident and/or electrocution. Transmission systems are designed with protection system that shuts off during power overload or similar emergencies. Indian and international electrical standards will be complied with by AP-TRANSCO at all times. There will be regular monitoring and maintenance to ensure safety and integrity of power lines and substations.

100. Working on elevated position during maintenance of power transmission lines may also pose occupational and safety risks to workers. To minimize risks of accidents, maintenance workers/linemen will be provided with safety clothing and other working gears for protection, provide training on safety and emergency preparedness, and implement a safety plan.

101. The operation of the subproject will create employment to local people. Aside from employment, there will be a stable and reliable supply of power, and improved delivery of service.

b. Use of mineral oil for transformers

i. Impacts on land and water

102. The use of transformers may cause potential accidental spillage that may contaminate land and water. The substations will have an oil-water separator and will have oil-containment structure/basin at the workshop areas.

ii. Impacts on people

103. Use and handling of mineral oil for transformers may pose occupational and health risks to workers due to exposure. Delivery and acceptance of mineral oil will be accompanied by material safety data sheets and/or be certified that it is polychlorinated biphenyl-free. Fire extinguishers will be posted at designated locations in the storage areas for mineral oil. Workers will be provided with training on emergency preparedness.

VI. CONSULTATION, INFORMATION DISCLOSURE, AND GRIEVANCE REDRESS MECHANISM

A. Public Consultation and Information Disclosure

104. Meaningful stakeholder consultation and participation is part of the project preparation and implementation strategy. A consultation and participation strategy will be designed and implemented with the assistance of consultants. By addressing stakeholder needs, there is greater awareness of the benefits and “ownership” of the project among stakeholders, which in turn contribute to sustainability. The consultation process during the project preparation has solicited inputs from a wide range of stakeholders, including government officials, NGOs, residents near the subproject locations and towns, marginalized/vulnerable beneficiary groups, and project-affected persons (APs).

105. Consultation, participation, and disclosure will ensure that information is provided and feedback on proposed subproject design is sought early, right from the subproject preparation phase, so that the views/preferences of stakeholders including potential beneficiaries and affected people can be adequately considered, and continue at each stage of the subproject preparation, processing, and implementation.

106. APs will be consulted at various stages in the project cycle to ensure: (i) incorporation of their views/concerns on compensation/resettlement assistance and environmental impacts and mitigation measures; (ii) inclusion of vulnerable groups in project benefits; (iii) identification of help required by APs during rehabilitation, if any; and (iv) avoidance of potential conflicts for smooth project implementation. It will also provide adequate opportunities for consultation and participation to all stakeholders and inclusion of the poor, vulnerable, marginalized, and APs in the project process.

107. Relevant information about any major changes to project scope will be shared with beneficiaries, affected persons, vulnerable groups, and other stakeholders.

108. The key stakeholders to be consulted during project preparation, EMP implementation, and project implementation include:

(i) Project beneficiaries;
(ii) Andhra Pradesh Industrial Association(s)
(iii) Elected representatives, community leaders, religious leaders, and representatives of community-based organizations;
(iv) local NGOs;
(v) Andhra Pradesh Pollution Control Board
(vi) local government and relevant government agency representatives, including local authorities responsible for land acquisition, protection, and conservation of forests and environment, archaeological sites, religious sites, and other relevant government departments;
(vii) residents, shopkeepers, and business people who live and work alongside the roads which would be widened, where pipes will be laid and near sites where facilities will be built;
(viii) Custodians, and users of socially and culturally important buildings;
(ix) VCICDP PMU and consultants; and
(x) ADB, Government of Andhra Pradesh and the Government of India

109. Initial consultations were done during the walk through surveys and site visits during the March – August 2015 which included discussions with government personnel, village representatives and local population close to the subproject locations. Consultations were held along the alignment of the proposed underground cable: (i) with the residents living in Vuda Revenue Colony, along the Kapuluppadu alignment; (ii) with the residents living in Marikivalasa village, along Ozone Valey alignment; and (iii) with the owners of commercial establishment in 100ft road junction, where the underground cable divides into two and traverses in different directions, one towards Kapuluppadu and other towards Ozone Valley.

110. Concerns of local people were common and they include: (i) load shedding and lack of reliable and stable supply of power affecting their produce and livelihood, and (ii) timely compensation to farmers affected during construction of substations, erection of the transmission towers, and stringing of conductors (iii) traffic management during implementation.

111. Local people are aware of the proposed project and are generally supportive due to expected benefits. Consultations with project stakeholders in varying degrees will continue throughout the life of the project. The proposed consultation plan during implementation will be prepared and its compliance will be monitored by AP-TRANSCO.

112. In order to engage with the community and enhance public understanding about the subproject and understand the views of the people pertaining to laying of transmission towers and lines, focus group discussions (FGD) and meetings were undertaken amongst the people living enroute, near the transmission line and the underground cable alignment. The opinions of the stakeholders and their perceptions were obtained during these consultations. The consultations with the stakeholders will continue throughout the subproject implementation period.

B. Outcome of the Consultations

113. Consultations were held along the alignment of the proposed underground cable in: (i) with the residents living in VUDA Revenue Colony, along the Kapuluppadu alignment; (ii) with the residents living in Marikivalasa village, along Ozone Valey alignment; and (iii) with the owners of commercial establishments in 100 Ft road junction, where the underground cable splits up and traverses in different direction, one towards Kapuluppadu and other towards Ozone Valley.

Figure 8: Public Consultations

Section of the Participants during the Consultations at Vuda, Revenue Colony – Kapuluppada

Section of the Participants during the Consultations at Marikivalasa Village, Ozone Valley

Section of the Participants during the Consultations at 100ft Road, the point where underground Cables split up

Section of the Participants during the Consultations at Vempadu Village, Nakkapalle

114. Further, consultations were also held with the villagers of Vempadu village and Chandanada village which are along the proposed transmission line. In both the villages many people walked away as a mark of protest against erecting towers in their village and those who stayed back refused to sign the attendance sheet and said that they will not allow towers to be laid in their land. The attendance sheet of the participants is given in Appendix 8.


Section of the Participants during the Consultations at Chandanada Village, Nakkapalle

115. The ADE of Visakhapatnam Mr. Harnath Babu, APTranco explained to the people about the proposed subproject and the benefits of augmenting the transmission capacity of the Visakhapatnam district. The people were also informed about the mitigation measures proposed while laying the cable such as (i) undertaking the work of digging the trenches in phases; (ii) completing laying of cable of 450m, the standard length of one drum of cable, in one go; and (iii) making provision for smooth movement of people while digging trenches along the road margins by providing hard platform to cross over the trench. Regarding the transmission line alignment, it was explained on: (i) how the proposed tentative alignment will be finalised in consultation with the villagers, elected local body representatives and revenue officials; (ii) how the alignment will avoid settlements and minimise use of private land and efforts taken to take the transmission line as far as possible in government waste land: and (iii) how compensation for crop and diminution value for land will be paid. The salient points are summarised in the following table.

Table 15: Summary of Consultation Outcome

Concerns and Issues	Response
Meetings along the underground cable alignment (Kapuluppadu and Ozone Valley)	
Meeting at Vuda Revenue Colony on 12.11.2015- Participants 23 (including 12 women (52%)	
Wanted underground cabling to be completed at the earliest as this region is prone to cyclone	Was informed that work will be awarded once the project is approved by GoAP
Whether the cabling get affected when the road margins are dug for telephone cable or some activity resulting in power cut	Was informed that the cables will be well protected and concrete slabs would be laid above the cable. Further, no telecommunication agency will be allowed dig without prior permission.
If there is fault in the cable, will it not take more time to rectify	The cable quality is such that there will be no faults and even if fault arises there are section points in which it can be checked and maintenance work undertaken in the section
What will happen to the overhead cables and towers	This underground cable laying is to augment the power transmission and without having to put towers. However, existing towers will be phased out over a period of time.
Meeting at Marikivalasa village on 12.11.2015- Participants 26 (including 13 women (50%))	
Were happy to note that underground cable is laid instead of towers and wanted all towers to be	It was informed that the government plans to replace overhead lines with cables as this region

Concerns and Issues	Response
replaced	is cyclone prone.
Requested for underground cable for individual houses also	Were told that there is no such proposal for now, but will inform higher authorities
Wanted to know when this work will start	Was informed that by early next year the work will be awarded and after that the contractor will start the work
Wanted to know if the road will be closed for cable laying and for how many days	Since the cables are being proposed along the road margins, no road need to be closed and work will be done with least impact to people and access to houses will be ensured
Meeting at 100ft Road Junction on 12.11.2015- Participants 18	
Were concerned if vehicles will be allowed in the road during laying of cable	It was explained that the 200m dia pvc pipes will be laid and inside that the cable will be laid and hence no road closure is required
Wanted to know if the pvc pipe will get damaged when truck go above the road margin	Cable will be laid 1-2m deep and on top there will be 50mm concrete slaps.
How long will it take to lay this cable as access to shops should not get affected	Were informed that the trench width will be maximum 2m and every commercial area the work will be phased out and done in sections to avoid disturbance. Further, temporary access will be provided to all shops.
Meeting in villages along the transmission line alignment (Nakapalle)	
Meeting at Vempadu Village 13.11.2015- Participants 12	
The villagers were unhappy about the tower being laid through their village and said that they will not give their land	Were told that the government will pay crop compensation to land owner and also Rs.99,500 for every tower constructed
Villagers said that the amount of Rs.99,500 is nothing compared to the land value	It was explained that till date no such amount was paid, but now it is being paid
Villagers informed that the land value is in crores and once tower is laid, the value comes down to lakhs. They said they do not want towers to be constructed in their village.	-
Meeting at Chandanada Village 13.11.2015- Participants 15	
The villagers said that they all are small farmers and cannot allow their land to be used for tower construction	-
Villagers suggested that APTransco use only government land and waste land for towers	Were told that the first choice will be government land and waste land and only if there is private land along the alignment.

C. Information Disclosure

116. Information is disclosed through public consultation and making relevant documents available in public locations. The following documents will be submitted to ADB for disclosure on its website:

(i) final IEE;
(ii) a new or updated IEE and corrective action plan prepared during project implementation, if any; and
(iii) environmental monitoring reports.

117. VCICDP PMU will send written endorsement to ADB for disclosing these documents on ADB's website. VCICDP PMU will also provide relevant safeguards information in a timely

manner, in an accessible place and in a form and languages understandable to affected people and other stakeholders. For illiterate people, other suitable communication methods will be used.

D. Grievance Redress Mechanism

118. **Common Grievance Redress Mechanism.** Project grievance redress mechanism will be established to evaluate, and facilitate the resolution of APs' concerns, complaints, and grievances related to social and environmental issues of the project. The GRM will aim to provide a time-bound and transparent mechanism to voice and resolve social and environmental concerns linked to the project.

119. A common GRM will be in place for social, environmental, or any other grievances related to the project. Every grievance shall be registered and careful documentation of process with regard to each grievance undertaken, as explained below. The AP-TRANSCO environmental and social safeguards officers will have the overall responsibility for timely grievance redress on environmental and social safeguards issues, including keeping and maintaining the complaint and redress records. Public awareness campaign will be conducted to ensure that awareness on the project and its grievance redress procedures is generated.

