

Environment and Social Management Plan for Rural HVDS Project

Andhra Pradesh

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Table of Contents

ACRONYMS AND ABBREVIATIONS	4
1. INTRODUCTION	6
1.1 Project Overview	6
1.2 Proposed Sub-Projects	9
1.3 Purpose of ESMP	11
2. SOCIO-ECONOMIC & BIO-GEOGRAPHIC PROFILE	12
2.1 History	12
2.2 Geographic Profile	12
2.3 Demographic Profile	12
2.4 Economic Profile	13
3. POLICY, LEGAL AND REGULATORY FRAMEWORK	15
3.1 Environmental	15
3.1.1 Mandatory Requirements (National/State)	15
3.1.2 World Bank Policies	16
3.2 Social	16
3.2.1 National and State law	16
3.2.2 World Bank Policies	19
4. POTENTIAL IMPACTS AND MITIGATION MEASURES	21
4.1 Potential Environmental Impacts and Mitigation Measures	21
4.2 Potential Social Impacts and Mitigation Measures	24
5. INSTITUTIONAL ARRANGEMENTS	27
6. GRIEVANCE REDRESSAL MECHANISM	28

7. MONITORING PLAN	31
8. TRAINING AND CAPACITY BUILDING	36
9. COST AND BUDGET	37
10. CONSULTATIONS	38
ANNEXURE 1 – 33/11 KV SUBSTATIONS MAPS	40
ANNEXURE 2 – ENVIORNMENT AND SOCIAL MANAGEMENT PLAN (ESMP)	44
ANNEXURE 3 – CHECKLIST FOR CONSULTATIONS	50
ANNEXURE 4 – DETAILS OF CONSULTATIONS	52
ANNEXURE 5 – ATTENDANCE SHEET FOR CONSULTATIONS	71
ANNEXURE 6 – SAFETY PLAN	86
Safety precaution to be followed during construction	93
Safety precaution to be followed during Operation & Maintenance	97

Acronyms and Abbreviations

ADE	Assistant Divisional Engineer
AE	Assistant Engineer
AP	Andhra Pradesh
APEPDCL	Andhra Pradesh Eastern Power Distribution Company Limited
APERC	Andhra Pradesh Electricity Regulatory Commission
APPPCB	Andhra Pradesh Pollution Control Board
APTRANSCO	Transmission Corporation of Andhra Pradesh Limited
CE	Chief Engineer
CEA	Central Electricity Authority
CGRF	Consumer Grievance Redressal Forum
CMVR	Central Motor Vehicle Rules
CMVR	Central Motor Vehicle Rules
CPCB	Central Pollution Control Board
CPRI	Central Power Research Institute
CPTD	Compensation Plan for Temporary Damages
CRZ	Coastal Regulation Zone
DC	District Collector
DE	Divisional Engineer
EE	Executive Engineer
EEE	Electrical and electronic equipment
EMF	Environment Management Framework
EPA	Environment Protection Agency
ESMF	Environment Social Management Framework
GHG	Green House Gas
GoAP	Government of Andhra Pradesh
Gol	Government of India
HVDS	High Voltage Distribution System
LVDS	Low Voltage Distribution System
MOEF	Ministry of Environment and Forests
MoP	Ministry of Power
MoU	Memorandum of Understanding
MRO	Mandal Revenue Officer
MVA	The Motor Vehicles Act
NGO	Non-Government Organisation
NOC	No Objection Certificate
PCB	Polychlorinated Biphenyls
PCCF	Principal Chief Conservator of Forests

PESO	Petroleum and Explosives Safety Organisation
PF	Provident Fund
PIUs	Project Implementation Unit
R&R	Rehabilitation and Resettlement
RFCTLARRA	Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act
ROW	Right of Way
SAPIO	State Asst. Public Information Officers
SC	Scheduled Caste
SE	Superintendent Engineer
SF6	Sulfur Hexafluoride
SIA	Social Impact Assessment
SPCB	State Pollution Control Board
SPIO	State Public Information Officer
ST	Scheduled Tribe
T&D	Transmission and distribution

1. Introduction

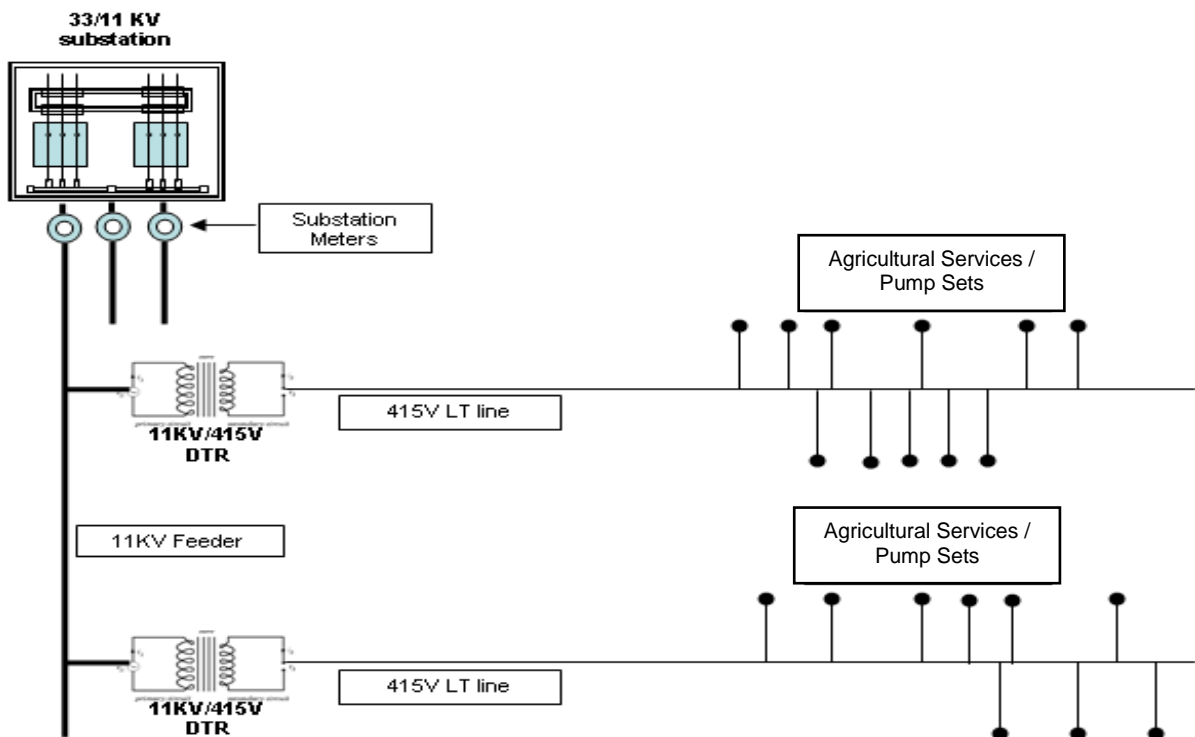
1.1 Project Overview

A typical transmission grid comprises High Voltage (HV) transmission circuits (400/220/132 KV) and substations. The transmission network interfaces with the distribution network at the 132/33kV substation level. Transmission lines deliver electricity up to this grid exit point (132/33 kV substation) and electricity is then delivered to the load centers (cities) through 33kV lines. These lines terminate at a 33kV substation, where the voltage is stepped-down to 11kV for power distribution to load points through a distribution network of lines at 11kV and lower.

Each 11kV feeder which emanates from the 33kV substation branches further into several subsidiary 11kV feeders to carry power close to the load points (localities, industrial areas, villages, etc.). At these load points, a distribution transformer (DTR) further reduces the voltage from 11kV to 415V to provide the last-mile connection through Low Tension (LT) lines to individual customers, either at 240V (as single-phase supply) or at 415V (as three-phase supply).

The common practice is to use large capacity DTRs, usually of 100kVA or 63kVA capacity, to serve a large number of consumers from a single DTR thereby minimizing the investments required in distribution infrastructure. This system is useful when catering to high load density rural areas where high concentration of LT consumers require LT lines to cover only short distances.

Electricity distribution in existing LT network:

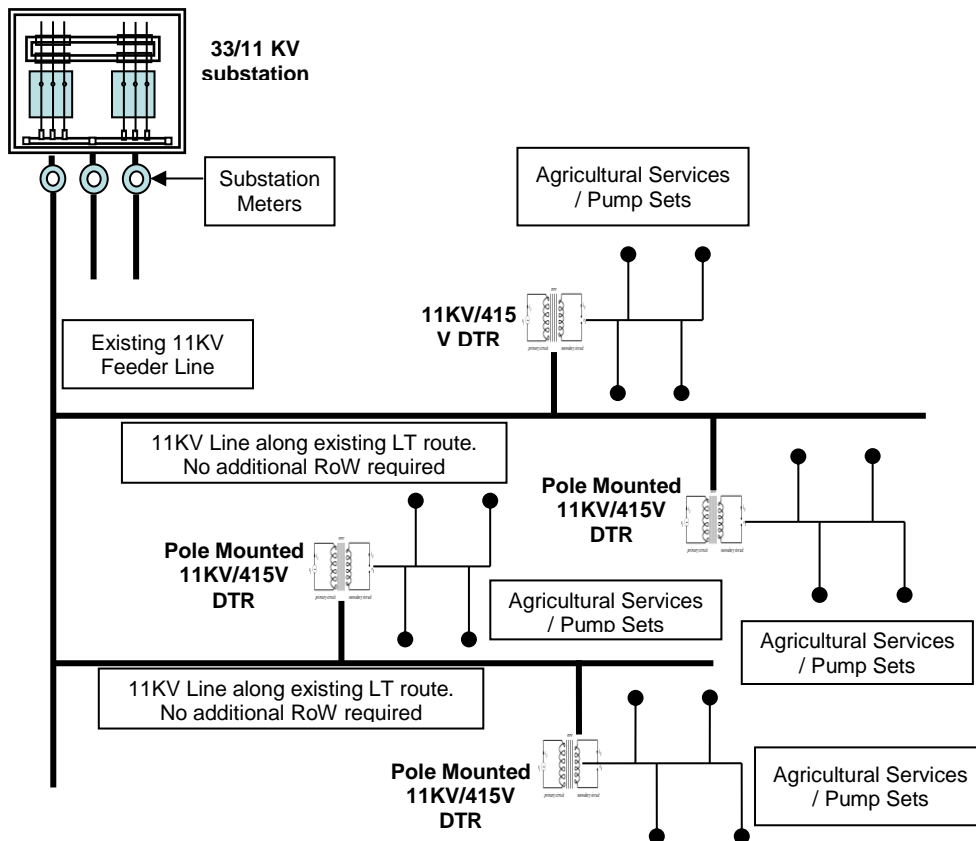


On the other hand, in rural areas, the consumer concentration is dispersed over relatively larger geographical area. As a result, lengthy LT lines are put in place which causes significant line

losses and voltage fluctuations. Consumers at the tail end of the LT line in particular face issues of low voltage. Due to low voltage, farmers try to compensate by using larger capacity motors which then overload the LT line. Additionally, due to the long length of the LT lines in this model, theft of electricity is easier and unauthorised connections also contribute to overloading the DTR leading to frequent failures. As the DTR is the collective responsibility of multiple farmers, there is very little incentive for any one farmer to prevent overloading of the line. Further the voltage fluctuations also lead to frequent burnouts of motors connected to the LT line.

A High Voltage Distribution System (HVDS) aims to address these issues in rural distribution by replacing existing 100/63 kVA transformers with large number of smaller capacity 3-phase distribution transformers (16/25 kVA) installed closer to the consumer load points, upgrading the voltage on Low Tension (LT) lines to 11kV lines, and replacing the existing conductors with LT Aerially Bunched (AB) cables connected to the 3-phase transformers.

Electricity distribution using the HVDS network is depicted below:



Typical components of an HVDS installation include;

1. A 9.1 meter Pre-stressed Cement Concrete (PSCC) pole
2. Small size one or more distribution transformers on 75x40 mm channel support (pole mounted DTR)
3. Extended service connection to the consumer bore-wells using LT cable, if required

As the project involves the replacement of existing LT lines with HT lines, there is very little additional construction work required as the existing poles are used. In some cases, intermediary poles may be required to carry the HT line but these are along existing routes and hence utilise the existing RoW; no RoW is required for the LT lines and only standard electricity safety norms have to be followed. In less than 10% of cases, a new route for the HT lines may be undertaken if it provides a shorter distance to an 11kV feeder line; however even in these cases the RoW requirements are insignificant as the utilities avoid tree plantations and in fields endeavour to erect the distribution poles on farm bunds rather than on cultivable lands. Further, as HVDS requires smaller capacity DTRs, these are mounted on either mono poles or H-poles and therefore have a minimal footprint.