120. Affected persons will have the flexibility of conveying grievances/suggestions by sending grievance redress/suggestion in writing, through telephone call to Divisional Engineer (DE), AP-TRANSCO's safeguard manager, or by filling forms for complaints/suggestion by email in the VCICDP Project site to be installed under the AP-TRANSCO websites. 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 how the problem was resolved will be undertaken. The AP-TRANSCO's safeguard officers will have the overall responsibility for timely grievance redressal on environmental and social safeguards issues and for registration of grievances, related disclosure, and communication with the aggrieved party.

121. **Grievance Redressal Committee.** Grievance Redressal Committee (GRC) will be established at two-levels, one at AP-TRANSCO level and another at PMU level, to receive, evaluate and facilitate the resolution of displaced persons concerns, complaints and grievances. The GRC will provide an opportunity to the APs to have their grievances redressed prior to approaching the jurisdictional sub court. The GRC is aimed to provide a trusted way to voice and resolve concerns linked to the project, and to be an effective way to address affected person's concerns without allowing it to escalate resulting in delays in project implementation.

122. The GRC will aim to provide a time-bound and transparent mechanism to voice and resolve social and environmental concerns linked to the project. The GRC is not intended to bypass the government's inbuilt redressal process, nor the provisions of the statute, but rather it is intended to address displaced persons concerns and complaints promptly, making it readily accessible to all segments of the displaced persons and is scaled to the risks and impacts of the project.

123. The AP-TRANSCO level GRCs will function out of each District where the subproject is being implemented. The GRC will be Chaired by Joint Collector and comprising of the Divisional Engineer acting as its member secretary and the following members: (i) RDO/Sub Collector of the division; (ii) Project Director, DRDA; (iii) Chief Executive Officer, Zilla Parishad; (iv) District Panchayat Officer; (v) District Education Officer; (vi) District Medical and Health Officer; (vii)

District Level representative of DISCOM; and (viii) Superintendent, RWS Panchayat Raj Department.

124. The Project Director, PMU will be the appellate authority who will be supported by the PMSC and Safeguard Officer of PMU, and concerned AP-TRANSCO to make final decisions on the unresolved issues.

125. **Grievance redress process.** In case of grievances that are immediate and urgent in the perception of the complainant, the contractor and PMSC on-site personnel will provide the most easily accessible or first level of contact for quick resolution of grievances. Contact phone numbers and names of the concerned Divisional Engineer, AP-TRANSCO safeguard officers and contractors will be posted at all construction sites at visible locations. The AP-TRANSCO safeguard officers will be responsible to see through the process of redressal of each grievance.

(i) **1st Level Grievance.** The phone number of the AP-TRANSCO office should be made available at the construction site signboards. The contractors, DE and AP-TRANSCO safeguard officers can immediately resolve on-site in consultation with each other, and will be required to do so within 7 days of receipt of a complaint/grievance.

(ii) **2nd Level Grievance.** All grievances that cannot be redressed within 7 days at field/ward level will be reviewed by the AP-TRANSCO level grievance redress committee (GRC) with support from AP-TRANSCO safeguard officers and PMSC environment and resettlement specialists. AP-TRANSCO level GRC will attempt to resolve them within 15 days.

(iii) **3rd Level Grievance.**The AP-TRANSCO safeguard officers will refer any unresolved or major issues to the PMU/State-level GRC, who in consultation with AP-TRANSCO will resolve them within 15 days.

126. Despite the project GRM, 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.

127. In the event that the established GRM is not in a position to resolve the issue, the affected person also can use the ADB Accountability Mechanism through directly contacting (in writing) the Complaint Receiving Officer (CRO) at ADB headquarters or the ADB India Resident Mission (INRM). The complaint can be submitted in any of the official languages of ADB's developing member countries. The ADB Accountability Mechanism information will be included in the project-relevant information to be distributed to the affected communities, as part of the project GRM.

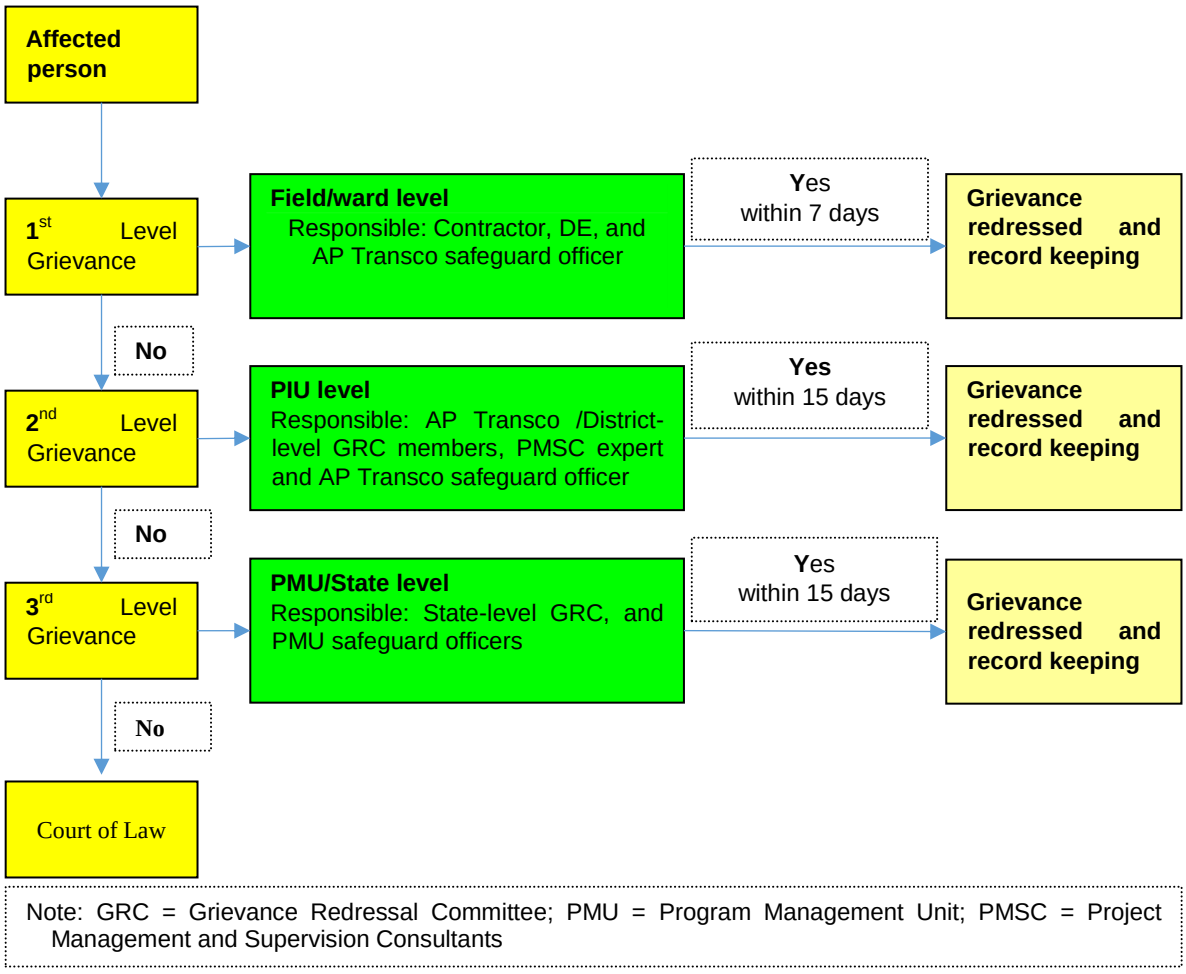
128. **Recordkeeping.** Records of all grievances received, including contact details of complainant, date the complaint was received, nature of grievance, agreed corrective actions and the date these were effected and final outcome will be kept by PMU. The number of grievances recorded and resolved and the outcomes will be displayed/disclosed in the PMU office, and on the web, as well as reported in the semi-annual social and environmental monitoring reports to be submitted to ADB.

129. Periodic review and documentation of lessons learned. The PMU, and AP-TRANSCO, supported by the PMSC specialist will periodically review the functioning of the GRM and record information on the effectiveness of the mechanism, especially on the AP-TRANSCO's ability to prevent and address grievances.

130. **Costs.** All costs involved in resolving the complaints (meetings, consultations, communication and reporting/information dissemination) will be borne by the respective AP-TRANSCO; while costs related to escalated grievances will be met by the PMU. Cost estimates for grievance redress are included in resettlement cost estimates. The grievance redress process is shown in Figure 9.

131. The GRCs will continue to function throughout the project duration.

Figure 9: Subproject Grievance Redress Mechanism



Note: GRC = Grievance Redressal Committee; PMU = Program Management Unit; PMSC = Project Management and Supervision Consultants

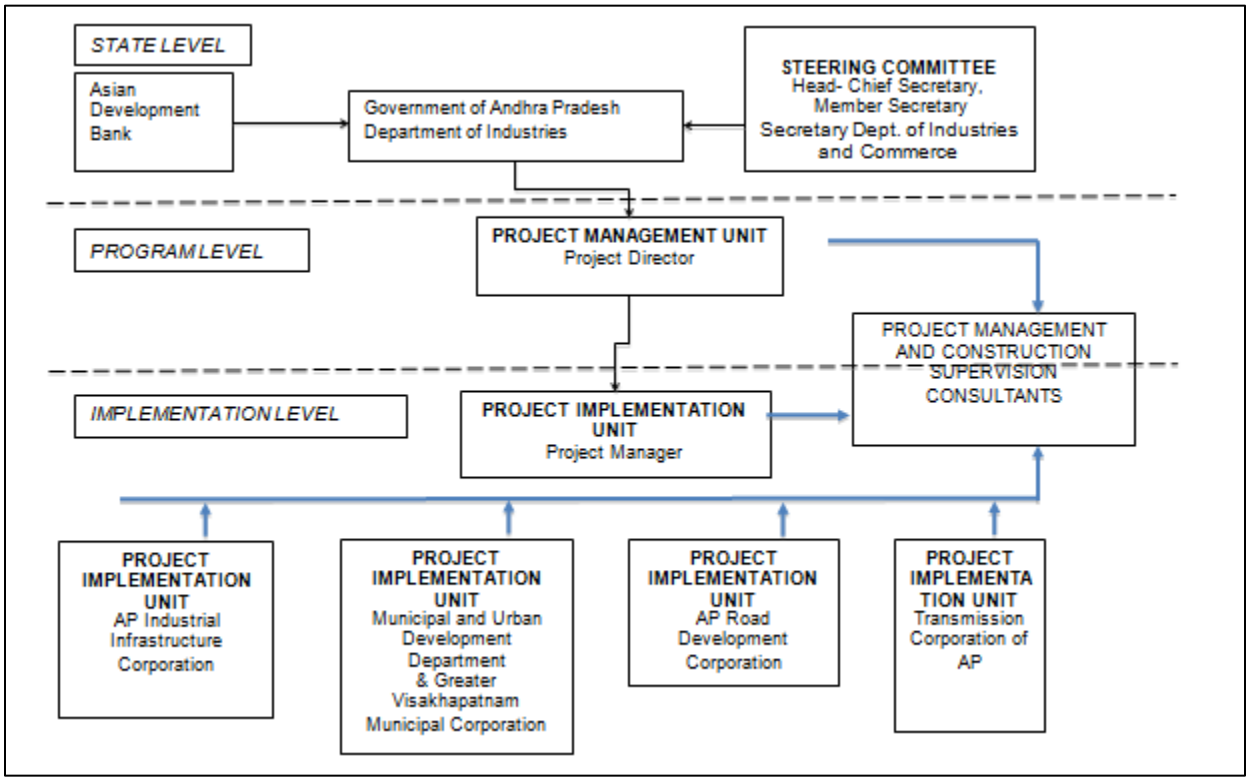
VII. INSTITUTIONAL ARRANGEMENTS AND RESPONSIBILITIES

132. DOI will be the executing agency. A PMU is established within the Directorate of Industries, which is under the DOI, for planning, implementation, monitoring and supervision, and coordination for the subproject. AP-TRANSCO, will be responsible for implementing the subproject. PMU will recruit PMSC to provide support in implementation of VCICDP subprojects.

133. PMU will support AP-TRANSCO in implementation, management and monitoring of the project. PMU and AP-TRANSCO will be assisted by PMSC respectively. AP-TRANSCO will appoint construction contractors to build infrastructure. Once the infrastructure is built and

commissioned, the AP-TRANSCO will operate and maintain the infrastructure. At state-level a Project Steering Committee (PSC) will be established to provide overall policy direction for the implementation of VCICDP subprojects.

Figure 10: VCICDP subproject Implementation Arrangements



A. Safeguard Implementation Arrangement

134. **Project Management Unit.** The PMU structure is as provided in the Table 16 below. PMU will be supported by PSMC. PMU will appoint a safeguards coordinator as a part of the PMSC team to collect information and progress on environmental and social safeguards compliance.

Table 16: Tentative PMU Structure

Position	***Tasks***
Project Director	Overall Project Management
Project Director (Department of Industries)	Management of land-related issues
Procurement Officer	Procurement of consultants, civil works, goods, and NGOs, etc.
PMSC (Senior Engineer)	Technical officer with engineering background and preferably experience of multilateral projects
Institutional Coordination and Policy Reforms officer	Policy and Institutional support
Investment Promotion Officer	Coordination of VCICDP promotion, marketing
Monitoring and Evaluation Officer	Monitoring project results
PMSC (Environmental Safeguards Officer)	Environmental safeguards compliance

Position	*Tasks*
PMSC (Social Safeguards and Gender Officer)	Resettlement compliance, social, gender
Chief Accountant and Financial Management Officer	Project accounting, audit and reporting
Accountant	Accounting
Office Manager	Office management

135. Key tasks and responsibilities of the PMU environmental safeguards officer are as follows:

(i) confirm existing IEEs/EMPs are updated based on detailed designs and that new IEEs/EMPs are prepared in accordance with the EARF and subproject selection criteria related to safeguards;
(ii) confirm whether IEEs/EMPs are included in bidding documents and civil works contracts;
(iii) provide oversight on environmental management aspects of subprojects;
(iv) ensure SEMPs prepared by contractors are cleared by AP-TRANSCO prior to commencement of civil works;
(v) establish a system to monitor environmental safeguards of the project including monitoring the indicators set out in the monitoring plan of the SEMPs;
(vi) facilitate and confirm overall compliance with all Government rules and regulations regarding site and environmental clearances as well as any other environmental requirements (e.g., Location Clearance Certificates, Environmental Clearance Certificates etc.), as relevant;
(vii) supervise and provide guidance to the AP-TRANSCO to properly carry out the environmental monitoring and assessments as per the EARF;
(viii) review, monitor and evaluate the effectiveness with which the SEMPs are implemented, and recommend necessary corrective actions to be taken as necessary;
(ix) consolidate monthly environmental monitoring reports from AP-TRANSCO and submit semi-annual monitoring reports to ADB;
(x) ensure timely disclosure of final IEEs/SEMPs in locations and in a form and language accessible to the public and local communities; and
(xi) address any grievances brought about through the Grievance Redress Mechanism (GRM) in a timely manner.

136. **Project Implementation Units.** In AP-TRANSCO, given the isolated locations of the proposed sub projects, the subprojects are under different Superintending Engineers and will implement the subprojects through respective circle offices and a special projects cell. The respective Senior Engineers will be deputed/designated as safeguard compliance officers covering both environment and social safeguards.

Table 17: AP-TRANSCO Environmental Safeguard Officer Tasks and Responsibilities

AP-TRANSCO Senior Engineer	Tasks and Responsibilities
Senior Engineer Cum Compliance Officer (DE Level) – APTransco	(i) Ensure complete payment and other resettlement assistants provided to the affected people prior to displacements (physical and economical) and starts of civil works in the affected areas; (ii) Coordinate with Safeguard Manager of PMU and ensure all social/environmental requirements if any are met.

137. **Project Management and Supervision Consultants.** The PMU and AP-TRANSCO will be assisted by PMSC which will be staffed with environmental and social safeguard specialists to provide required assistance and regular progress report on safeguards implementation. The environmental specialist will have overall responsibility in implementation of environmental safeguards, including appropriate monitoring and reporting responsibilities. Key tasks and responsibilities of the PSMC environmental specialists are as follows:

(i) Update the EARF as required;
(ii) Update the IEEs including site- and subproject-specific EMPs for Project 1;
(iii) Prepare the IEEs and EMPs for Project 2 components;
(iv) Supervise EMP implementation;
(v) Prepare a monitoring report of final site- and subproject-specific EMPs and communicate with the stakeholders, including ADB on the progress, of the subprojects including environmental safeguards compliance;
(vi) Prepare semi-annual environmental safeguards compliance reports; and
(vii) Support the implementing agencies in preparing periodic financing requests and necessary environmental safeguard reports for subsequent tranches.
(viii) Establish a system to monitor environmental safeguards of the Project; prepare indicators for monitoring important parameters of safeguards;
(ix) Ensure all requisite approvals and no objection certificates are in place to allow implementation, and that these are renewed in a timely manner where required;
(x) Ensure that provisions and conditions of all necessary permits, consents, NOCs, etc., are incorporated in the IEEs/RPs;
(xi) Take proactive action to anticipate the potential environmental impacts of the Project to avoid delays in implementation;
(xii) Assist AP-TRANSCO in the establishment of GRC for IEE implementation;
(xiii) Support the AP-TRANSCO and PMU in the GRM implementation to address any grievances submitted in a timely manner and establish record keeping system for complaint and redressal status of the project;
(xiv) Assist the AP-TRANSCO and PMU in the project GRM mechanism and complaint solution;
(xv) Assist the AP-TRANSCO and PMU for GRM record keeping for first tier complaint and redressed actions;
(xvi) Ensure that the relevant environmental mitigation measures specified in the updated EMP will be incorporated into bidding documents and approved by the ADB prior to the issuance of the invitation for bidding;
(xvii) Closely monitor and supervise to ensure that all mitigation measures and monitoring requirements set out in the EMP are implemented and complied with throughout the project implementation, and when required, prepare or recommend necessary corrective actions to be taken and monitor its implementation;
(xviii) Provide on-the-job training programs to AP-TRANSCO staff involved in Project implementation for strengthening their capacity in managing and monitoring environmental safeguards; and
(xix) Assist the AP-TRANSCO's safeguards officer to sensitize the turnkey contractors on ADB SPS, EARF, and GRM during detailed design and civil works implementation.

138. **Civil works contracts and contractors.** EMPs are to be included in bidding and contract documents and verified by the AP-TRANSCO and PMU. The contractor will be required to designate an Environment, Health and Safety (EHS) supervisor to ensure implementation of

EMP during civil works. Contractors are to carry out all environmental mitigation and monitoring measures outlined in their contract.

139. The PMU and AP-TRANSCO will ensure that bidding and contract documents include specific provisions requiring contractors to comply with: (i) all applicable labor laws and core labor standards on (a) prohibition of child labor as defined in national legislation for construction and maintenance activities; (b) equal pay for equal work of equal value regardless of gender, ethnicity, or caste; and (c) elimination of forced labor; and with (ii) the requirement to disseminate information on sexually transmitted diseases, including HIV/AIDS, to employees and local communities surrounding the project sites.

Table 18: Institutional Roles & Responsibility: Environmental Safeguards

Phase	PMU / AP-TRANSCOs	PMSC	ADB
Appraisal stage of all Subprojects under the investment program	PMU / AP-TRANSCO to review the REA checklists and draft IEE. PMU / AP-TRANSCO to submit draft IEE to ADB for review and approval. PMU / AP-TRANSCO to disclose on its website the approved IEE. PMU / AP-TRANSCO to ensure disclosure of information throughout the duration of the subproject.	PMSC to conduct REA for each subproject using checklists and to prepare IEE	ADB to review the REA checklists and reconfirm the categorization. ADB will review and approve IEE reports (Category B) subprojects. ADB to disclose on its website the submitted IEE report.
Detailed Design Phase of all Subprojects under the investment program	PMU / AP-TRANSCO with the assistance of PMSC to incorporate the EMP, environmental mitigation and monitoring measures into contract documents. PMU / AP-TRANSCO to obtain all applicable consents/permits/clearances PMU to submit to ADB final IEE for approval and disclosure at ADB website.	PMSC to revise the IEE and EMP in accordance with detailed design changes if warranted. PMSC to ensure incorporation of EMP in bid documents and contracts. PMSC to prepare inventory of utilities to be affected by the subproject.	ADB will review and approve updated IEE reports. ADB to disclose on its website updated IEE report.
Pre-construction Phase of all Subprojects under the investment program	AP-TRANSCO conducted initial public consultation and disclosure during IEE process and comments are reflected in the IEE report. PMU / AP-TRANSCO to monitor the disclosure and public consultation. AP-TRANSCO and PMSC to approve contractor‘s proposed locations for construction work camps, storage areas, hauling roads, lay down areas, disposal areas for solid and hazardous wastes.	PMSC to ensure statutory clearances and permits from government agencies/other entities are obtained prior to start of civil works. PMSC to ensure disclosure of information prior to start of civil works and throughout the duration of the construction period. PMSC to approve contractor‘s site-specific environmental plan (such	

Phase	PMU / AP-TRANSCOs	PMSC	ADB
	PMU to submit to ADB in prescribed format semi-annual Environment Monitoring Report 6 months after Loan effective date.	as traffic management plan, waste management plan, locations for camp sites, storage areas, lay down areas, and other sites/plans specified in the EMP). PMSC to conduct baseline environmental conditions and inventory of affected trees.	
Construction Phase of all Subprojects under the investment program	PMU / AP-TRANSCO will review 6-monthly monitoring and EMP implementation report including the status of Project compliance with statutory clearances and with relevant loan covenants and submit the 6-monthly report to ADB and seek permission to disclose the same in the investment program web site.	PMSC to monitor the implementation of mitigation measures by Contractor. PMSC to prepare monthly progress reports including a section on implementation of the mitigation measures (application of EMP and monitoring plan) PMSC (as per EMP) will conduct environmental quality monitoring during construction stage (ambient air and noise, and water quality). PMSC to prepare the six-monthly monitoring report on environment by focusing on the progress in implementation of the EMP and issues encountered and measures adopted, follow-up actions required, if any.	ADB to review the 6 monthly report, provide necessary advice if needed to the PMU and approve the same. ADB to disclose on its website environmental monitoring reports.
Pre-operation Phase (Commissioning and Defect Liability Period)	PMU / AP-TRANSCO to review monitoring report of PMSC on post-construction activities by the contractors as specified in the EMP PMU / AP-TRANSCO to review applicable consents requirements	PMSC to apply for the CTOs prior to commissioning. PMSC to monitor and approve post-construction activities by the contractors as specified in the EMP.	
Operation Phase of all Subprojects under the investment program	AP-TRANSCO to conduct monitoring, as specified in the environmental monitoring plan. APPCB to monitor the compliance of the standards regarding drinking water quality, ground water, ambient		

Phase	PMU / AP-TRANSCOs	PMSC	ADB
	air, effluent quality from treatment plant, noise, as applicable.		