Land & RoW Considerations

- No land required for HVDS as DTRs to be pole mounted
- RoW:
 - Existing RoW to be used in majority of cases; as existing lines to be replaced, no additional RoW needed
 - Some intermediary poles may be erected, but these are few in number
 - In less than 10% cases new line may be laid if closer to 11Kv feeder; however tree plantations avoided
 - LT lines connecting agri-services do not require RoW

Note: In almost all the cases, the conversion of LT line to 11 KV line is undertaken with the same conductor. The balance conductors, if any, will be removed and devoluted to District Stores as scrap.

Extending the 11kV lines to as near as the load points as possible helps improve quality of supply and reduces the line losses normally seen with lengthy LT lines. In HVDS system, LT overhead line is completely avoided and instead LT AB cable is used from DTR up to consumer field, thus eliminating LT line faults. The project benefits include:



- (i) Reduction in distribution transmission (DTR) failure rate;
- (ii) Reduction in technical losses in the system;
- (iii) Enhanced reliability & quality of power;
- (iv) Enhanced customer satisfaction; and
- (v) Avoidance of theft.

The conversion to HVDS was started in Andhra Pradesh as early as 2006. Currently APEPDCL and APSPDCL are in the process of converting left over LVDS agricultural services¹ to HVDS. The details of works envisioned under World Bank funding are provided in following section.

¹ The term Agricultural Services (or Agri Services) is used in this report to denote electricity connections for irrigation pump sets

1.2 Proposed Sub-Projects

A) Sub-projects under APEPDCL

The sub-projects involve conversion of LVDS to HVDS and erection of new small capacity DTRs (16, 25 & 40 KVA) in five districts, viz. West Godavari, East Godavari, Visakhapatnam, Vizianagaram and Srikakulam. Package-wise details of the project-activities are provided below:

Table 1: District-wise detail of Project Components APEPDCL

Package Number	Package Description	No of Agri Services	DTRs Proposed	Length of LT line to be converted to HT (in km)
1	Design, Supply & Conversion of existing LT network into High Voltage Distribution System in West Godavari Districts, of Andhra Pradesh on 100% Turnkey Basis with World Bank's funding.	9,854	6,811	1,830
2	Design, Supply & Conversion of existing LT network into High Voltage Distribution System in East Godavari District, of Andhra Pradesh on 100% Turnkey Basis with World Bank's funding.	3,286	1,695	560
3	Design, Supply & Conversion of existing LT network into High Voltage Distribution System in Srikakulam district, of Andhra Pradesh on 100% Turnkey Basis with World Bank's funding.	8,350	2,878	1,823
4	Design, Supply & Conversion of existing LT network into High Voltage Distribution System in Vizianagaram District, of Andhra Pradesh on Partial Turnkey Basis with World Bank's funding.	8,797	4,262	1,254
5	Design, Supply & Conversion of existing LT network into High Voltage Distribution System in Visakhapatnam District, of Andhra Pradesh on 100% Turnkey Basis with World Bank's funding.	3,011	1,337	643
Total		33,298	16,983	6,110

B) Sub-projects under APSPDCL

The sub-project involves conversion of LV Distribution Network to HVDS and erection of new small capacity DTRs (16, 25 & 40 KVA) in two districts, i.e. Kurnool and Anantapur. Package-wise details of the proposed subproject components are given in the following table:

Table 2: Package-wise detail of Project Components APSPDCL

Package Number	Package Description	No of Agri Services	DTRs Proposed	Length of LT line to be converted to HT (in km)
1	System improvement project for conversion of existing LT network into High Voltage Distribution System in Anantapur division of Anantapur District under World Bank's funding	26,005	11,842	3,590.6
2	System improvement project for conversion of existing LT network into High Voltage Distribution System in Gooty division of Anantapur District under World Bank's funding	16,516	8,373	5,222.10
3	System improvement project for conversion of existing LT network into High Voltage Distribution System in Hindupur & Kadiri divisions of Anantapur District under World Bank's funding	15,861	12,773	2109.30
4	System improvement project for conversion of existing LT network into High Voltage Distribution System in Kalyandurg division of Anantapur District under World Bank's funding	13,536	6,967	546.60
5	System improvement project for conversion of existing LT network into High Voltage Distribution System in Adoni division of Kurnool District under World Bank's funding	21,477	10,648	2,023.12
6	System improvement project for conversion of existing LT network into High Voltage Distribution System in Nandyala division of Kurnool District under World Bank's funding	11,804	8,024	1,524.56
7	System improvement project for conversion of existing LT network into High Voltage Distribution System in Kurnool & Dhone divisions of Kurnool District under World Bank's funding	17,987	8,568	1,627.90
Total		1,23,186	67,195	16,644.18

The transmission network of the State Transmission Utility (APTRANSCO) provides adequate upstream feed to the distribution network at 400KV, 220KV and 132KV level. The network at 33KV level is interconnected with provisioning of main and alternative supply on majority of the 33/11KV substations, however in case of exigencies the supply from a single 33KV feeder is extended to 3-4 number of substations through alternative arrangements. Further 11KV interconnection is generally radial in nature, however few of the critical loads have been provided with alternative supply arrangements.

1.3 Purpose of ESMP

The present Environment and Social Management Plan (ESMP) has been developed to identify the possible environmental and social issues related to the rural HVDS project in the five districts in which APEPDCL plans to implement the HVDS project. The document also describes the management measures to minimize or mitigate the potential adverse social and environmental impacts and to enhance the potential positive impacts based on the Environmental and Social Management Framework (ESMF) for power transmission and distribution in Andhra Pradesh.

2. Socio-Economic & Bio-Geographic Profile

2.1 History

In 1953, the Andhra State Act was passed creating the State of Andhra which constituted territories of the Madras State that were predominantly Telugu-speaking. In 1956 the Telugu-speaking people in the region of the former state of Hyderabad were merged with the Andhra state to form the combined state of Andhra Pradesh. This was the first Indian state formed on the basis of linguistic identification. The combined state had 23 districts with its capital in Hyderabad. Following a prolonged movement for a separate State, Andhra Pradesh was further bifurcated on 2nd of June 2014, to form the state of Telangana by passing of the AP State Reorganization Bill. After bifurcation, 10 districts (including the capital city of Hyderabad) with a combined area of 1,14,840 Sq. Km. and a population of 3.53 Crore people became a part of the new State of Telangana. Andhra Pradesh presently constitutes 13 districts and has a new capital city of Amravati.

2.2 Geographic Profile

The present-day state of Andhra Pradesh, lies between 12°41' and 22°N latitude and 77° and 84°40'E longitude and covers an area of 1,62,760 Sq. Km. making it the 8th largest state in the country. It includes the eastern part of the Deccan Plateau and a sizeable part of the Eastern Ghats and is bordered by Maharashtra, Chhattisgarh, Telangana and Orissa in the North, the Bay of Bengal in the East, Tamil Nadu to the South and Karnataka to the West. The State has the second longest coastline in the country with a length of 974 Km. and two major rivers, the Godavari and the Krishna.

Of the total land area, 38.31% of the state's geographical area is under net area sown (62.35 lakh hectares), 22.51 % under forest (36.63 lakh hectares), 8.61 % under current fallow lands (14.01 lakh hectares), 12.30% under land put to non-agricultural uses (20.02 lakh hectares), 8.30 % under barren and uncultivable land (13.51 lakh hectares) and remaining 9.97% is under other fallow land, cultivable waste lands like permanent pastures and other grazing lands and land under miscellaneous tree crops and groves not included in net area sown.

2.3 Demographic Profile

A.P. is the 10th largest state in India with a population of 4.94 Crore (4.08% of India's population) and a population density of 304 persons per Sq. Km. There are 126.65 Lakh households in the State and the average size of the household is 3.95. A.P. is largely rural with 70.42% of the population living in rural areas and 29.58% living in urban areas.

Of the total population Scheduled Castes (SC) constitute 17.10% and Scheduled Tribes (ST) 5.33%. Prakasam is the district with the highest SC population (7.88 lakh) while Vizianagaram has the lowest (2.47 Lakh). Visakhapatnam is the district with the largest concentration of STs with 14.42% of the total ST population, while Kurnool with 2.04% has the lowest concentration.

The growth rate of population has slowed from 11.89% in 2001 to 9.21% in 2011 while the sex ratio rose from 983 in 2001 to 997 in 2011 (as per census data). In absolute terms, 2.47 crore (50.1%) of the total population is male and 2.46 Crore (49.9%) female. The districts of Visakhapatnam, East Godavari, West Godavari and Guntur, have registered a progressive sex

ratio moving from less than 1000 category to more than 1000 from 2001 to 2011. The SCs and STs have registered a sex ratio of 1007 and 1009 respectively. However, despite the overall improvement in sex ratio, there was a troubling decline in child sex ratio from 964 in 2001 to 944 in 2011 (census data).

Literacy Rate in the state has increased and was 67.35% as per the 2011 population census as against 62.07% in the 2001 census; however this is still lower than India's overall literacy rate, which was 72.98% in 2011. The literacy rate is much higher for urban areas (79.2%) than rural areas (62.4%). Also, while male literacy is 74.8%, female literacy is only 59.96%. Among the districts West Godavari has the highest literacy (74.63% in 2011), while Vizianagaram has the lowest (58.89% in 2011).

District-wise Demographic Data

According to the Socio Economic and Caste Census 2011, there are 13 districts in the State of Andhra Pradesh, 670 tehsils, 14,514 gram panchayats/police stations. The total number of villages in Andhra Pradesh are 17,521 and additionally there are 94 towns. The number of rural households is 93.44 lakh (76.15%) and urban households is 29.26 lakh (23.85%). The district with the highest density of population is Krishna district (518), while Kadapa district has the lowest density (118). District wise demographic data is provided below:

District	Area (Sq. Km.)	Population	Male Population	Female Population	Sex Ratio	Literacy (%)	Density / Sq. Km.
Srikakulam	5,837	27,03,114	13,41,738	13,61,376	1015	61.74	463
East Godavari	10,807	51,54,296	25,69,688	25,84,608	1006	70.99	477
Guntur	11,391	48,87,813	24,40,521	24,47,292	1003	67.4	429
Krishna	8,727	45,17,398	22,67,375	22,50,023	992	73.74	518
Visakhapatnam	11,161	42,90,589	21,38,910	21,51,679	1006	66.91	384
Chittoor	15,152	41,74,064	20,90,204	20,83,860	997	71.53	275
Anantapur	19,130	40,81,148	20,64,495	20,16,653	977	63.57	213
Kurnool	17,658	40,53,463	20,39,227	20,14,236	988	59.97	230
West Godavari	7,742	39,36,966	19,64,918	19,72,048	1004	74.63	509
Nellore	13,076	29,63,557	14,92,974	14,70,583	985	68.9	227
YSR (Kadapa)	15,359	28,82,469	14,51,777	14,30,692	985	67.3	188
Prakasam	17,626	33,97,448	17,14,764	16,82,684	981	63.08	193
Vizianagaram	6,539	2,344,474	1,161,477	1,182,997	1019	58.89	359

Data taken from Census 2011

2.4 Economic Profile

Andhra Pradesh's Gross State Domestic Product (GSDP) at constant (2011-12) Prices grew by 10.99% from INR 4,44,752 Crores in 2014-15 to INR 4,93,641 Crores in 2015-16; this was higher than India's overall GDP growth which was 7.6% over the same time period. In terms of sectoral contribution to the economy, the services sector contributed the most to overall Gross Value Added (GVA) in 2015-16 (47%) followed by agriculture (29%) and industry (24%). The services sector in fact has been the major driver of economic growth in the State and continued to be so

in 2015-16, registering a growth rate of 11.39% over the previous year. Real estate and trade, hotels and restaurants were the major contributors to the service sector growth. The industry sector saw the second fastest growth, growing by 11.13% over the previous year led by growth in manufacturing and construction.

While the agriculture and allied activities sector did not grow by double digits, it still grew by an impressive 8.4% over the previous year. The main crops in the state are Rice, Maize and Pulses. The area under food grains in Andhra Pradesh grew by 4.21% to 41.30 lakh hectares in 2015-16 from 39.63 lakh hectares in 2014-15. The total production of food grains however decreased by 14.4% in 2015-16 to 137.56 lakh tonnes from 160.03 lakh tonnes in 2014-15. This decline was due to unfavourable seasonal conditions in some parts of the State. This resulted in a negative growth in agriculture sub-sector of the agriculture and allied sector. The overall positive growth was instead fuelled by the livestock, fisheries and horticulture sub-sectors.

Under the livestock sub-sector, increase in the production of Milk, Meat & Egg resulted in posting an encouraging growth rate of 11.2%; while the increase in the production of Marine fish and brackish water prawns helped to register a significant growth rate of 32.8% in Fishing Sector. Horticulture too grew impressively by 9.96% and contributed 5.6% to the overall GSDP of Andhra Pradesh. There is 14.74 Lakh Ha. area under Horticulture in Andhra Pradesh with production of 188.22 lakhs MTs.

The per capita income (at current prices) of Andhra Pradesh also rose by 12.38% in this time period from INR 95,689 in 2014-15 to INR 1,07,532 in 2015-16. However, as per the National Sample Survey Office (NSSO) of 68th Round (2011-12) the unemployment rate for Andhra Pradesh State for Rural and Urban sectors stood at 12% and 43% respectively. While the rural unemployment rate is lower than the corresponding figure for India (which is 17%), the urban unemployment is significantly higher than the national average which was 34%.

3. Policy, Legal and Regulatory Framework

The activities to be undertaken as part of the rural HVDS project have negligible social and environmental impacts. The rural HVDS project will be undertaken within the purview of Indian and State laws and keeping in mind the appropriate international obligations and directives and the environment and social policies of the funding agency.

3.1 Environmental

3.1.1 Mandatory Requirements (National/State)

	Provisions	Applicability
1	Article 48 A	The State shall endeavour to protect and improve the environment and to safeguard the forests and wildlife of the country.
2	Article 51 A (g)	It shall be the duty of every citizen of India to protect and improve the natural environment including forests, lakes, rivers and wildlife and to have compassion for living creatures.
3	Environmental Policy, 2006	The policy seeks to stimulate partnerships of different stakeholders, i.e. public agencies, local communities, academic and scientific institutions, the investment community, and international development partners, in harnessing their respective resources and strengths for environmental management. The dominant theme of this policy is that while conservation of environmental resources is necessary to secure livelihoods and well-being of all, the most secure basis for conservation is to ensure that people dependent on particular resources obtain better livelihoods from the fact of conservation, than from degradation of the resource."
4	Forest (Conservation) Act, 1980	This Act provides for the conservation of forests and regulates the diversion of forest land to non-forestry purposes. When any transmission/distribution line traverses forest land, prior clearance is mandatorily required from Ministry of Environment and Forests (MoEF), GoI under the Forest (Conservation) Act, 1980.
5	Environment (Protection) Act, 1986	It is umbrella legislation for the protection and improvement of environment. This Act as such is not applicable to transmission/ distribution projects of APEPDCL. Project categories are specified under the schedule of the EIA notification. Even then some limited compliance measures notified under this EPA, 1986 are to be adhered to relevant rules and regulations under the EPA, 1986 applicable to the operations of APEPDCL.
6	Indian Treasure Trove Act, 1878 as amended in 1949	The Act provides for procedures to be followed in case of finding of any treasure, archaeological artefacts etc. during excavation. Possibilities of such discoveries are quite remote due to limited and shallow excavations. However, in case of such findings the concerned Utility will follow the laid down procedure in the Section-4 of Act.

3.1.2 World Bank Policies

	Safeguard Policy Triggered	Applicability
1	Environmental Assessment: OP/BP 4.01	Environmental impacts for grid extensions are related to installation of power lines, which for instance may require safe disposal of construction, old equipment and other waste. These substations are small and impacts are expected to be limited. In view of this, the project has been given a Category B classification under OP4.01.
2	Natural Habitats OP/BP 4.04	Significant impacts on natural habitats are not expected since it is a linear project and also the footprint is limited to small area only. However as specific subprojects and their locations are yet to be determined further information may be needed during implementation to ascertain specific impacts.
3	Forests OP/BP 4.36	This policy is Not Applicable as the Project does not pass through some of the forest areas and have no impact on the health and quality of forests, or affect the rights and welfare of people and their level of dependence upon or interaction with forests, nor aims to bring about changes in the management, protection or utilization of natural forests or plantations.

3.2 Social

3.2.1 National and State law

	Act / Rules / Policies	Applicability
1	The Constitution (73rd Amendment) Act, 1992	Enables participation of Panchayat level institutions in decision-making and supporting preparation and implementation of development schemes.
2	5th Schedule of Constitution (Article 244 (1))	Provides for the administration and control of Scheduled Areas and Scheduled Tribes. Article 244(1) and Article 244 (2) of the constitution of India enables the government to enact separate laws for governance and administration of the tribal areas. In pursuance of these articles, President of India had asked each of the state to identify tribal dominated areas. Areas thus identified by the states were declared as Fifth schedule areas
3	Panchayats (Extension to Scheduled Areas) Act, 1996	The provisions of PESA Act extends the provisions of Part IX of constitution relating to Panchayats to the Scheduled Areas. As per the provisions, every village in Schedule V areas will have a Gram Sabha which would approve the plans, programmes and projects for social and economic development before any such plans, programmes and projects are taken up for implementation at village level.
4	The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act (RFCTLARRA), 2013	If any involuntary land acquisitions are undertaken to secure land for projects they will fall under the purview of The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act (RFCTLARRA), 2013. The act puts the onus on the State Government to ensure that there is a legitimate and bona fide public purpose which necessitates the acquisition and that the potential benefits of the project outweigh the social costs to the affected populations. The responsibility of the utilities is restricted to selecting the site for substations and requesting for land to be secured. The RFCTLARRA, 2013 makes it mandatory for the

Act / Rules / Policies	Applicability
	<p>State Government to carry out a Social Impact Assessment (SIA) and publicise the findings through public hearings. Further, the Act outlines the criteria for determining compensation to be given for the land acquired and requires that Rehabilitation and Resettlement (R&R) Awards are provided for each affected family. The awards are also to be made public ensuring transparency in the process.</p> <p>In case of rural HVDS project, the act will not be triggered as none of the project components require securing of land.</p>
<p>5 Andhra Pradesh Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Rules, (A.P. RFCTLARRR) 2014</p>	<p>These rules have been notified by the Government of Andhra Pradesh in exercise of the powers conferred by Section 109 of the RFCTLARRA, 2013. The rules specify:</p> <ul style="list-style-type: none"> (i) Process for carrying out the Social Impact Assessments (SIAs) (ii) Institutional Support for SIAs (iii) Other guidelines for carrying out the SIAs (iv) Process for conducting public hearings (v) Declaration of Awards and Compensation <p>In case of rural HVDS project, the act will not be triggered as none of the project components require securing of land.</p>
<p>6 The Electricity Act, 2003 (With Amendments in 2003 & 2007) and The Indian Telegraph Act, 1885</p>	<p>At the national level, the Indian Telegraph Act, 1885 and the Electricity Act, 2003 give the transmission and distribution utilities the authority to place towers, poles and lines on any land as required. However, Section 10 (b) of the Indian Telegraph Act, 1885, clearly states that land for the lines and poles (towers) will not be acquired. Further, Section 67 (3) and 68 (5) of the Electricity Act, 2003 require the utilities to minimise damage to property in carrying out their works, and to pay full compensation to all persons interested for any damage sustained by them due to the works carried out.</p>
<p>7 Ministry of Power, Guidelines for Payment of Compensation Towards Damages in Regard to Right of Way for Transmission Lines, 2015</p>	<p>These guidelines have been formulated for “determining the compensation towards “damages” as stipulated in Section 67 and 68 of the Electricity Act, 2003 read with Section 10 and 16 of the Indian Telegraph Act, 1885 which will be in <i>addition to the compensation towards normal crop and tree damages</i>”</p> <p>According to Section 2 of the Guidelines, compensation will be payable only for transmission lines supported by a tower base of 66 kV and above, and not for sub-transmission and distribution lines below 66 kV.</p>
<p>8 The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006</p>	<p>The Act recognises and vests the forest rights and occupation in forest land in forest dwelling Scheduled Tribes and other traditional forest dwellers who have been residing in such forests for generations but whose rights could not be recorded. The Act provides a framework for recording forest rights so vested and the nature of evidence required for such recognition and vesting in respect of forest land.</p> <p>There are no scheduled area or forest area within the project area.</p>

Act / Rules / Policies	Applicability
<p>9 The Andhra Pradesh Forest Act, 1967 and Rules (thereunder)</p>	<p>The Act consolidates and amends the laws relating to protection and management of forests in the state of Andhra Pradesh. It lays down guidelines to constitute any land as reserved forest and protected forest, and guidelines for preservation of private forests. The act also provides rules for:</p> <ul style="list-style-type: none"> a) Timber and other forest produce in transit or possession b) Possession of Sandalwood c) Collection of drift and stranded timber <p>During laying of transmission / distribution lines or erecting towers, all possible efforts should be made to avoid forest areas (reserved forest, protected forest and private forest). In case, passing through forest areas is unavoidable, prior permission of the forest department should be sought.</p> <p>There are no scheduled area or forest area within the project area.</p>
<p>10 The Right to Information Act, 2005</p>	<p>The Act provides for setting out the practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, the constitution of a Central Information Commission and State Information Commissions and for matters connected therewith or incidental thereto. The implementation of RTI by the utilities is provided in Annexure 10.</p>
<p>11 Ancient Monuments & Archaeological Sites and Remains Act, 1958</p>	<p>The Act has been enacted to prevent damage to archaeological sites identified by Archaeological Survey of India. During route alignment, all possible efforts are made to avoid these areas. Wherever it becomes unavoidable the concerned Utility will take necessary permission under this act.</p> <p>There are no archaeological sites within the project area.</p>
<p>12 Indian Treasure Trove Act, 1878 as amended in 1949</p>	<p>The Act provides for procedures to be followed in case of finding of any treasure, archaeological artefacts etc. during excavation. Possibilities of such discoveries are quite remote due to limited and shallow excavations. However, in case of such findings the concerned Utility will follow the laid down procedure in the Section-4 of Act.</p>
<p>14 APERC Standards of Performance (Regulation no. 7 of 2004 and regulation no. 9 of 2013)</p>	<p>The regulation contains the guaranteed standards of performance, these are the minimum standards of service that a distribution licensee shall achieve to individual consumers, and Overall Service Standards which the licensee shall seek to achieve in the discharge of his obligation as a licensee. In the said Regulation, vide Schedule-II, the Commission also has prescribed the compensation payable and manner of payment of compensation to consumers for non-compliance of the Standards in terms of the provisions of section 57 of the Electricity Act, 2003.</p>
<p>15 Central Electricity Authority (Measures relating to Safety and Electric Supply) Regulations, 2010</p>	<p>The regulations lay down measures related to safety. Key measures include:</p> <ul style="list-style-type: none"> • Para 5 of the regulations mandate the appointment of Electrical Safety Officer in all suppliers of electricity including generating companies, transmission companies and distribution companies. The officer will ensure the observation of safety measures specified under these regulation in their organization for construction, operation and

Act / Rules / Policies		Applicability
		<p>maintenance of power stations, sub-stations, and transmission and distribution lines.</p> <ul style="list-style-type: none"> • Para 7 of the regulations lays down safety measures for operation and maintenance of transmission and distribution systems. The para states the educational qualification for engineers, supervisors and technicians, and also specifies the trainings to be conducted by transmission and distribution companies. • Chapter IV specifies general conditions relating to supply and use of electricity • Chapter VI specifies safety precautions for electrical installations and apparatus of voltage exceeding 650V • Chapter VII provides safety requirements for overhead lines and underground cables
16	Central Electricity Authority (Safety Requirements for Construction, Operation and Maintenance of Electrical Plants and Electric lines) Regulations, 2011	<ul style="list-style-type: none"> • The provisions of these regulations are in addition to and not in derogation of the provisions of any other law in force for the time being. • Para 4 of the regulations provide safety provisions relating to Owner (utilities) and specifies that owner shall make safety provisions an integral part of work processes to ensure safety of employees including employees of contractor, sub-contractor as well as visitors. • The regulations further provide provisions for setting up of safety management system, safety manual, safety officer and safety committee, reporting of accidents, emergency management plan, mock drills and medical facilities • Para 7 of the regulations specify safety provisions relating to contractor

3.2.2 World Bank Policies

Act / Rules / Policies		Applicability
1	Involuntary Resettlement (OP 4.12)	This policy covers direct economic and social impacts that both result from Bank-assisted investment projects, and are caused by the involuntary taking of land. To avoid or minimize involuntary resettlement and, where this is not feasible, assist displaced persons in improving or at least restoring their livelihoods and standards of living in real terms relative to pre-displacement levels or to levels prevailing prior to the beginning of project implementation, whichever is higher.
2	Physical Cultural Resources (OP 4.11)	This policy assists countries to avoid or mitigate adverse impacts on physical cultural resources from the Bank financed development projects. The policy defines physical cultural resources as movable or immovable objects, sites, structures, groups of structures, and natural features and landscapes that have archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural significance. Physical cultural resources may be located in urban or rural settings, and may be above or below ground, or under water. Their cultural interest may be at the local, provincial or national level, or within the international community.