Notes: APPCB = Andhra Pradesh State Pollution Control Board, PMSC = Project Management Consultants, CTE = Consent to Establish, CTO = Consent to Operate, PMSC = Design and Supervision Consultant, EIA = Environmental Impact Assessment, EMP = Environmental Management Plan, IEE = Initial Environmental Examination, PMU = Project Management Unit; AP-TRANSCO = Project Implementation Unit; REA = Rapid Environmental Assessment.

VIII. INSTITUTIONAL CAPACITY AND DEVELOPMENT

140. The PMSC environmental safeguards specialist will be responsible for training PMU and AP-TRANSCO on environmental awareness and management in accordance with both ADB and government requirements. Typical modules would be as follows: (i) sensitization; (ii) introduction to environment and environmental considerations in water supply and wastewater projects; (iii) review of IEEs and integration into the project detailed design; (iv) improved coordination within nodal departments; and (v) monitoring and reporting system. Specific modules customized for the available skill set will be devised after assessing the capabilities of the target participants and the requirements of the project. The contractors will be required to conduct environmental awareness and orientation of workers prior to deployment to work sites. The proposed training project, along with the frequency of sessions, is presented in Table 11.

Table 19: Training Program for Environmental Management

Description	Contents	Schedule	Participants
Pre-construction stage			
Orientation workshop	Module 1 – Orientation - ADB Safeguard Policy Statement - Government of India Environmental Laws and Regulations	1/2 day (at Hyderabad) (50 persons)	PMU, and AP-TRANSCO officials involved in project implementation
Description	**Contents**	**Schedule**	**Participants**
	Module 2 – Environmental Assessment Process - ADB environmental process, identification of impacts and mitigation measures, formulation of an environmental management plan (EMP), implementation, and monitoring requirements - Review of environmental assessment report to comply with ADB requirements - Incorporation of EMP into the project design and contracts	1/2 day (at Hyderabad) (50 persons)	PMU, and AP-TRANSCO officials involved in project implementation.
Construction stage			

Description	Contents	Schedule	Participants
Orientation program/ workshop for contractors and supervisory staff	- Roles and responsibilities of officials/contractors/consultants towards protection of environment - Environmental issues during construction - Implementation of EMP - Monitoring of EMP implementation - Reporting requirements	1 day (at Subproject locations) (15 persons)	PMU AP-TRANSCO Contractors
Experiences and best practices sharing	- Experiences on EMP implementation – issues and challenges - Best practices followed	1 day on a regular period to be determined by PMU, AP-TRANSCOs, and PMSC (at Hyderabad / Visakhapatnam) (50 persons)	PMU AP-TRANSCO Contractors

ADB = Asian Development Bank; EMP = Environmental Management Plan; AP-TRANSCO = Project Implementation Unit; PMU = Project Management Unit; PMSC = Design and Supervision Consultant; AP-TRANSCO= Transmission corporation of Andhra Pradesh

A. Environmental Management Plan

1. Mitigation

141. The environmental management plan (EMP) presents a summary of the environmental impacts associated with subprojects for power transmission system improvement including the mitigation measures (**Table 20**). The EMP will be updated before the start of civil works, and as needed, to accommodate any change in the condition of the site or alignment of the transmission line after the contractor survey, performance of Contractor(s), and feedback from local people or other stakeholders.

IX. MONITORING AND REPORTING

142. DOI will monitor and measure the progress of EMP implementation. The monitoring activities will correspond with the project's risks and impacts. In addition to recording information on the work and deviation of work components from original scope, PMU, AP-TRANSCO, and PMSC will undertake site inspections and document review to verify compliance with the EMP and progress toward the final outcome.

143. AP-TRANSCO / PMSC will submit monthly monitoring and implementation reports to PMU, who will take follow-up actions, if necessary. DOI will submit semi-annual monitoring reports to ADB. The suggested monitoring report format is in Appendix 4. A construction site checklist is attached at Appendix 6, which is to be filled by the PMSC/AP-TRANSCO supervising staff, and attached to monthly reports. Subproject budgets will reflect the costs of monitoring and reporting requirements. For projects likely to have significant adverse environmental impacts during operation, reporting will continue at the minimum on an annual basis. Monitoring reports will be posted in a location accessible to the public.

144. Compliance with loan covenants will be screened by the Department of Industries, Government of Andhra Pradesh.

145. ADB will review project performance against the DOI, Government of Andhra Pradesh, commitments as agreed in the legal documents. The extent of ADB's monitoring and supervision activities will be commensurate with the project's risks and impacts. Monitoring and supervising of social and environmental safeguards will be integrated into the project performance management system. ADB will monitor projects on an ongoing basis until a project completion report is issued. ADB will carry out the following monitoring actions to supervise project implementation:

(i) conduct periodic site visits for projects with adverse environmental or social impacts;
(ii) conduct supervision missions with detailed review by ADB's safeguard specialists/officers or consultants for projects with significant adverse social or environmental impacts;
(iii) review the periodic monitoring reports submitted by EAs to ensure that adverse impacts and risks are mitigated, as planned and agreed with ADB;
(iv) work with EAs to rectify to the extent possible any failures to comply with their safeguard commitments, as covenanted in the legal agreements, and exercise remedies to reestablish compliance as appropriate; and
(v) prepare a project completion report that assesses whether the objective and desired outcomes of the safeguard plans have been achieved, taking into account the baseline conditions and the results of monitoring.

146. The Safeguards Officer will coordinate and interact with government agencies and local authorities on permits (as needed), update and finalize the draft IEE, and will prepare environmental monitoring reports for submission to ADB at least twice a year during construction and annually during operation. The Contractor(s) will be informed of their responsibility to comply with the EMP and the requirements of ADB by the Safeguards Officer. There are specific responsibilities for EMP compliance during construction phase that will rest with the Contractor(s) who will be monitored by the safeguards officer during the implementation of the project.

Table 20: Environmental Management Plan

Project Activity	Environmental Component Likely to be Affected	Description of Potential Environmental Impact	Mitigation/Enhancement Measures	Estimated Cost	Responsible Unit
Planning and Pre-Construction Stage					
Preparation of feasibility study and detailed project report (DPR) • Location of substation, transmission and distribution lines • Choice of equipment and technology	□ Land and vegetation	• Loss of agricultural land and crops • Loss of habitat and vegetation clearing • Land acquisition • Increase in soil erosion and impact to soil productivity	• Use of criteria for site selection which include environmental factors to minimize potential impacts • Use of checklist/questionnaire in evaluating substation sites which aim at avoidance of land acquisition and environmental impacts • Substations are all on government land • No land acquisition required but transfers of ownership from the APIIC to AP-TRANSCO is required • Transmission line will not traverse forest, sanctuary, or protected areas • Use of non PCB[7] based oil for transformers	Included in the Project Costs * Associated costs of land transfers from the Government will be borne by AP Transco	AP-TRANSCO,
	□ People	• Physical displacement of people and structures • Economic loss to people • Disturbance and inconvenience to people due to traffic, increased noise and dust levels, vibration • Interference to existing utilities			
	□ Water	• Interference to local drainage • Water quality impacts due to erosion and/or			

[7] PCB: Polychloro Biphenyls

Project Activity	Environmental Component Likely to be Affected	Description of Potential Environmental Impact	Mitigation/Enhancement Measures	Estimated Cost	Responsible Unit
		sedimentation			
	Air	• Increase dust and noise levels, and vibration • Emissions from heavy equipment machinery and construction vehicles			
Construction Stage					
Orientation for contractor and workers	People	Awareness of workers on the environmental requirements and their responsibility Understanding of Contractor(s) of their responsibility in implementing the EMP	Conduct briefing of Contractor(s) on EMP, records management, and reporting • Identify critical areas to be monitored and the required mitigation measures • Create awareness of sexually-transmitted diseases such as HIV/AIDs • Conduct training/drills on emergency preparedness Encourage workers to conduct exercises every day prior to start of work to keep fit	Included in the costs of contract Contractor(s)	Contractor(s), AP-TRANSCO-Safeguards Officer PMSC / AP-TRANSCO Safeguards Officer
Prepare construction	People	• Avoid effects of Contractor(s) unplanned activities	• Temporary pedestrian and traffic management plan	Included in the costs of Contractor(s)	Contractor(s), AP-TRANSCO-

Project Activity	Environmental Component Likely to be Affected	Description of Potential Environmental Impact	Mitigation/Enhancement Measures	Estimated Cost	Responsible Unit
management work plan		• Smooth work implementation	• Community and safety plan		AP-TRANSCO PMSC / AP-TRANSCO Safeguards Officer
	□ Land		□ Spoils disposal plan		
	□ Air		□ Noise and dust control plan		
	□ Water		□ Drainage and storm water management plan		
	□ Waste		• Materials management plan • Construction waste management plan		
Hiring of project staff and workers	□ People	• Conflict due to potential workers' migration • Lack of local support to the project • Dispute over transparency of hiring	□Contractor(s) will be encouraged to use local labor for manual work and eligible local workforce for clerical and office jobs	---	Contractor(s), AP-TRANSCO-AP-TRANSCO PMSC / AP-TRANSCO Safeguards Officer
Presence of workers at construction sites	□ People	• Increase in demand for services such as food, temporary housing, etc.	□ None required	---	---

Project Activity	Environmental Component Likely to be Affected	Description of Potential Environmental Impact	Mitigation/Enhancement Measures	Estimated Cost	Responsible Unit
• Site preparation, vegetation and land clearing for substations and transmission line right-of-way (ROW) • Construction of substations, installation of required equipment at substations, erection of transmission towers and stringing of conductors	□ People	• Dismantling of structure(s) and equipment from existing substations • Dismantled equipment may be suspected or potentially-PCB contaminated	• Construction management plan will be strictly implemented • Use of proper safety clothes/equipment in dismantling structure(s) and equipment	Included in the costs of Contractor(s)	Contractor(s), AP-TRANSCO-PMU PMSC / AP-TRANSCO-Safeguards Officer
		□ Potential safety risks to community	• Provide fence or barricade (as appropriate), sufficient lights, clear warning signs and danger signals, and take all precautions identified in the community and safety plan • Assign security personnel to prevent accidents, trespassing, and pilferage • Contractor(s) to direct drivers to strictly follow road regulations		