Act / Rules / Policies		Applicability
3	Indigenous Peoples (OP 4.10)	This policy contributes to the Bank's mission of poverty reduction and sustainable development by ensuring that the development process fully respects the dignity, human rights, economies, and cultures of Indigenous Peoples. The Bank provides project financing only where free, prior, and informed consultation results in broad community support to the project by the affected Indigenous Peoples. Such Bank financed projects include measures to (a) avoid potentially adverse effects on the Indigenous Peoples' communities; or (b) when avoidance is not feasible, minimize, mitigate, or compensate for such effects Bank financed projects are also designed to ensure that the Indigenous Peoples receive social and economic benefits that are culturally appropriate and gender and inter generationally inclusive. The project shall ascertain broad community support for the project based on social assessment and free prior and informed consultation with the affected Tribal community, if any.

4. Potential Impacts and Mitigation Measures

The HVDS system consists of pole mounted distribution transformers (DTRs) exclusively installed in agricultural fields in rural areas. The project typically involves erection of a 9.1 m concrete pole and installation of one or more small size distribution transformers on a metal channel support frame. The installation thus requires a very small area of land to erect the pole on ground and take about one or two days for completing the erection. The HVDS system is an immobile power supply installation and does not have any components resulting into vibrations and noise or any kind of gaseous or liquid emissions. Furthermore, the planned activities are flexible in nature and the location of pole and the route of the distribution line can be aligned to avoid potential damage to crops, if any.

In view of the nature and size of the installation, potential environmental impacts of the rural HVDS project are generally expected to be insignificant and mostly localised to the erection site. The installation requires a very minimal space of about 1 square meter and hence there is no need of securing land for the project and hence The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act (RFCTLARRA), 2013, will not be triggered. The project activities do not attract any requirements under The Environment Protection Act 1986.

The potential impacts of the rural HVDS project and the corresponding mitigation methods are provided below:

4.1 Potential Environmental Impacts and Mitigation Measures

The overall HVDS construction activity is on a very small spatial scale, and of a short duration of about a week. Hence environmental impacts during the construction phase are generally insignificant and temporary.

Impact on Air Quality and Noise

The project construction activity is a very short term activity of about 1 or 2 days, and does not require any significant movement of men and material to the site. The vehicular movement may be limited to one or two vehicles. The pole erection and DTR installation will involve very limited ground work without the use of any heavy machinery. Hence, the potential for dust generation and noise, if any, is expected to be insignificant and short-lived.

Impact on Water Resources

The project activity does not require use of water neither results into generation of any wastewater. No fuel and other lubricants are required at the sites. Hence, the project activity is not expected to have any impact on water quality or availability. The project activity of upgradation of existing LVDS to HVDS is being taken up to minimise the energy losses and quality of power supply. Hence no adverse impact on ground water availability is expected due to the upgradation to HVDS.

Impact on Drainage Pattern

The project activity is typically a standalone pole mounted DTR and does not require any significant area of land. Hence no adverse impact on local surface drainage pattern is expected.

Impact on wildlife

The project activity is typically a standalone pole mounted DTR and will be located in agricultural fields. The structure is provided with suitably earthing. As such no significant adverse impact due to the project activities is expected on the wildlife.

Impact due to construction labour camp

The manpower requirement for erection of the HVDS is about 4 to 5 workers. Moreover, the construction activity is of a very short duration of 1 or 2 days. The construction workers are generally employed from within the project villages. As such the project activity will not require setting-up of labour camp and hence no associated adverse impacts are expected.

Anticipated environmental impacts during “operational phase”

The HVDS is a fixed pole mounted power supply structure without any rotating or vibrating parts, hence, the structures will not have any negative impact during the operation phase. There may be humming noise from the transformers which will be felt only to a distance of up to 5 meter from the source and therefore not expected to cause nuisance in the farms.

A summary of expected environmental impacts and the mitigation measures during the construction stages are given below.

Activity / Aspect	Anticipated Impact	Severity of Impact (High/Med/Low/ Insignificant)	Mitigation Methods
Construction Phase			
Use of farmland for erection of the HVDS	Loss of agricultural land	Insignificant	None as the installation is typically pole mounted and requires minimal land area.
Excavation for pole erection	Loss of soil productivity	None	The project activity is limited to erecting a pole with a small size transformer, and hence is not expected to have any impact on soil and geology at the site. However maximum effort to be taken to protect /preserve topsoil and reinstate after completion of the construction.
Pole Erection and Transportation	Increase in airborne dust particles during construction	Insignificant The construction activity is a very short term activity of about one or two days and does not require any significant movement of men and material to the site. The vehicular movement may limited to one or two vehicles and shortlived for one or two days. The pole erection and DTR installation will involve very limited ground work	None specific

		without the use of any heavy machinery. Hence, the potential for dust generation is low and shortlived.	
Pole Erection and Transportation	Noise	Insignificant As the project activities are very small scale, located in agricultural field and of short duration. No heavy machineries are required for the excavaton and erection activities.	None specific
Transportation and storage of labour and materials	Soil / water contamination due to spillage / leakage	Insignificant The project components are solid electrical and mechanical components like cables, metal frames and transformer, and does not include use/handling of any chemicals, liquids at site.	Contractor to ensure that construction materials should be stored in covered areas to ensure protection from any potential damages during handling and storage. Avoid storage along water bodies, if any.
Health and safety	Injury and sickness of workers	Insignificant	Contractor to ensure that construction safety guidelines to be communicated to the workers specially covering working at height, and electrical safety to increase safety awareness among the workers. All construction workers to be provided with relevant personal protective equipment namely safety shoes, safety hemlet, electrical gloves and safety harness. The detailed Safety Plan is provided in Annexure 6.
Operation Phase			
Transformer Noise	Noise pollution	Insignificant There may be a humming noise from the transformer, which is felt within 5 meter distance from the transformer. However the HVDS are located within agricultural fields and hence no impact on human habitation is expected.	None specific
Handling of old transformers	Soil contamination due to leakage of	Low The transformers are very small in size (16/25/40 KVA) and	Any incident of leak must be immediately reported and rectified.

	oil from transformer	typically have low volume of oil storage. The leakage of oil from the transformer is very rare as the equipment is static and suitable seals are provided at joints as per standard design practices. Hence, the leakage of oil from the transformer, if any, is expected to be insignificant to cause any serious adverse environmental impact.	
	Contamination of soil due to leakage / spillage of oil during transportation and storage of transformers	Low The transformers are very small in size (16/25/40 KVA) and typically have low volume of oil storage. Hence, the leakage of oil from the transformer, if any, is expected to be insignificant to cause any serious adverse environmental impact.	During transfer of the non-functional transformers from site to the central workshop, preventive measures such as provisioning of secondary containment (trays) and spill control kit / absorption pad should be ensured. Appropriate tools must be used during handling and transport of the transformers to avoid damage and leak.

4.2 Potential Social Impacts and Mitigation Measures

The objective of the rural HVDS project include reduction in DTR failure rate, ensuring enhanced reliability & quality of power and enhanced customer satisfaction. Therefore, following positive impacts are expected from the implementation of the HVDS project:

- *Improved and Reliable power supply:*
In LVDS, an 11kv line is connected to a mother transformer (63kva or 100kva) from which connections are provided for multiple agri-pump sets connected through LT lines which can be 2-3 Km in length. It is difficult to monitor the load on the transformer and prevent overload and outages. Also, the voltage levels fall considerably at the tail end of the power line making it difficult to operate the power sets.

In HVDS, an individual transformer (16kva, 25kva or 40kva depending on sanctioned capacity in horse-power) is provided for each pump set. Hence, overloading of the line is avoided. Also, as individual farmers are responsible for their own transformer, they would not use faulty motors or let others connect to their transformers.

Furthermore, it was observed that in the LVDS, transformers fail 1-3 times a year because of overloading, which is reduced considerably in the HVDS. It takes 2 days to fix a minor problem and up to a week to fix a major problem. During that time there is no back up to run the pumps and therefore during that time all the pump sets connected to that line do not get power supply. However, in case of damage to transformer in HVDS, only a few farmers are affected.

- *Reduced expenditure on maintenance of pump sets:*
In LVDS, the pump sets are repeatedly damaged because of the low voltage power supply and frequent voltage fluctuations. At times, the pump has to be repaired 2-3 times a year and repair cost vary between INR 5,000 to INR 20,000 each time, depending on the size of the pump set. As the HVDS provides better voltage profile, the damage to the pump sets is substantially reduced, resulting in lower expenditure on repair and maintenance of pump sets.
- *Employment Creation:*
As per, rural electrification plan of the state of Andhra Pradesh dated July 2011, one acre of assured irrigation results in 100 man-days of potential employment². The proposed HVDS work will ensure reliable electricity supply for agricultural purposes, thereby ensuring assured irrigation and creating employment.

² Rural Electrification Plan of the State of Andhra Pradesh (2011). Energy Department, Gazette Notification

Negative Impacts

Impact	Mitigation Method
Social Inequities: Small, marginal and women farmers do not get HVDS connection	<ul style="list-style-type: none"> The existing LT feeder line are being upgraded to HVDS irrespective of the socio-economic status of the farmer. Hence connections to all pumpsets on a feeder line will be replaced wherever technically feasible.
Right of the Way for erecting poles and laying lines: As in majority of cases the existing LT lines (415 V) are being replaced with HT lines (11 KV) no additional RoW is required.	<ul style="list-style-type: none"> As the majority of the work involves replacing existing lines, no additional RoW requirement is there. In some cases intermediary poles may be erected but these are few in number. In less than 10% of cases, a new line may be laid if an 11kV feeder is closer to agricultural services. Further, LT lines connecting agri-services do not require RoW. In most cases, farmers do not have any grievance regarding positioning of the Poles and lines on their land, as they get reliable power supply because of the project.
Damage to crop and trees: Crops and trees may be damaged during the construction phase and also for the maintenance of the RoW; as the majority of work involves replacement of existing LT lines with HT, it is not expected that there will be any significant crop or tree damage in the process as RoW already exists.	<ul style="list-style-type: none"> Crop damage is limited as most of the civil work takes place in non-agricultural season. A clearance of 2.6 m between the conductor (11 KV) and the trees is to be maintained. This clearance is maintained through pruning the trees (There is no need to cut the tree). The damage to trees is mostly relevant in cases of coconut or palm tree cultivation but farmers are willing to maintain the clearance as the benefits from reliable supply of electricity far outweigh the cost of pruning of few trees.
Distruption of Power Supply: Power supply will have to temporarily discontinued to allow for construction activities. Also, power supply is distrupted during the maintainence activity	<ul style="list-style-type: none"> Agriculture power is provided for 7 hours a day; replacement of LT lines is undertaken during the rest of the day so power supply is not affected due to the work. Provision of AB switches for the transformers to enable the maintenance of transformer without disrupting the power supply
Impact on community health and safety due to exposure to electric currents, hazardous materials, electromagnetic fields etc.	<ul style="list-style-type: none"> Display danger signs at appropriate locations Display boards with precautions to be adopted by consumers, owners, occupiers, electrical contractors, electric workmen and suppliers Display of instructions for resuscitation of persons suffering from electric shock.
Impact on labour health and safety due to exposure to electric currents, hazardous materials, electromagnetic fields etc.	<ul style="list-style-type: none"> Contractor should follow defined protocols for health & safety Safety equipment should be provided to workers Sign-boarding of hazardous areas / materials should be done. The detailed Safety Plan is provided in Annexure 6.
Violation of labour standards	<ul style="list-style-type: none"> Contractor should follow labour standards as per applicable laws such as minimum wages, equal pay for equal work, no child labour etc.