Project Activity	Environmental Component Likely to be Affected	Description of Potential Environmental Impact	Mitigation/Enhancement Measures	Estimated Cost	Responsible Unit
		Interference with road crossings	• Danger and clearly visible warning signs will be posted at designated sites • Scaffoldings will be placed over road crossing points • Construction vehicles to strictly follow road regulations • Implement temporary pedestrian and traffic management plan		
•		Potential health and safety risks to workers	• Provide sanitary facilities and wash areas • Provide safe drinking water and garbage bins • Enforce good housekeeping at all times • Provide workers with hard hat, safety shoes and belts • Coordinate with nearest hospital for arrangements in case of accidents • Assign nurse or medical staff to make weekly rounds at substation	Included in the costs of Contractor(s)	

Project Activity	Environmental Component Likely to be Affected	Description of Potential Environmental Impact	Mitigation/Enhancement Measures	Estimated Cost	Responsible Unit
			sites • Set up first aid treatment within construction sites and field office • Observance and compliance with relevant safety measures required by law and best engineering practices • Provide communication devices to designated workers		
	Land and vegetation	• Erosion and localized flooding	• Only minimal vegetation will be cleared since most of the substation sites are on grassland. • Landscaping/replanting of trees at subs-stations will be done after completion of construction works		
			• Compensation for temporary damages to crops/plants along the ROW and substations • Cut trees owned by the government will be sold and revenue turned over to Revenue Authority • Debris/dismantled	Included in the costs of Contractor(s) Included in the costs of Contractor(s)	

Project Activity	Environmental Component Likely to be Affected	Description of Potential Environmental Impact	Mitigation/Enhancement Measures	Estimated Cost	Responsible Unit
			structures/equipment will be disposed of in designated landfill and/or controlled dumpsites • Usable scrap materials from dismantling will be stored in warehouses of AP-TRANSCO • Erosion-control measures will be provided (as needed) • Implement spoils disposal plan and construction waste management plan		
	Water	• Generation of sewage from construction workers • Localized flooding • Increase turbidity in surface water near construction sites	• Avoidance of waterways in site selection • Provide sanitary facilities to workers and safe drinking water. • Construction works will be done during summer in areas potential for erosion and localized flooding • Implement drainage and storm water management plan • Waterways were avoided in selecting subproject sites		

Project Activity	Environmental Component Likely to be Affected	Description of Potential Environmental Impact	Mitigation/Enhancement Measures	Estimated Cost	Responsible Unit
	□ Air	• Heavy equipment and construction vehicles may increase vehicular emissions • Transport of construction materials to constructions sites may increase dust level • Earthmoving works, excavations, and opened land areas for substations and towers may increase dust levels • Increase in noise level and vibration from excavation and heavy equipment and construction vehicles	• Construction vehicles will be maintained to minimize vehicular emissions • Enclose construction sites temporarily to contain dust dispersion • Temporary storage / Warehouse for construction materials onsite will be provided to reduce trips of material delivery • Contractor(s) will be required to maintain construction vehicles and heavy equipment machineries regularly to reduce emissions • Opened land areas or sources of dust will be sprayed with water (as needed) • Transport of dust-generating materials will be covered • Observance of low speed by vehicles to reduce noise • Noise-generating works will be done between 7AM and 7PM done at daytime as required by APPCB		

Project Activity	Environmental Component Likely to be Affected	Description of Potential Environmental Impact	Mitigation/Enhancement Measures	Estimated Cost	Responsible Unit
			• Construction sites will be covered with acoustic screens and machineries will be temporarily enclosed to control noise • Require Contractor(s) to maintain and tune-up construction vehicles to reduce noise and no blowing of horns • Observe/comply with traffic management plan		
Operation and Maintenance Stage					
Use of mineral oil for transformers	• Land • Water	Accidental spillage that would contaminate land and water	• Provision of oil-water separator • Provide for oil containment structure	Included in the O & M costs of Project	AP-TRANSCO
	People	Occupational health risks to workers due to exposure	• Acceptance of mineral oil should be accompanied with Material Data Safety Sheets and/or be certified that it is PCB-free • Fire extinguishers readily available in storage areas for mineral oil		

Project Activity	Environmental Component Likely to be Affected	Description of Potential Environmental Impact	Mitigation/Enhancement Measures	Estimated Cost	Responsible Unit
Presence of substations, power transmission and distribution lines	Land and vegetation	• Depreciation of land property values adjacent to substations and power transmission towers • Restrictions on height of plants/crops that will be allowed within the ROW to keep its integrity. • Lopping of trees and/or pruning along the ROW to maintain height restrictions.	• Availability of stable and reliable power will trigger economic development in the area Restriction of height to ensure the required vertical spacing between the conductors and the vegetation is maintained for safety reasons. Height restrictions on vegetation will be: (i) 5.5 m for the 400 kV, (ii) 4.6 m for the 220 kV, and (iii) 4 m for the 132 kV. A budget for planting medicinal plants along the ROW may be allocated. • Pruning or lopping of trees ensure the integrity the transmission line and safety	---	---
	People	Hazards such as electrocution, lightning strike, etc. due to accidental failure of power transmission and distribution lines	• Provide security and inspection personnel to avoid pilferage and vandalism of equipment and lines • Appropriate grounding and deactivation of live power lines during maintenance work	Included in the O & M costs of Project	AP-TRANSCO

Project Activity	Environmental Component Likely to be Affected	Description of Potential Environmental Impact	Mitigation/Enhancement Measures	Estimated Cost	Responsible Unit
			• Designed with protection system that shuts off during power overload or similar emergencies • Maintain and comply with electrical standards • Regular monitoring and maintenance to ensure safety and integrity of power lines and substations • Conduct information and education campaign to local people to enhance awareness on safety practices of living near substations		
		Accident working in elevated position	• Implement safety plan to reduce risks • Provision of safety belts and other working gears for protection	Included in the O & M costs of Project	AP-TRANSCO,
			Conduct training to maintenance workers on safety		

Project Activity	Environmental Component Likely to be Affected	Description of Potential Environmental Impact	Mitigation/Enhancement Measures	Estimated Cost	Responsible Unit
		□ Potential exposure to electric and magnetic fields (EMF)	• EMF levels expected to be way below the limits set by International Commission on Non-Ionizing Radiation Protection(ICNRP) which is 4.17 kV/m for electric field and 833 mG for magnetic field • Spot measurements of EMF to have baseline data • Substations will be fenced and security staff assigned to prevent unauthorized public access • Information and education campaign will be conducted to local people to create awareness on safety practices	Included in the O & M costs of Project	AP-TRANSCO
		□ Generation of employment	□ Jobs positions will be created during the operation	---	AP-TRANSCO

Project Activity	Environmental Component Likely to be Affected	Description of Potential Environmental Impact	Mitigation/Enhancement Measures	Estimated Cost	Responsible Unit
	□ Noise	□ Disturbance to settlements near the substations	• Periodic maintenance of equipment such as transformers and capacitors to minimize noise generation • Provide enclosure of noise • generating equipment • Monitor ambient noise levels	Included in the O & M costs of Project	AP-TRANSCO

Table 21: Environmental Monitoring Plan

Project Stage	Parameter / Indicator	Location	Method of Measurement	Frequency	Responsibility (Implementation and Supervision)
Pre-Construction and Planning	Guaranteed noise level of equipment and machineries	Substation sites	Machinery and equipment specifications – compliance to ambient noise levels	Once	AP-TRANSCO
	Soil quality	Substation sites and transmission / distribution towers	Sampling and chemical analysis	Once	Contractor(s) / AP-TRANSCO
	Quality of transformer oil	Substations sites	Material Safety Data Sheet – compliance to IS:1866	Once	AP-TRANSCO
	Loss of terrestrial and aquatic habitat	Substation sites	Ocular inspection, transect survey	Once	AP-TRANSCO
	Proximity to water resources	Substation sites and towers	Ocular inspection, maps	Once	AP-TRANSCO
	Routes of migratory birds	Substation and towers	Ocular survey/observation, secondary data	Quarterly to capture seasonal variations	AP-TRANSCO
Construction	Local recruitment of workers and staff	Substations, transmission towers, stringing of conductors	Number of local workers and staff recruited	Monthly	AP-TRANSCO / Contractor(s)
	Orientation of Contractor(s) and workers on issues like HIV/AIDS, compliance to EMP, etc.	Substations, transmission towers, stringing of conductors	Number of participants	Once before construction, and as needed	AP-TRANSCO / Contractor(s)
	Spraying of water to opened land areas and before movement of construction vehicles	Substations and road easements affected by delivery of equipment and construction material; transmission tower sites (if needed); stringing of conductors	Ocular inspection/spot checks	• Weekly at road easements (or as needed) • Every day at substation sites during dry season	AP-TRANSCO / Contractor(s)

Project Stage	Parameter / Indicator	Location	Method of Measurement	Frequency	Responsibility (Implementation and Supervision)
	Solid waste management	Substations, workers' camps, stringing of conductors, transmission towers	Ocular inspection/spot checks	Every week	AP-TRANSCO / Contractor(s)
	Danger and warning signs for safety of	Substations and road easements	Ocular inspection/spot	Once a month	AP-TRANSCO /
	workers and the public	affected by delivery of equipment and construction material; transmission towers; stringing of conductors	checks		Contractor(s)
	Announcement to the public of works schedule	Substations; along the road easement affected by interconnections of distribution lines, transmission towers, and stringing of conductors	Work schedule log sheet	As needed	AP-TRANSCO / Contractor(s)
	Erosion control measures such as silt traps	Substations, transmission towers	Ocular inspection	Once a month	AP-TRANSCO / Contractor(s)
	Smoke belching construction vehicles	Substations, transmission towers, and stringing of conductors	Ocular inspection/spot checking	Weekly	AP-TRANSCO / Contractor(s)
	Dust and noise level	Substations; along the road easement affected by interconnections of distribution lines, transmission towers, and stringing of conductors	Ocular inspection / Monitoring	Twice a month	AP-TRANSCO / Contractor(s)

Project Stage	Parameter / Indicator	Location	Method of Measurement	Frequency	Responsibility (Implementation and Supervision)
	Housekeeping	Substations, transmission towers, workers' camps	Ocular inspection/spot checks	Weekly	AP-TRANSCO / Contractor(s)
Operation	Failure of transmission towers and/or distribution lines	Along the alignment	Maintenance log sheet	Monthly	AP-TRANSCO
	Occupational health, and safety	Substations, transmission lines	Number of accidents and/or injuries	Once a Month	AP-TRANSCO
	Tree planting, maintenance of green landscape	Substations	Ocular inspection	Quarterly	AP-TRANSCO
	Housekeeping	Substations	Spot checks	Monthly	AP-TRANSCO
	Collection of waste (i.e., oil, garbage, etc)	Substations	O & M log sheet	Monthly	AP-TRANSCO
	Bird collision/electrocution	Along the alignment	Spot checks/observation	Monthly	AP-TRANSCO
	Pilferage of cables	Along transmission and distribution lines	Ocular inspection; O&M log sheet (security operations)	Quarterly	AP-TRANSCO

B. Conclusion and Recommendation

147. Aside from best engineering practice and survey approaches in selecting the transmission lines, selection criteria were considered to minimize environmental impacts. For substations, one of the primary considerations in selecting the sites is avoidance of land acquisition.

148. All the subproject locations for substation and for transmission system improvement are not located anywhere near the national parks and wildlife sanctuaries or the cultural/archeological excavation sites. The impacts that are associated during construction stage such as increased noise and dust level are temporary and of short duration. Approach roads in substation sites are available and will not require any major up gradation to facilitate construction. Relevant Indian construction standards on the design, installation and maintenance of substations and transmission lines such as IS:5613 (1995) Part II, IS:4091-1967 and IS:3072 (1975) will be complied with. Mitigation measures and monitoring to minimize environmental impacts have been incorporated in the environmental management plan and monitoring plan. Environmental monitoring report will be submitted by AP-TRANSCO to ADB semi-annually during construction and annually during operation. A safeguards officer will be assigned by AP-TRANSCO to provide technical support to contractors in addressing relevant

environment issues and in complying the requirements of ADB. To ensure sustainability, a workshop/training on safeguards compliance will be part of capacity building provided by the project.

149. AP-TRANSCO conducts “vigilance” through its cell which covers civil and electrical works only and do not include grievance on environmental issues. To address this limitation, a grievance redress mechanism will be implemented as soon as the project commence. As part of this mechanism, a grievance redress committee will be created and AP-TRANSCO will ensure the representation of women in the members. The grievance redress committee will function throughout the life of the project.

150. Consultations will continue in varying degrees during construction and operation. Local people will be informed of the grievance redress mechanism through a flyer/project brief that will be made available in local language at the field office of AP-TRANSCO. The draft IEE will be posted in the website of ADB as provided for by SPS 2009 and Public Communications Policy 2011. All the relevant permits required by Government of India will be obtained by AP-TRANSCO prior to construction works.

151. AP-TRANSCO will obtain the relevant permits from Government of Andhra Pradesh prior to civil works. The draft
IEE will be publicly disclosed as required by ADB’s SPS 2009 and Public Communications Policy 2011. The project will have long-term beneficial impacts due to improved stability and reliability of power distribution systems in Andhra Pradesh.

Appendix 1: Rapid Environmental Assessment (REA) Checklist

Instructions:

(i) The project team completes this checklist to support the environmental classification of a project. It is to be attached to the environmental categorization form and submitted to the Environment and Safeguards Division (RSES), for endorsement by Director, RSES and for approval by the Chief Compliance Officer.

(ii) This checklist focuses on environmental issues and concerns. To ensure that social dimensions are adequately considered, refer also to ADB's (a) checklists on involuntary resettlement and Indigenous Peoples; (b) poverty reduction handbook; (c) staff guide to consultation and participation; and (d) gender checklists.

(iii) Answer the questions assuming the "without mitigation" case. The purpose is to identify potential impacts. Use the "remarks" section to discuss any anticipated mitigation measures.

Country/Project Title: Transmission and Distribution network strengthening - APTRANSCO

Sector Division: South Asia Urban and Water Division

Screening Questions	Yes	No	Remarks
A. Project Siting Is the Project area adjacent to or within any of the following environmentally sensitive areas?			
• Cultural heritage site		✓	The locations and cable line alignments have been fine-tuned to avoid sensitive ecosystems. There are no protected areas, primary forest, wetlands, swamp forest, mangroves, estuarine areas, areas identified as having special ecological significance within the cable line alignment. There are no cultural heritage sites adjacent or within the locations.
• Legally protected area (core zone or buffer zone)		✓	
• Wetland		✓	
• Mangrove		✓	
• Estuarine		✓	
• Special area for protecting biodiversity		✓	
B. Potential Environmental Impacts Will the Project cause…			
• impairment of historical/cultural areas; disfiguration of landscape or potential loss/damage to physical cultural resources?		✓	Not anticipated.
• disturbance to precious ecology (e.g. sensitive or protected areas)?		✓	Not anticipated.
• alteration of surface water hydrology of waterways resulting in increased sediment in streams affected by increased soil erosion at construction site?	✓		During construction of substations underground trenching up-to a maximum depth of around 2.5 – 3 meters. There may be increased sediments due to excavation works. However, the impacts are small-

Screening Questions	Yes	No	Remarks
			scale, short in duration and insignificant thus no hydrological impacts are anticipated. The EMP ensures measures are included to mitigate the impacts.
• deterioration of surface water quality due to silt runoff and sanitary wastes from worker-based camps and chemicals used in construction?		✓	Not anticipated. Workers camp will be small as most of the workers employed will be local. Contractor will be required to manage excavated soils and provide adequate sanitary facilities for the workers. The EMP ensures measures are included to mitigate the impacts.
• increased air pollution due to project construction and operation?	✓		Anticipated during construction period. However site-specific, low in magnitude and short in duration. The EMP ensures measures are included to mitigate the impacts.
• noise and vibration due to project construction or operation?		✓	Not significant. Only small scale trenching and cable laying activities. For sub-station construction, good industrial practices on noise and vibration control and monitoring will be implemented. No significant impact anticipated during operation.
• involuntary resettlement of people? (physical displacement and/or economic displacement)		✓	Not anticipated.
• disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups?		✓	Not anticipated.
• poor sanitation and solid waste disposal in construction camps and work sites, and possible transmission of communicable diseases (such as STIs and HIV/AIDS) from workers to local populations?		✓	Not anticipated. Most of the workers will be employed from local areas. Temporary worker camps will be required to be provided with appropriate sanitation facilities in accordance with good international practice, including water supply, and washing facilities, temporary toilets, and waste containers. Contractors will be required to provide adequate training on HIV/AIDs to workers.
• creation of temporary breeding habitats for diseases such as those transmitted by mosquitoes and rodents?		✓	Not anticipated.

Screening Questions	Yes	No	Remarks
• social conflicts if workers from other regions or countries are hired?		✓	Not anticipated. Local workers and labor force will be hired.
• large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?		✓	Not anticipated. The construction activity will be localized and manageable with the availability of local labor. Temporary worker camps will be small, and will be required to be provided with appropriate sanitation facilities, including water supply, and washing facilities, temporary toilets, and waste containers. Worker camp sanitation facilities should developed in consultation with relevant local authorities and has all required local, province and national approvals.
• risks and vulnerabilities related to occupational health and safety due to physical, chemical, biological, and radiological hazards during project construction and operation?		✓	Not anticipated.
• risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation?		✓	Not applicable. Construction will not involve use of explosives and chemicals.
• community safety risks due to both accidental and natural causes, especially where the structural elements or components of the project are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning?	✓		Community safety risks with power lines and substations include unauthorized access. As mitigation measures, towers will be fitted with anti-climbing devices and substations will have a security fence and full-time security personnel on site.
• generation of solid waste and/or hazardous waste?	✓		Domestic and construction wastes will be routinely collected and disposed of at licensed waste disposal facilities.
• use of chemicals?		✓	No hazardous chemical is anticipated to be used during construction. Hazardous chemical storage and disposal guidelines will be implemented in accordance with local requirements.

Screening Questions	Yes	No	Remarks
• generation of wastewater during construction or operation?		✓	Not anticipated.

A Checklist for Preliminary Climate Risk Screening

Country/Project Title:

Sector:

Subsector:

Division/Department:

Screening Questions		Score	Remarks[1]
Location and Design of project	Is siting and/or routing of the project (or its components) likely to be affected by climate conditions including extreme weather related events such as floods, droughts, storms, landslides?	1	
	Would the project design (e.g. the clearance for bridges) need to consider any hydro-meteorological parameters (e.g., sea-level, peak river flow, reliable water level, peak wind speed etc)?	0	
Materials and Maintenance	Would weather, current and likely future climate conditions (e.g. prevailing humidity level, temperature contrast between hot summer days and cold winter days, exposure to wind and humidity hydro-meteorological parameters likely affect the selection of project inputs over the life of project outputs (e.g. construction material)?	1	
	Would weather, current and likely future climate conditions, and related extreme events likely affect the maintenance (scheduling and cost) of project output(s) ?	0	
Performance of project outputs	Would weather/climate conditions, and related extreme events likely affect the performance (e.g. annual power production) of project output(s) (e.g. hydro-power generation facilities) throughout their design life time?	1	

Options for answers and corresponding score are provided below:

[1] If possible, provide details on the sensitivity of project components to climate conditions, such as how climate parameters are considered in design standards for infrastructure components, how changes in key climate parameters and sea level might affect the siting/routing of project, the selection of construction material and/or scheduling, performances and/or the maintenance cost/scheduling of project outputs.

Response	Score
Not Likely	0
Likely	1
Very Likely	2

Responses when added that provide a score of 0 will be considered low risk project. If adding all responses will result to a score of 1-4 and that no score of 2 was given to any single response, the project will be assigned a medium risk category. A total score of 5 or more (which include providing a score of 1 in all responses) or a 2 in any single response, will be categorized as high risk project.

Result of Initial Screening (Low, Medium, High):_____**MEDIUM**_____

Other Comments:_____

Prepared by: _____

Appendix 2: Environmental Standards

General Standards for Discharge of Environmental Pollutants (Wastewater)

S. No.	Parameter	Inland surface water	Public sewers	Land for irrigation
	2		3	
	.	(a)	(b)	(c)
1	Suspended solids mg/l, max.	100	600	200
2	Particle size of suspended solids	shall pass 850 micron IS Sieve	-	-
3	pH value	5.5 to 9.0	5.5 to 9.0	5.5 to 9.0
4	Temperature	shall not exceed 5oC above the receiving water temperature		
5	Oil and grease, mg/l max,	10	20	10
6	Total residual chlorine, mg/l max	1.0	-	-
7	Ammonical nitrogen N),mg/l, max.	50	50	-
8	Total kjeldahl nitrogen (as N);mg/l, max. mg/l, max.	100	-	-
9	Free ammonia (as NH3), mg/l,max.	5.0	-	-
10	Biochemical oxygen demand (3 days at 27oC), mg/l, max.	30	350	100
11	Chemical oxygen demand, mg/l, max.	250	-	-
12	Arsenic(as As).	0.2	0.2	0.2
13	Mercury (As Hg), mg/l, max.	0.01	0.01	-
14	Lead (as Pb) mg/l, max	0.1	1.0	-
15	Cadmium (as Cd) mg/l, max	2.0	1.0	-
16	Hexavalent chromium (as Cr + 6),mg/l, max.	0.1	2.0	-
17	Total chromium (as Cr) mg/l, max.	2.0	2.0	-
18	Copper (as Cu)mg/l, max.	3.0	3.0	-
19	Zinc (as Zn) mg/l, max.	5.0	15	-
20	Selenium (as Se)	0.05	0.05	-
21	Nickel (as Ni) mg/l, max.	3.0	3.0	-
22	Cyanide (as CN) mg/l, max.	0.2	2.0	0.2
23	Fluoride (as F) mg/l, max.	2.0	15	-
24	Dissolved phos- phates (as P),mg/l, max.	5.0	-	-