The detailed Social Management Plan (SMP) is provided in Annexure 2.

5. Institutional Arrangements

This section provides the institutional arrangements to implement the Environment and Social safeguards for the rural HVDS project. The project will be implemented by APEPDCL. A PIU has been set-up in the utility for implementing this project. The key members of PIU are listed below:

Role	Designation
Main point of contact	ED World Bank Projects
Technical Member	ADE/T/Dir - operations
Finance Member	GM/IA
Procurement Member	ADE Projects
Environment and Social Member	SE/Civil (APSPDCL); EE/Civil (APEPDCL)

Additionally, the staff of utility will coordinate with other administrative institutions, private players and civil society organisations to manage the impacts. These institutional arrangements are provided below. These arrangements has been documented based on consultations with APEPDCL:

- Transformers are fenced or insulated to prevent the accidents. Caution boards are put up at appropriate location to avoid accidents
- The Superintending Engineer/Operations submits the design to the local railway authority for approval in case Railway crossings are in or around the route of the distribution line
- Field Staff (AE/ADE) negotiate with farmers for RoW and clearance between the conductor and trees.
- Handling sick transformers:
 - AE/Operations and ADE/operations identify and inspect the sick unit on field and prepare a preliminary report.
 - The sick unit along with the preliminary report is sent to the Special Maintenance Unit, where the transformer is further inspected to determine the cause of the fault
 - In case, the unit cannot be repaired an estimate is prepared and sent to corporate office of DISCOMS, where a committee of 5 to 6 officers is formed to supervise the scrapping of the transformer including removal of waste oil, scrapping of aluminum and copper coil and scrapping of iron in the body of the transformer
 - The oil is stored in sealed drums and all scrap, including oil, is devoluted to DISCOMS stores, where the scraps are stored until auction to registered recyclers.

6. Grievance Redressal Mechanism

The grievance redressal mechanism provides the mechanism to address/resolve the concerns and grievances of people affected by the projects. The minor concerns of the people are usually handled through the public consultations undertaken during the construction phase. The GRM is elaborated below:

Informal mechanisms to resolve grievances are described below:

- Any person with grievance can visit the local office of the utility for redressal. The DE is the main officer to handle any complaints.
- Awareness camps are held in villages to inform about the new initiatives of the utilities like the proposed project to replace existing irrigation pump sets with the energy-efficient pump sets. People can raise their complaints during these camps.

EPDCL also have a formal framework in place to address the grievances. The key mechanisms available are described below:

- Substation Advisory Committee
- District Electrical Coordination Committee
- Meet the CMD
- Dial the CMD
- Online registration of complaints
- Registering complaints at a Toll-Free number
- Grievance Redressal in Scheduled Areas
- Grievance Redressal Forum
- Judicial intervention

Substation Advisory Committee

A Substation Advisory Committee has been constituted at each sub-station of the discomms. The committee is headed by the local MLA (Member of Legislative Assembly) and meets once every month. During the committee meetings the farmers and consumers can raise their grievances to the MLA.

District Electrical Coordination Committee

District Electrical Coordination Committee are constituted for all Central Government aided projects and is chaired by the District Collector (DC). The committee is a forum for consumers to raise their concerns regarding the central Government aided-projects.

Meet the CMD - Spandana

Consumer meetings are held at the corporate office of SPDCL (in Tirupati) and EPDCL (in Vishakhapatnam) every Monday from 9:30 AM onwards. Consumers/public with grievances can personally meet the CMD and other senior officials of SPDCL and EPDCL.

Apart from consumers, contractors can also participate in 'Spandana'

Dial the CMD

Every Monday from 9:30 AM to 10:30 AM, consumers/public can directly call the CMD on a dedicated helpline. Each call is attended and recorded.

Online registration of complaints

Consumers can register the complaints on the website of EPDCL

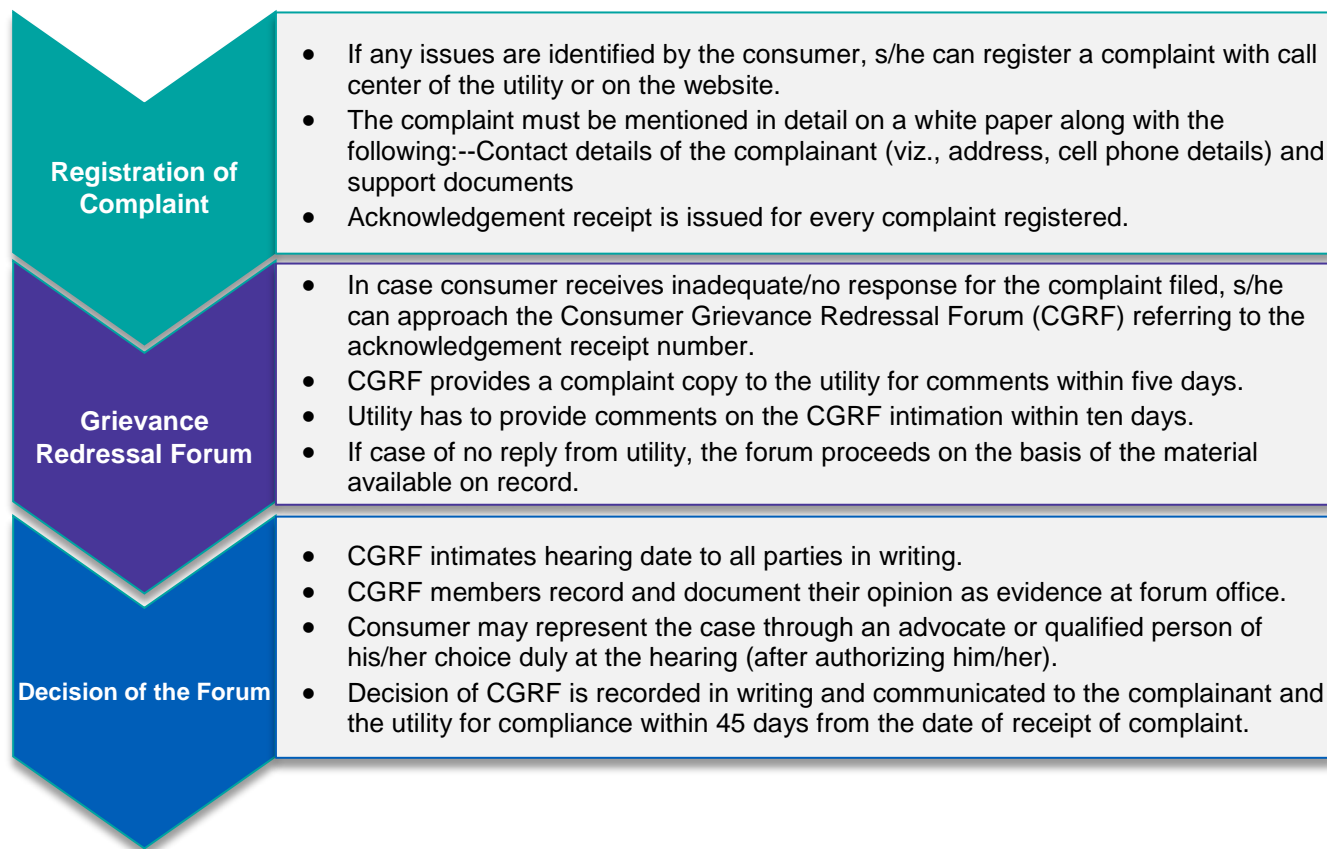
Registering complaints at a Toll-Free number

The consumers can call a toll-free number to register the complaint. A centralised call centre has been established (Number #1912) to receive supply related complaints. Also, a toll free number has been established where consumers can directly raise their concerns to CMD of the utilities on every Monday 9 AM onwards.

Grievance Redressal in Scheduled Areas

A coordination committee consisting of the Project Officer from Integrated Tribal Development Authority (ITDA) and the DE of the distribution utility is constituted to redress grievances in Scheduled Areas.

Grievance Redressal Forum



Judicial Intervention

In case the grievances are not resolved at the utility level. The people can approach the judicial authority and file a court case against the utilities.

Outreach and publicity

Consultations with the consumers revealed that consumers in rural areas are not aware of most of the grievance redressal mechanisms. They approach local lineman in case of any complaint and the lineman either resolves it or escalates the issue to appropriate level. There is a need to publicize various mechanisms for GRM like the toll free number and SPANDANA.

7. Monitoring Plan

This section details out the plan to monitor the implementation of social impact management and mitigation measures and grievance redressal mechanism.

The environment and social member of the project team has overall responsibility for achieving the environmental and social performance. They will be responsible for monitoring the ESMP, including monitoring the implementation of the ESMP.

The environmental and social monitoring plan for each project will be integrated with construction, operation and maintenance and shall be monitored by the designated environment and social member on a monthly basis.

Objective of monitoring plan

The primary objective of monitoring plan is to verify the absence of or record environmental and social impacts resulting from the subproject activities and to ensure compliance with the "mitigation measures" identified earlier in order to prevent or reduce adverse impacts and enhance positive impacts from project activities.

Monitoring during pre-construction:

Before construction work on a sub-project begins, monitoring formats will be developed to track the execution of the ESMP. The Environment and Social Member will be responsible for monitoring and ensuring effective implementation of the environment and social mitigation/management measures, and payment of compensation as required for the respective subprojects. The following table provides the general parameters to be monitored during the pre-construction phase.

Guidelines for social monitoring during pre-construction phase			
Activity / Issues	Parameter to be Monitored	Measurement & Frequency	Monitoring Responsibility
Location of overhead line and poles for HVDS	▪ Route alignment and HVDS sketches	▪ Once. Monitoring officer to visit field before route approval	▪ DE Construction (Route approvals provided by SE Operations)
	▪ Payment of damages / compensation	▪ Quarterly till process is completed	▪ DE Construction

Guidelines for environmental monitoring during pre-construction phase		
Parameter	Frequency	Responsibility
Completion of Environment assessment	One Time at start of sub-project	• Environment and Social Member

Monitoring during construction:

During implementation of all subprojects, the Environment and Social Member will be responsible for monitoring and ensuring effective implementation of the environmental and social mitigation/enhancement measures (including health and safety measures) outlined in the ESMP.

Following table provides the general environmental parameters to be monitored during the construction phase of the sub-projects.