S. No.	Parameter	Inland surface water	Public sewers	Land for irrigation
25	Sulphide (as S) mg/l, max.	2.0	-	-
26	Phenolic compounds (as C6H50H)mg/l, max.	1.0	5.0	-
27	Radioactive materials: (a) Alpha emitters micro curie mg/l, max. (b)Beta emittersmicro curie mg/l	10-7 10-6	10-7 10-6	10-8 10-7
28	Bio-assay test	90% suivival of fish after 96 hours in 100% effluent	90% suivival of fish after 96 hours in 100% effluen	90% suivival of fish after 96 hours in 100% effluen
29	Manganese	2 mg/l	2 mg/l	-
30	Iron (as Fe)	3mg/l	3mg/l	-
31	Vanadium (as V)	0.2mg/l	0.2mg/l	-
32	Nitrate Nitrogen	10 mg/l	-	-

National Ambient Air Quality Standards

Pollutant	Concentration in ambient Air			
	Average	Industrial, Residential and other rural area	Ecologically Sensitive Area (Notified by Central Government)	Methods of Measurement
SO_2 ug/m^3	Annual* 24 hours**	50 80	20 80	- Improved West and Geake - Ultraviolet Fluorescence
NO_x ug/m^3	Annual* 24 hours**	40 80	30 80	- Modified Jacob and Hochheiser - Chemiluminescence
PM10 ug/m3	Annual* 24 hours**	60 100	60 100	- Gravimetric - TEOM - Beta Attenuation
$PM_{2.5}$ ug/m^3	Annual* 24 hours**	40 60	40 60	- Gravimetric - TEOM - Beta Attenuation
Ozone (O_3) ug/m^3	8 Hours** 1 Hour**	100 180	100 180	- UV Photometric - Chemiluminescence - Chemical Method
Lead ug/m^3	Annual* 24 hours**	0.50 1.0	0.50 1.0	- AAS/ICP Method after sampling on EPM 2000 or equivalent filter paper - ED-XRF using Teflon filter
CO ug/m^3	8 Hours** 1 Hour**	2000 4000	2000 4000	- Non Dispersive Infra Red Spectroscopy

Pollutant	Concentration in ambient Air			
	Average	Industrial, Residential and other rural area	Ecologically Sensitive Area (Notified by Central Government)	Methods of Measurement
NH_3 ug/m^3	Annual* 24 hours**	100 400	100 400	- Chemiluminescence - Indophenol blue method
Benzene (C_6H_6) ug/m^3	Annual*	05	05	- Gas Chromatography based Continuous Analyzer - Adsorption followed by GC Analysis
Benzo Pyrene-Particulate Phase only ug/m^3	Annual*	01	01	- Solvent extraction followed by HPLC/GC analysis
Arsenic ng/m^3	Annual*	06	06	- AAS/ICP Method after sampling on EPM 2000 or equivalent filter paper
Nickel ng/m^3	Annual*	20	20	- AAS/ICP Method after sampling on EPM 2000 or equivalent filter paper

Source: Gazette of India, Part II-Section -3-Subsection (i)

* Annual Arithmetic Mean of minimum 104 measurements in a year taken twice a week 24-hourly at uniform interval.

** 24-hourly / 8-hourly values or 0.1 hourly monitored values shall be complied with 98% of the time in the year. However, 2% of the time, it may exceed but not on two consecutive days.

Ambient Noise Standards

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

Gazette Notification dated 26th December 1989. It is based on the weighted equivalent noise level (Leq).

* Day time is from 6 am to 9 pm whereas night time is from 9 pm to 6 am

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

These noise standards have been given the status of statutory norms vide Noise Pollution (Regulation and Control) Rules, 2000. However, these rules have changed the periods for ‘Day Time’ and ‘Night Time’ to 6 a.m. to 10 p.m. and 10 p.m. to 6 am respectively.

Surface Water Quality Classification Criteria

Designated-Best-Use	Class of water	Criteria
Drinking Water Source without conventional treatment but after disinfection	A	Total Coliforms Organism MPN/100ml shall be 50 or less pH between 6.5 and 8.5 Dissolved Oxygen 6mg/l or more Biochemical Oxygen Demand 5 days 20°C 2mg/l or les
Outdoor bathing (Organised)	B	Total Coliforms Organism MPN/100ml shall be 500 or less pH between 6.5 and 8.5 Dissolved Oxygen 5mg/l or more Biochemical Oxygen Demand 5 days 20°C 3mg/l or less
Drinking water source after conventional treatment and disinfection	C	Total Coliforms Organism MPN/100ml shall be 5000 or less pH between 6 to 9 Dissolved Oxygen 4mg/l or more Biochemical Oxygen Demand 5 days 20°C 3mg/l or less
Propagation of Wild life and Fisheries	D	pH between 6.5 to 8.5 Dissolved Oxygen 4mg/l or more Free Ammonia (as N) 1.2 mg/l or less
Irrigation, Industrial Cooling, Controlled Waste disposal	E	pH betwwn 6.0 to 8.5 Electrical Conductivity at 25°C micro mhos/cm Max.2250 Sodium absorption Ratio Max. 26 Boron Max. 2mg/l

Source: Central Pollution Control Board
MPN = Most Probable Number

Vehicle Exhaust Emission Norms

1. Passenger Cars

Norms	CO(g/km)	HC+ NOx(g/km)
1991Norms	14.3-27.1	2.0(Only HC)
1996 Norms	8.68-12.40	3.00-4.36
1998Norms	4.34-6.20	1.50-2.18
India stage 2000 norms	2.72	0.97
Bharat stage-II	2.2	0.5
Bharat Stage-III	2.3	0.35(combined)
Bharat Stage-IV	1.0	0.18(combined)

2. Heavy Diesel Vehicles

Norms	CO(g/kmhr)	HC (g/kmhr)	NOx (g/kmhr)	PM(g/kmhr)
1991Norms	14	3.5	18	-
1996 Norms	11.2	2.4	14.4	-
India stage 2000 norms	4.5	1.1	8.0	0.36
Bharat stage-II	4.0	1.1	7.0	0.15
Bharat Stage-III	2.1	1.6	5.0	0.10
Bharat Stage-IV	1.5	0.96	3.5	0.02

Source: Central Pollution Control Board
CO = Carbon Monixide; g/kmhr = grams per kilometer-hour; HC = Hydrocarbons; NOx = oxides of nitrogen; PM = Particulates Matter

Appendix 3: Records of Public Consultation

The following table is the suggested format for recording the minutes of the public consultations conducted for the project.

Date and Venue of Public Consultation	Number of attendees	Issues /concerns raised during the public consultation	Response of the EA/IA on how to address the issues and concerns

Attachments:
Attendance sheets
Photo documentation

Appendix 4: Sample Annual Environmental Monitoring Report

TEMPLATE

This template must be included as an appendix in the IEE that will be prepared for EACH sub- project. It can be adapted to the specific subproject as necessary.

I. Introduction

- Overall project description and objectives
- Description of subprojects
- Environmental category of the subprojects
- Details of site personnel and/or consultants responsible for environmental monitoring
- Overall project and subproject progress and status

No.	Subproject Name	Status of Subproject				List of Works	Progress of Works
		Design	Preconstruction	Construction	Operational Phase		
		☐	☐	☐	☐		
		☐	☐	☐	☐		
		☐	☐	☐	☐		

II. Compliance status with national/state/local statutory environmental requirements

No.	Subproject Name	Statutory Environmental Requirements	Status of Compliance	Action Required

III. Compliance status with environmental loan covenants

No. (List Schedule and Paragraph Number of Loan Agreement)	Covenant	Status of Compliance	Action Required

IV. COMPLIANCE STATUS WITH THE ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN

a. Provide the monitoring results as per the parameters outlined in the EMP. Append supporting documents where applicable, including environmental site inspection reports.

b. There should be reporting on the following items which can be incorporated in the checklist of routine environmental site inspection reports, followed with a summary in the semi-annual report send to ADB. Visual assessment and review of relevant site documentation during routine site inspection need to note and record the following:

- what are the dust suppression techniques followed for site, and if any dust was noted to escape the site boundaries;
- if muddy water was escaping site boundaries, or muddy tracks were seen on adjacent roads;
- adequacy of type of erosion and sediment control measures installed on-site, condition of erosion and sediment control measures, including if these were intact following heavy rain;
- are there designated areas for concrete works and refueling;
- are there spill kits on site, and if there are site procedure for handling emergencies;
- is there any chemical stored on site and what is the storage condition;
- are there any dewatering activities, if yes, where is the water being discharged;
- how are the stockpiles being managed;
- how are solid and liquid waste being handled on-site;
- review of the complaint management system; and
- checking if there are any activities being undertaken outside of working hours, and how that is being managed.

Summary Monitoring Table

Impacts (List fro IEE)	Mitigation Measures (List from IEE)	Parameters Monitored (As a minimum, those identified in the IEE should be monitored)	Method of Monitoring	Location of Monitoring	Date of Monitoring Conducted	Name of Person Who Conducted the Monitoring
Design Phase						
Pre-construction Phase						
Construction Phase						
Operational Phase						

Impacts (List fro IEE)	Mitigation Measures (List from IEE)	Parameters Monitored (As a minimum, those identified in the IEE should be monitored)	Method of Monitoring	Location of Monitoring	Date of Monitoring Conducted	Name of Person Who Conducted the Monitoring

Overall Compliance with EMP

No.	Subproje ct Name	EMP Part of Contract Documents (Y/N)	EMP Being Implemented (Y/N)	Status of Implementation (Excellent/ Satisfactory/ Partially Satisfactory/ Below Satisfactory)	Action Proposed and Additional Measures Required

V. APPROACH AND METHODOLOGY FOR ENVIRONMENTAL MONITORING OF THE PROJECT

Brief description on the approach and methodology used for environmental monitoring of each subproject

VI. MONITORING OF ENVIRONMENTAL IMPACTS ON PROJECT SURROUNDINGS (AMBIENT AIR, WATER QUALITY, AND NOISE LEVELS)

- Brief discussion on the basis for monitoring
- Indicate type and location of environmental parameters to be monitored
- Indicate the method of monitoring and equipment to be used
- Provide monitoring results and an analysis of results in relation to baseline data and statutory requirements

As a minimum the results should be presented as per the tables below.

Air Quality Results

Site No.	Date of Testing	Site Location	Parameters (Government Standards)		
			PM_{10} µg/m^3	SO_2 µg/m^3	NO_2 µg/m^3

Site No.	Date of Testing	Site Location	Parameters (Monitoring Results)		
			PM_{10} µg/m^3	SO_2 µg/m^3	NO_2 µg/m^3

Water Quality Results

Site No.	Date of Sampling	Site Location	Parameters (Government Standards)					
			pH	Conductivity µS/cm	BOD mg/l	TSS mg/l	TN mg/l	TP mg/l

Site No.	Date of Sampling	Site Location	Parameters (Monitoring Results)					
			pH	Conductivity µS/cm	BOD mg/l	TSS mg/l	TN mg/l	TP mg/l

Noise Quality Results

Site No.	Date of Testing	Site Location	LA_{eq} (dBA) (Government Standard)	
			Daytime	Nighttime

Site No.	Date of Testing	Site Location	LA_{eq} (dBA) (Monitoring Results)	
			Daytime	Nighttime

VII. SUMMARY OF KEY ISSUES AND REMEDIAL ACTIONS

Summary of follow up time-bound actions to be taken within a set timeframe.

APPENDIXES

- Photos
- Summary of consultations
- Copies of environmental clearances and permits
- Sample of environmental site inspection report
- Other

Appendix 5: Sample Environmental Site Inspection Report

Project Name
Contract Number

NAME: _____ DATE: _____

TITLE: _____ DMA: _____ LOCATION: _____ GROUP: _____

WEATHER CONDITION: _____

INITIAL SITE CONDITION: _____

CONCLUDING SITE CONDITION:

Satisfactory _____ Unsatisfactory _____ Incident _____ Resolved _____ Unresolved _____

INCIDENT:
Nature of incident: _____

Intervention steps: _____

Incident issues:
Resolution

Project activity stage	Survey	
	Design	
	Implementation	
	Pre-commissioning	
	Guarantee period	

Inspection

Emissions	Waste minimization
Air quality	Reuse and recycling
Noise pollution	Dust and litter control
Hazardous substances	Trees and vegetation

Site restored to original condition	Yes		No	

Signature

_____

Sign off

_____ _____

Name **Name**
Position **Position**

Appendix 6: Construction Site Checklist for EMP Monitoring

	Yes (√) No (x)
Monitoring Details: _____	
EHS supervisor appointed by contractor and available on site	
Construction site management plan (spoils, safety, material, schedule, equipment etc.,) prepared	
Traffic management plan prepared	
Dust is under control	
Excavated soil properly placed within minimum space	
Construction area is confined; no traffic/pedestrian entry observed	
Surplus soil/debris/waste is disposed without delay	
Construction material (sand/gravel/aggregate) brought to site as & when required only	
Tarpaulins used to cover sand & other loose material when transported by vehicles	
After unloading , wheels & undercarriage of vehicles cleaned prior to leaving the site	
No AC pipes disturbed/removed during excavation	
No chance finds encountered during excavation	
Work is planned in consultation with traffic police	
Work is not being conducted during heavy traffic	
Work at a stretch is completed within a day (excavation, pipe laying & backfilling)	
Pipe trenches are not kept open unduly	
Road is not completely closed; work is conducted on edge; at least one line is kept open	
Road is closed; alternative route provided & public is informed, information board provided	
Pedestrian access to houses is not blocked due to pipe laying	
Spaces left in between trenches for access	
Wooden planks/metal sheets provided across trench for pedestrian	
No public/unauthorized entry observed in work site	
Children safety measures (barricades, security) in place at work sites in residential areas	
Prior public information provided about the work, schedule and disturbances	
Caution/warning board provided on site	
Guards with red flag provided during work at busy roads	
Workers using appropriate PPE (boots, masks, gloves, helmets, ear muffs etc)	
Working conditions at CETP are assessed by EHS expert and ensure that there is no risk	
Workers conducting or near heavy noise work is provided with ear muffs	
Contractor is following standard & safe construction practices	
Deep excavation is conducted with land slip/protection measures	
First aid facilities are available on site and workers informed	
Drinking water provided at the site	
Toilet facility provided at the site	
Separate toilet facility is provided for women workers	
Workers camps are maintained cleanly	
Adequate toilet & bath facilities provided	
Contractor employed local workers as far as possible	
Workers camp set up with the permission of PIU	
Adequate housing provided	
Sufficient water provided for drinking/washing/bath	
No noisy work is conducted in the nights	
Local people informed of noisy work o blasting activity conducted	

Pneumatic drills or other equipment creating vibration is not used near old/risky buildings

Appendix 7: Sample Grievance Registration Form

(To be available in Telegu and English)

The _____Project welcomes complaints, suggestions, queries, and comments regarding project implementation. We encourage persons with grievance to provide their name and contact information to enable us to get in touch with you for clarification and feedback.
Should you choose to include your personal details but want that information to remain confidential, please inform us by writing/typing *(CONFIDENTIAL)* above your name. Thank you.

Date	**Place of registration**	**Project Town** **Project:**			
Contact information/personal details					
Name		**Gender**	* Male * Female	**Age**	
Home address					
Place					
Phone no.					
E-mail					
Complaint/suggestion/comment/question Please provide the details (who, what, where, and how) of your grievance below: If included as attachment/note/letter, please tick here:					
How do you want us to reach you for feedback or update on your comment/grievance?					

FOR OFFICIAL USE ONLY

Registered by: (Name of official registering grievance)
Mode of communication: Note/letter E-mail Verbal/telephonic
Reviewed by: (Names/positions of officials reviewing grievance)

Action taken:	
Whether action taken disclosed:	Yes No
Means of disclosure:	

Appendix 8: Public Consultations Attendance Sheet

V-3/2

ADB TA7491:INDIA
Visakhapatnam to Chennai
Industrial Corridor Development Program (VCICDP)

Public Consultations / Focus Group Discussion

Attendance Sheet

Date : Place :		Substation Name:	
S.No	**Name**	**Designation / Occupation**	**Signature**
11	ch. Simhachalam	Private Jobs	ch. Simhachalam 9949496447
12	P.నూకాలమ్మ		939182624
13	E.అప్పలనాయుడు	House wife	9581484731
14	B. VAMSI RAJU	Bank empt	9247192449
15	N. VENKATESWARA RAO	Private job	9908119261 N. Venkateswara Rao
16	G. S. Naidu	Contract	9490811523
17	అప్పారావు	LABOUR	9505311244
18	R. Ramalakshmi	House wife	R. Ramalakshmi 9652704663
19	K. Parvathi	House wife	K. Parvathi 9553919534
20	E. శ్రీనివాస్	Business	E. SRINIVAS 9700501376

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1

ADB TA7491:INDIA
Visakhapatnam to Chennai
Industrial Corridor Development Program (VCICDP)

Public Consultations / Focus Group Discussion

Attendance Sheet

Date : 12-011-2013
Place : MARIKIVALASA

Substation Name: 132/33 kV OZone VALLEY SS

S.No	Name	Designation / Occupation	Signature
1	MANYALA SOMBABU GANU	Ex. COUNCILOR FOR 4th WARD	M [illegible] Ex.Councillor
2.	[illegible]	[illegible]	9912386664 [illegible]
3.	[illegible]	[illegible]	9550503395 [illegible]
4	[illegible]	[illegible]	[illegible]
5	D. RAJ	[illegible]	9701214487
5	D. RAJESH	Business	9652553626
6	[illegible]	Billing man	[illegible]
7	Ch Lamava	[illegible]	Ch Lamava 9605206952G
8	E. [illegible]	[illegible]	E. [illegible] 99127 55739
9.	S. [illegible]	[illegible]	[illegible] 9000739128
10.	O. [illegible]	Employ.	O. Gosha Patrudu 9948710210

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2

ADB TA7491:INDIA
Visakhapatnam to Chennai
Industrial Corridor Development Program (VCICDP)

Public Consultations / Focus Group Discussion

Attendance Sheet

Date : Place :		Substation Name:	
S.No	**Name**	**Designation / Occupation**	**Signature**
11	D. రాజు	గ్రామ వాసి	D. రాజు
12	P. సూర్యకళ	గ్రామవాసి	P. Suryakala 8374174254
13	M. వెంకాంధ్ర	గ్రామ వార్డ్ సోషల్ వెల్ఫేర్	M. వెంకాంధ్ర
14	D. కొండ	సోషల్ వెల్ఫేర్	D. కొండ
15	B. లలిత	సోషల్ వెల్ఫేర్	బొబ్బిలి 9618140674
16	M. పద్మజ	సోషల్ వెల్ఫేర్	M: Padmaja 9133664777
17	P. కొండమ్మ	సోషల్ వెల్ఫేర్	P కొండమ్మ
18	P.S.K. Murthy	గ్రామ సర్పంచ్	9963789379 Murthy P కొండమ్మ
19	G. రాజు	House wife	9052401977 G. రాజు

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3

ADB TA7491:INDIA
Visakhapatnam to Chennai
Industrial Corridor Development Program (VCICDP)

Public Consultations / Focus Group Discussion

Attendance Sheet

Date : 12-11-2015
Place : CHINA RUSHIKONDA

Substation Name: 132/33kV GISS KAPULUPPADA

S.No	Name	Designation / Occupation	Signature
20,	V. [illegible]	[illegible]	9704362452 V. [illegible]
21,	G. [illegible]	〃	G. [illegible]. 9652794864.
22	V. [illegible]	〃	V. [illegible] 8573382583
23	V. [illegible]	〃	V. [illegible] 9550818411
24	G. [illegible]	〃	[illegible]
25	MOKONDAMMA	Ex. [illegible]	MOKONDAMMA
26	M. [illegible]	[illegible]	M. [illegible] 9133664777

V-2/1

ADB TA7491:INDIA
Visakhapatnam to Chennai
Industrial Corridor Development Program (VCICDP)

Public Consultations / Focus Group Discussion

Attendance Sheet

Date : 12-[illegible]-2013 Substation Name: 132/33kV K.[illegible]
Place : 100ft Road Highway Jn. ONGOZONE VALLEY SS JN.

S.No	Name	Designation / Occupation	Signature
1	K. Krishna murthy	Employee	8341411361
2	N. APPALA RAJU	వ్యవసాయం	N. Appala Raju 9985964127
3	N. Srinivasa Rao	కాంట్రాక్టర్	N. Sr 9966970223
4	B. Paidayya	వ్యవసాయం	B Paidayya 9949520294
5	M. Anand	ప్రైవేట్	9642999554
6	T. Rajulu	Electrical work	T. Rajulu 9032111143
7	N. Narasimhulu	వ్యవసాయం	N. N 9490935451
8	N. SRINU	Computer Hardware	N. Srinu 7893282602
9	S. [illegible]	వ్యవసాయం	9985327729
10	[illegible]	[illegible]	9000063759

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ADB TA7491:INDIA
Visakhapatnam to Chennai
Industrial Corridor Development Program (VCICDP)

Public Consultations / Focus Group Discussion

Attendance Sheet

Date : Place :		Substation Name:	
S.No	**Name**	**Designation / Occupation**	**Signature**
	T. Gowrish	వ్యవ	9866046005
	G.V Appa Rao		9849622081
	పేరు చెప్పలేదు		8520820677
	T. [illegible]	Auto	9505191148
	D. Ravi Kumar	Ele	9032459912
	T. Ramesh	(Ele)	9963022318
	A. Rahman	Chicken Center	9154562331
	పేరు చెప్పలేదు	AUTO	9963164815

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ADB TA7491:INDIA
Visakhapatnam to Chennai
Industrial Corridor Development Program (VCICDP)

Public Consultations / Focus Group Discussion

Attendance Sheet

Date : Place :		Substation Name:	
S.No	**Name**	**Designation / Occupation**	**Signature**
	T Rao	Un Employed	T-RAMANA 8125284898
	నక్కమల్లేశ్వరరావు	RETIRED	E MALLESWARA RAO 9849829166
	ఆకారపు నాయుడు		995934283 4