Guidelines for social monitoring during construction phase				
Activity / Issues	Potential Impacts	Parameter to be monitored	Measurement & frequency	Monitoring Responsibility
Erection of poles, laying of lines and replacement of transformers	<ul style="list-style-type: none"> Crops and trees may be damaged during the construction phase and also for the maintenance of the RoW; however this is unlikely. 	<ul style="list-style-type: none"> Work Schedule Route alignment and HVDS sketches Records for payment of compensation 	<ul style="list-style-type: none"> Once at the start of civil work Monthly 	<ul style="list-style-type: none"> DE Construction
	<ul style="list-style-type: none"> Impact on worker health and safety – possibility of electrocution, falling from height, and exposure to magnetic fields 	<ul style="list-style-type: none"> Presence of documented health & safety protocols Use of safety equipment by workers Presence of signboards at appropriate locations 	<ul style="list-style-type: none"> Daily for safety equipment Weekly for other measures 	<ul style="list-style-type: none"> Construction contractor & DE Construction
	<ul style="list-style-type: none"> Impact on community health and safety due to exposure to electric currents, hazardous materials, electromagnetic fields etc. 	<ul style="list-style-type: none"> Signboards / instructions are displayed at appropriate places 	<ul style="list-style-type: none"> Weekly for signboards 	<ul style="list-style-type: none"> DE Construction
	<ul style="list-style-type: none"> Disruption of power supply 	<ul style="list-style-type: none"> Work schedule 	<ul style="list-style-type: none"> Daily 	<ul style="list-style-type: none"> DE Construction
	<ul style="list-style-type: none"> Violation of labour standards 	<ul style="list-style-type: none"> Labour laws are being followed Welfare facilities are available 	<ul style="list-style-type: none"> Monthly 	<ul style="list-style-type: none"> DE Construction

Guidelines for environment monitoring during construction phase				
Activity / Issues	Potential Impacts	Parameter to be monitored	Measurement & frequency	Monitoring Responsibility
Erection of poles, laying of lines and replacement of transformers	▪ Increase in airborne fugitive dust	▪ Number of complaints from neighbours / local authorities, if any.	▪ Daily review during construction period	▪ Construction contractor, Social and Environment Member of the Utility
	▪ Increase in noise pollution	▪ Number of complaints from neighbours / local authorities, if any.	▪ Daily review during construction period	▪ Construction contractor, Social and Environment Member
	▪ Soil / water contamination due to spillage / leakage of oil	▪ Visual monitoring of storage arrangements ▪ Incidents of spillages at site. ▪ Number of complaints from neighbours / local authorities, if any.	▪ Daily review during construction period	▪ Construction contractor, Social and Environment Member
	▪ Impact on drainage patterns	▪ Visual monitoring of area within and around subproject location	▪ Daily during construction period	▪ Construction contractor, under guidance of the Social and Environment Member
	▪ Impact on worker / community health and safety	▪ Use of personal protective equipment (PPEs) by workers ▪ Presence of cautionary signboards at appropriate locations ▪ Availability of first aid equipment	▪ Daily for safety equipment ▪ At the time of initiation of work at each site.	▪ Construction contractor and AE

In addition to the above, routine monitoring will be carried-out to ensure that:

- All personnel at the project sites are provided with personal protective equipment like helmets, goggles, safety shoes, ear plugs, hand gloves etc. by the contractor.
- Suitable first aid facilities for handling emergency situation like fire, explosion, electrocution, etc. are provided at the work and camp sites by the contractor.

- The construction workers, supervisors and engineers are properly trained and qualified.
- The construction sites are access controlled.

Monitoring during operation

The following table presents guideline for monitoring of environmental parameters during operation phase.

Guidelines for social monitoring during operation phase				
Activity / Issues	Potential Impacts	Parameter to be monitored	Measurement & frequency	Monitoring Responsibility
Operation and maintenance of HVDS	<ul style="list-style-type: none"> ▪ Impact on worker health and safety – possibility of electrocution, falling from height, and exposure to magnetic fields 	<ul style="list-style-type: none"> ▪ Use of safety equipment by workers ▪ Presence of signboards at appropriate locations ▪ Adequate safety standards 	<ul style="list-style-type: none"> ▪ Weekly 	<ul style="list-style-type: none"> ▪ DE Operations
	<ul style="list-style-type: none"> ▪ Impact on community health and safety due to exposure to electric current 	<ul style="list-style-type: none"> ▪ Signboards / instructions are displayed at appropriate places 	<ul style="list-style-type: none"> ▪ Weekly for signboards 	<ul style="list-style-type: none"> ▪ DE Operations
	<ul style="list-style-type: none"> ▪ Disruption of power supply 	<ul style="list-style-type: none"> ▪ Work schedule 	<ul style="list-style-type: none"> ▪ Daily 	<ul style="list-style-type: none"> ▪ DE Operations

Guidelines for environmental monitoring during operation phase				
Activity / Issues	Potential Impacts	Parameter to be monitored	Measurement & frequency	Monitoring Responsibility
Operation and maintenance of HVDS	<ul style="list-style-type: none"> ▪ Soil / water contamination due to spillage / leakage of hazardous chemicals and oil 	<ul style="list-style-type: none"> ▪ No. of incidents of leak / spillage ▪ Availability and health of secondary containment ▪ Availability of spill control kit / saw dust buckets 	<ul style="list-style-type: none"> ▪ During daily rounds 	<ul style="list-style-type: none"> ▪ DE Operations

	<ul style="list-style-type: none"> ▪ Soil / water contamination due to spillage / leakage of oil from transformer 	<ul style="list-style-type: none"> ▪ No. of incidents of leak ▪ No. of user complaints 	<ul style="list-style-type: none"> ▪ During routine maintenance 	<ul style="list-style-type: none"> ▪ DE Operations
	<ul style="list-style-type: none"> ▪ Risk of fire hazards due to proximity of tree branches 	<ul style="list-style-type: none"> ▪ Visual inspection of unsafe trees 	<ul style="list-style-type: none"> ▪ Once every month for unsafe trees (and as directed by field engineer) 	<ul style="list-style-type: none"> ▪ DE Operations
	<ul style="list-style-type: none"> ▪ Impact on worker / community health and safety 	<ul style="list-style-type: none"> ▪ Use of personal protective equipment (PPEs) by workers ▪ Presence of cautionary signboards at appropriate locations 	<ul style="list-style-type: none"> ▪ Daily for safety equipment ▪ Weekly for other measures 	<ul style="list-style-type: none"> ▪ Construction contractor and AE

8. Training and Capacity Building

Training and development of employees is an integral part for implementation of ESMP. Training needs identification has been carried out at corporate and field level, based on which focused training modules are suggested for:

- Strengthening in-house corporate level capacity and the capacities of the field offices to implement the provision of ESMP.
- Creating Awareness, providing the tools for implementation of Environmental and Social Policy, and accompanying set of management procedures

Environment and social member and Field office are key stakeholders identified for implementation of ESMPs. The training programs, identified in the table below, are to be conducted, at the corporate level, with the help of local or national training institutions and experts in various aspects of environmental and social management.

Suggested Sessions	Target Audience
EA & SA process	Environment and Social Member
Formulate and Implement ESMP	Environment and Social Member
ESMF & project cycle	Environment and Social Member
Awareness of Central/State laws, policies on environment and social aspects	Environment and Social Member
Monitoring the implementation of ESMP	Environment and Social Member

Trainings will be undertaken at the corporate level as identified in this document (which are in line with the training needs identified in the ESMF).

9. Cost and Budget

The costs incurred to implement the various requirements of the ESMP are budgeted and adequate financial provisions are required to meet the management measures to be undertaken to mitigate the impacts as underlined in this ESMP document. The tentative cost estimates for environmental and social management are provided below:

	Item	Cost per utility (in INR)	Assumptions
1.	Management of Social Impact	3,78,050	For crop damages during HVDS work and Damage to any structure, road, any other public utility like water pipes etc.
2.	Management of Environment impact	50,000	Secondary containment, spill kit, tools for handling chemical/oil containers
3.	Monitoring		Monitoring will be undertaken by employees and hence no additional cost
4.	Training and Capacity Building		Part of training cost of the overall proposed investment.
5.	GRM (including spend on publicity)		Mechanism in place. Need based mechanism will be made as and when required.
Total:		4,28,050	

10. Consultations

Consultations were undertaken with the farmers in the project area to understand their concerns and perceptions regarding the rural HVDS project. The number of consultations undertaken are provided below:

Summary table of consultations

Date	Name of Place	No. of attendees
7 July'16 (West Godavari)	Amberpeta Village	04
	Nallamadum Village	17
	Yerngudam Village	19
8 July'16 (East Godavari)	Muggalla Village	41
	Alamuru Village	16
	Gandepalli Village	18
11 July'16 (Vishakhapatnam)	Etikoppaka Village	17
	Makavarapalem	15
	Chodauram	15
	Padmanabham Village	07
12 July'16 (Vijaynagram)	Akkivaram Village	06
	Golapeta Village	14
	Ramabhadrapuram Village	33
	Paradhi Village	25
13 July'16 (Srikakulam)	Bejjipuram Village	17
	Arangi Peta Village	10
	Mabugam Village	14
	Maikivalasa	13

The checklist for the group discussion is provided in Annexure 3. The key points discussed in the consultations are provided below:

- **Key challenges with LVDS**

The consultations revealed that the farmers face various challenges with the LVDS system ranging from low voltage problems, power failures, recurrent interruptions, exposure to accidents and theft.

The major problem reported was low voltage and voltage fluctuations; particularly for connections at the tail end of a LT line. Due to the low voltage, water pressure is low and most farmers claimed that they were unable to irrigate their fields sufficiently in the 7 hours of power available in the day. Further, due to voltage fluctuations, motors connected to the LT lines would frequently burn out leading to additional costs for the farmer; both due to repair / replacement costs and due to wages that have to be paid to agricultural labour even when

water is not available. Hence, in addition to not being able to irrigate their fields, farmers also bear an additional economic burden.

Another issue highlighted by the respondents was the frequent overloading of the line which would lead to the mother transformer failing frequently. Due to poor voltage, some farmers use higher capacity motors than permitted causing overloading of the line. Additionally, the long length of the uninsulated LT line makes it easier for unauthorized connections to be hooked to the line which also contributes to overloading. As multiple motors are connected to one transformer, when the transformer fails all connections on that line are affected. As no individual person has ownership of the transformer, individual farmers are not motivated to report the issue or take the onus of having the fault rectified.

- **Benefits of HVDS**

All the respondents were interested in getting HVDS as soon as possible. Based on their observation of those who already have an HVDS connection, the respondents believe that the problems they face with the LVDS connection will be fixed if they get a main reason is that problems that people are facing with the current LVDS will be fixed if they get an HVDS connection. Specifically, the respondents specified the following advantages of HVDS: better voltage profile, higher water pressure (hence better irrigation of the fields), fewer failures of their motors and the transformers, and reduction in overloading and theft due to individual responsibility for the transformer. Further, if there is a fault with any one motor or transformer, it will not affect all the farmers in the area but only one or two. Respondents felt that as a result of these benefits, they would have a better yield.

Due to the perceived benefits, the respondents claimed that they would be willing to provide access for poles and maintain a RoW corridor for the HT lines. However, some requested that if possible the poles be placed on the farm bunds and not the fields.

- **Disadvantages of HVDS**

There were no striking disadvantages that farmers mentioned about HVDS. Respondents only requested that as far as possible, construction work to take place in off season; and that AB switches be provided for each transformer so that repair work can take place during the time power is being supplied without affecting other connections on the line.

The detailed report on village wise consultation are provided in Annexure 4

Annexure 1 – 33/11 Kv Substations Maps

Maps of 33/11 KV sub-stations with connected 33KV lines in districts covered by APEPDCL is provided below.

Figure 1:33/11KV Substations with Connected 33 KV lines in East Godavari District

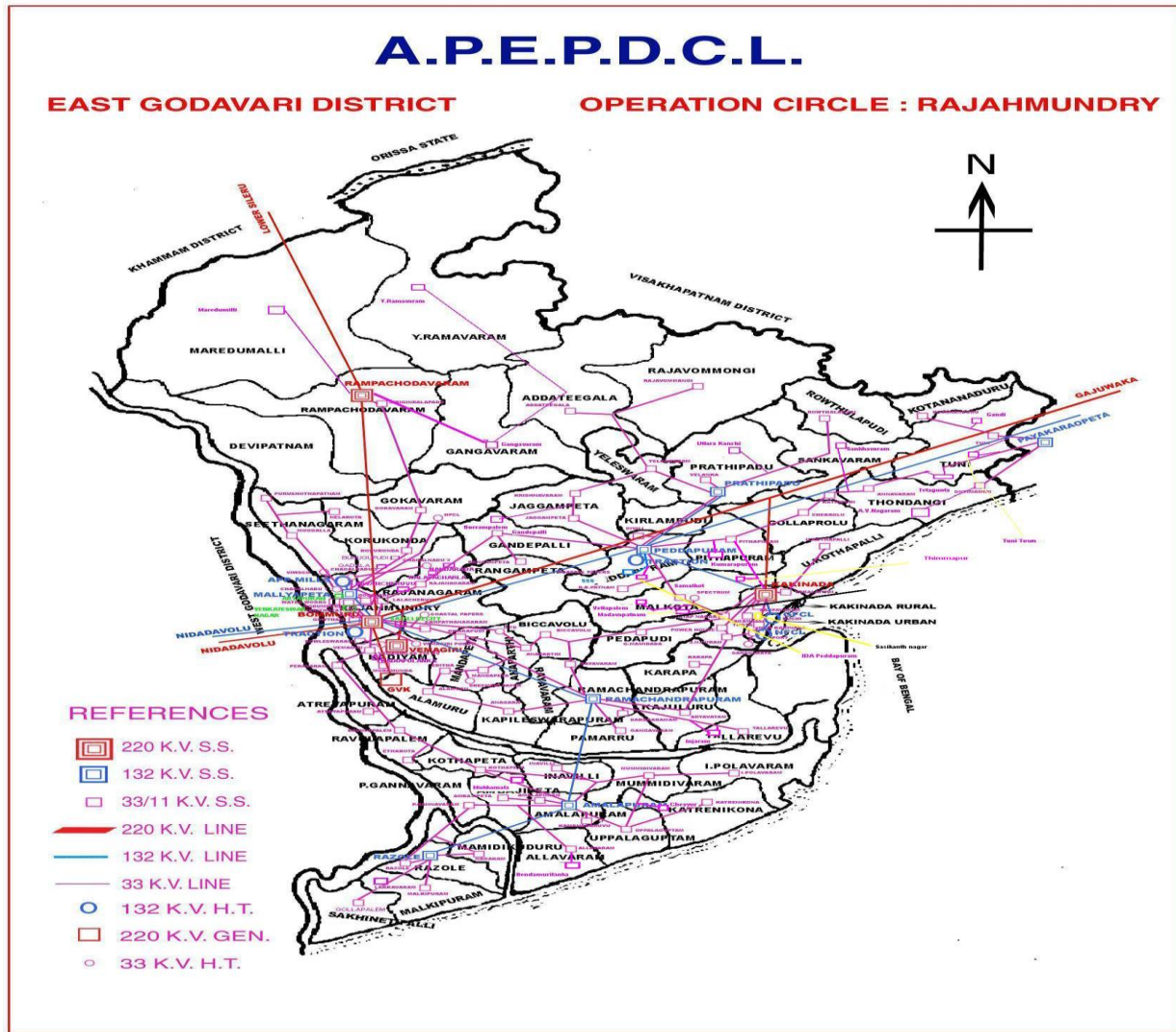


Figure 2: 33/11KV Substations with Connected 33 KV lines in West Godavari District

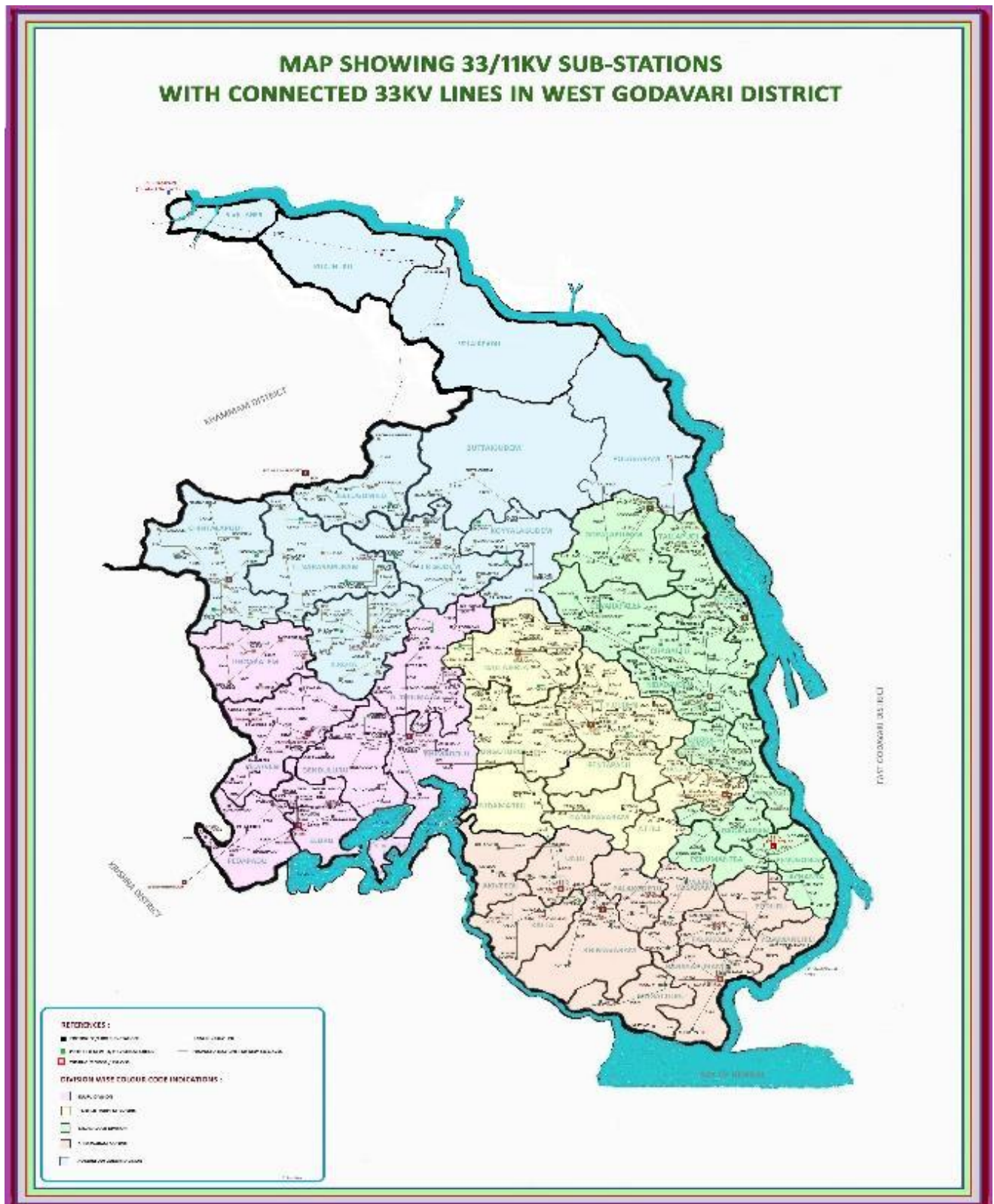


Figure 3: 33/11KV Substations with Connected 33 KV lines in Visakhapatnam District

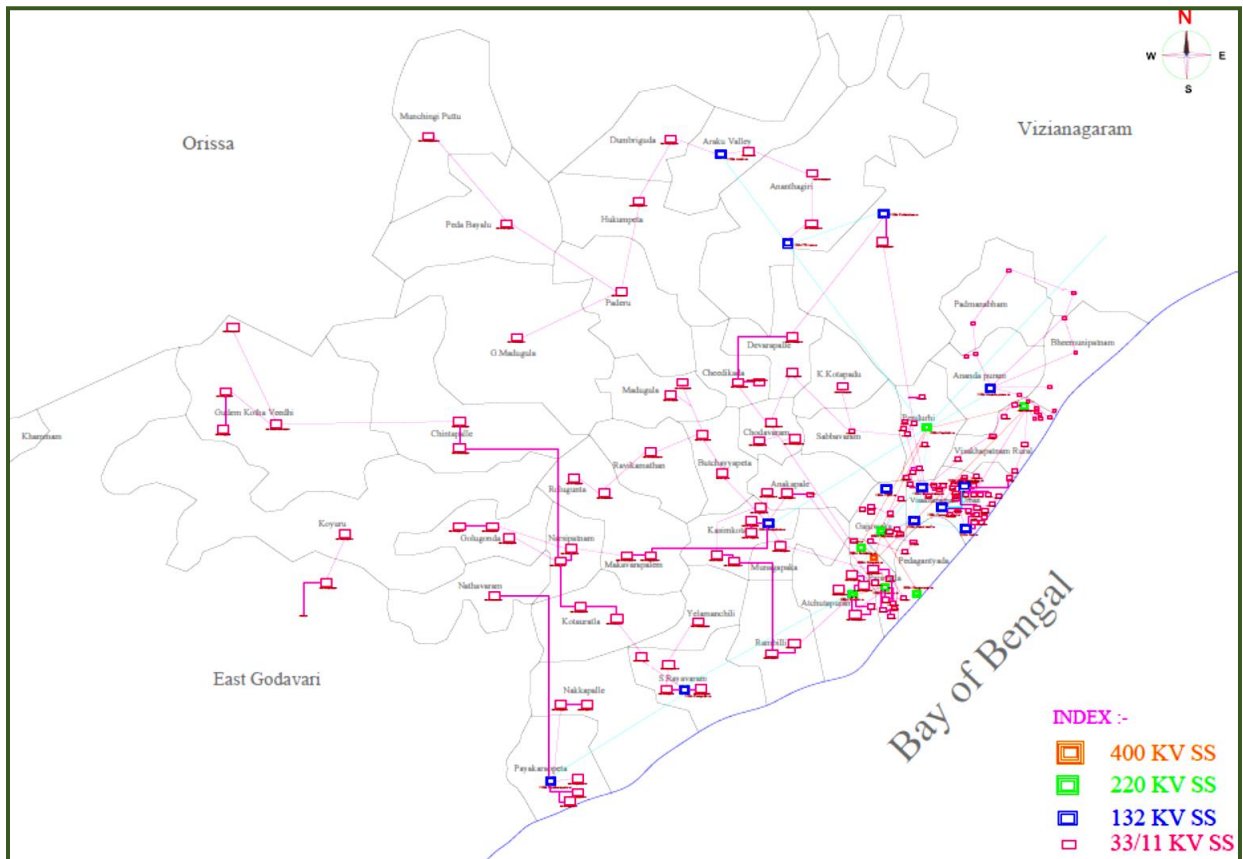
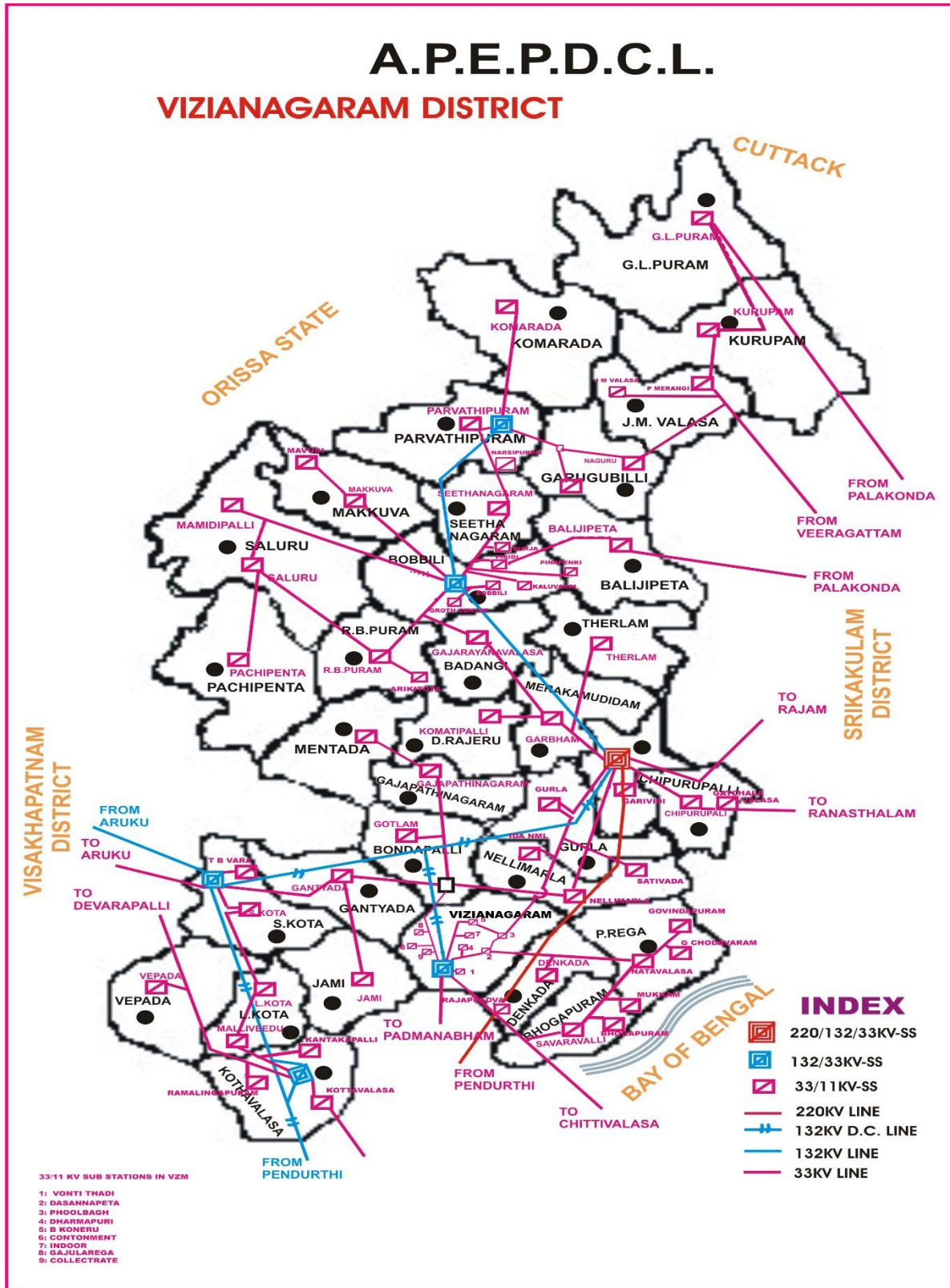


Figure 4: 33/11KV Substations with Connected 33 KV lines in Vizianagaram District



Annexure 2 – Environment and Social Management Plan (ESMP)

Typical environmental “general impacts” during “construction phase” and corresponding mitigation measures for HVDS subprojects.						
Activity / Issues	Potential Impacts	Proposed Mitigation and Enhancement Measures	Parameter to be monitored	Measurement & frequency	Monitoring Responsibility	Implementation Schedule
Erection of poles, laying of lines and replacement of transformers	<ul style="list-style-type: none"> Increase in airborne fugitive dust 	<ul style="list-style-type: none"> Overall the anticipated impact is insignificant and of a short duration. However, sprinkling of water around the construction and material handling area is recommended to minimize the fugitive dust. Maintain a Complaint Register at site 	<ul style="list-style-type: none"> Number of complaints from neighbours / local authorities, if any. 	<ul style="list-style-type: none"> Daily review during construction period 	<ul style="list-style-type: none"> Construction contractor, Social and Environment Member of the Utility 	<ul style="list-style-type: none"> During construction
	<ul style="list-style-type: none"> Increase in noise pollution 	<ul style="list-style-type: none"> No construction activity to be carried out during night time Regular and effective maintenance of construction equipment Maintain a Complaint Register at site 	<ul style="list-style-type: none"> Number of complaints from neighbours / local authorities, if any. 	<ul style="list-style-type: none"> Daily review during construction period 	<ul style="list-style-type: none"> Construction contractor, Social and Environment Member 	<ul style="list-style-type: none"> During construction
	<ul style="list-style-type: none"> Soil / water contamination due to spillage / leakage of oil 	<ul style="list-style-type: none"> Construction materials should be stored in covered areas to ensure protection from any potential damages during handling and storage. Avoid storage along water bodies, if any. Maintain a Complaint Register at site 	<ul style="list-style-type: none"> Visual monitoring of storage arrangements Incidents of spillages at site. Number of complaints from neighbours / local authorities, if any. 	<ul style="list-style-type: none"> Daily review during construction period 	<ul style="list-style-type: none"> Construction contractor, Social and Environment Member 	<ul style="list-style-type: none"> During construction

	<ul style="list-style-type: none"> Impact on drainage patterns 	<ul style="list-style-type: none"> Regular monitoring and clearing of natural drains / low lying areas along the project site No stacking of construction debris and material along the natural drains / low lying areas. 	<ul style="list-style-type: none"> Visual monitoring of area within and around subproject location 	<ul style="list-style-type: none"> Daily during construction period 	<ul style="list-style-type: none"> Construction contractor, under guidance of the Social and Environment Member 	<ul style="list-style-type: none"> During construction
	<ul style="list-style-type: none"> Impact on worker / community health and safety 	<ul style="list-style-type: none"> All personnel at the project sites are provided with personal protective equipment like helmets, goggles, safety shoes, ear plugs, hand gloves etc. Suitable first aid facilities for handling emergency situation like fire, explosion, electrocution, etc. are provided at the work and camp sites. The construction workers, supervisors and engineers are properly trained and qualified. The construction sites are access controlled. Cautionary signboards / instructions to be displayed at appropriate places Ensure access roads are maintained Compliance with labour laws 	<ul style="list-style-type: none"> Use of personal protective equipment (PPEs) by workers Presence of cautionary signboards at appropriate locations Availability of first aid equipment 	<ul style="list-style-type: none"> Daily for safety equipment At the time of initiation of work at each site. 	<ul style="list-style-type: none"> Construction contractor and AE 	<ul style="list-style-type: none"> During construction
Typical environmental “general impacts” during “operation phase” and corresponding mitigation measures for HVDS subprojects.						
Operation and maintenance of HVDS	<ul style="list-style-type: none"> Soil / water contamination due to spillage / leakage of hazardous chemicals and oil during repair and maintenance 	<ul style="list-style-type: none"> Use of appropriate tools for handling of chemical / oil containers. Avoid storage along drainage / streams, if any. Provision of spill control kit / saw dust buckets at storage site to control spillage 	<ul style="list-style-type: none"> No. of incidents of leak / spillage Availability and health of secondary containment Availability of spill control kit / saw dust buckets 	<ul style="list-style-type: none"> During daily rounds 	<ul style="list-style-type: none"> DE Operations 	<ul style="list-style-type: none"> During Operations Phase

<ul style="list-style-type: none"> ▪ Soil / water contamination due to spillage / leakage of oil from transformer 	<ul style="list-style-type: none"> ▪ The chemicals and oil containers should be safely barricaded to ensure protection from any potential damages during storage. ▪ Provision of spill control kit / saw dust buckets at storage site to control spillage ▪ Immediate communication of any incident of transformer oil leakage 	<ul style="list-style-type: none"> ▪ No. of incidents of leak ▪ No. of user complaints 	<ul style="list-style-type: none"> ▪ During routine maintenance 	<ul style="list-style-type: none"> ▪ DE Operations 	<ul style="list-style-type: none"> ▪ During Operation & Maintenance Phase
<ul style="list-style-type: none"> ▪ Risk of fire hazards due to proximity of tree branches 	<ul style="list-style-type: none"> ▪ Maintaining RoW by pruning / cutting unsafe trees in RoW corridor 	<ul style="list-style-type: none"> ▪ Visual inspection of unsafe trees 	<ul style="list-style-type: none"> ▪ Once every month for unsafe trees (and as directed by field engineer) 	<ul style="list-style-type: none"> ▪ DE Operations 	<ul style="list-style-type: none"> ▪ During Operations and Maintenance Phase
<ul style="list-style-type: none"> ▪ Impact on worker / community health and safety 	<ul style="list-style-type: none"> ▪ All maintenance personnel are provided with personal protective equipment like helmets, goggles, safety shoes, ear plugs, hand gloves etc. ▪ The maintenance personnel are properly trained and qualified. ▪ Cautionary signboards / instructions to be displayed at appropriate places 	<ul style="list-style-type: none"> ▪ Use of personal protective equipment (PPEs) by workers ▪ Presence of cautionary signboards at appropriate locations 	<ul style="list-style-type: none"> ▪ Daily for safety equipment ▪ Weekly for other measures 	<ul style="list-style-type: none"> ▪ DE Operations 	<ul style="list-style-type: none"> ▪ During Operation and Maintenance phase

Social Management Plan

Typical “general impacts” during “pre-construction phase” and corresponding mitigation measures for transmission and distribution projects.						
Activity / Issues	Potential Impacts	Proposed Mitigation and Enhancement Measures	Parameter to be monitored	Measurement & frequency	Monitoring Responsibility	Implementation Schedule
Location of overhead line and poles for HVDS	<ul style="list-style-type: none"> Social inequities 	<ul style="list-style-type: none"> Ensure that small and marginal farmers also receive project benefit. All pump sets on a LT feeder line are upgraded to HVDS connection irrespective of socio-economic status of the farmer 	<ul style="list-style-type: none"> Route alignment and HVDS sketches 	<ul style="list-style-type: none"> Once 	<ul style="list-style-type: none"> DE Construction 	<ul style="list-style-type: none"> At time of detailed survey for route alignment
	<ul style="list-style-type: none"> Damage to socially / culturally sensitive and historical sites 	<ul style="list-style-type: none"> Careful selection of site and route alignment to avoid encroachment of socially, culturally and archaeological sensitive areas (e.g. sacred groves, graveyards, religious worship place, monuments etc.) 	<ul style="list-style-type: none"> Route alignment and HVDS sketches 	<ul style="list-style-type: none"> Once 	<ul style="list-style-type: none"> DE Construction 	<ul style="list-style-type: none"> At time of detailed survey for route alignment
Typical “general impacts” during “construction phase” and corresponding mitigation measures for transmission and distribution projects.						
Erection of poles, laying of lines and replacement of transformers	<ul style="list-style-type: none"> Crops and trees may be damaged during the construction phase and also for the maintenance of the RoW; however this is unlikely as construction is undertaken during non-harvesting season and the 	<ul style="list-style-type: none"> Civil work to take place in non-agricultural season to minimize. Where possible, clearance of 2.6 m between the conductor (11 KV) and tree should be maintained through pruning the trees (There is no need to cut the tree). Appropriate compensation will be provided for tree and crop damage 	<ul style="list-style-type: none"> Work Schedule Route alignment and HVDS sketches Records for payment of compensation 	<ul style="list-style-type: none"> Once at the start of civil work Monthly 	<ul style="list-style-type: none"> DE Construction 	<ul style="list-style-type: none"> During construction

	lines are laid along the bunds					
	<ul style="list-style-type: none"> ▪ Impact on worker health and safety – possibility of electrocution, falling from height 	<ul style="list-style-type: none"> ▪ Contractor should follow defined protocols for health & safety ▪ Safety equipment should be provided to workers ▪ Sign boarding of hazardous areas / materials should be done 	<ul style="list-style-type: none"> ▪ Presence of documented health & safety protocols ▪ Use of safety equipment by workers ▪ Presence of signboards at appropriate locations 	<ul style="list-style-type: none"> ▪ Daily for safety equipment ▪ Weekly for other measures 	<ul style="list-style-type: none"> ▪ DE Construction 	<ul style="list-style-type: none"> ▪ During construction
	<ul style="list-style-type: none"> ▪ Impact on community health and safety due to exposure to electric currents, hazardous materials, electromagnetic fields etc. 	<ul style="list-style-type: none"> ▪ Display danger signs at appropriate locations ▪ Display boards with precautions to be adopted by consumers, owners, occupiers, electrical contractors, electric workmen and suppliers ▪ Display of instructions for resuscitation of persons suffering from electric shock. 	<ul style="list-style-type: none"> ▪ Signboards / instructions are displayed at appropriate places 	<ul style="list-style-type: none"> ▪ Weekly for signboards 	<ul style="list-style-type: none"> ▪ DE Construction 	<ul style="list-style-type: none"> ▪ During Construction
	<ul style="list-style-type: none"> ▪ Disruption of power supply 	<ul style="list-style-type: none"> ▪ Agriculture power is provided for 7 hours a day. Works should be undertaken during the rest of the day so power supply is not affected. 	<ul style="list-style-type: none"> ▪ Work schedule 	<ul style="list-style-type: none"> ▪ Daily 	<ul style="list-style-type: none"> ▪ DE Construction 	<ul style="list-style-type: none"> ▪ During Construction
	<ul style="list-style-type: none"> ▪ Violation of labour standards 	<ul style="list-style-type: none"> ▪ Contractor should follow labour standards as per applicable laws such as minimum wages, equal pay for equal work, no child labour etc. 	<ul style="list-style-type: none"> ▪ Labour laws are being followed ▪ Welfare facilities are available 	<ul style="list-style-type: none"> ▪ Monthly 	<ul style="list-style-type: none"> ▪ DE Construction 	<ul style="list-style-type: none"> ▪ During Construction

Typical “general impacts” during “operation and maintenance phase” and corresponding mitigation measures for transmission and distribution projects.						
Operation and maintenance of HVDS	<ul style="list-style-type: none"> Impact on worker health and safety – possibility of electrocution, falling from height, and exposure to magnetic fields 	<ul style="list-style-type: none"> Safety equipment should be provided to workers Sign boarding of hazardous areas / materials should be done Careful design Safety awareness Emergency planning Medical facilities 	<ul style="list-style-type: none"> Use of safety equipment by workers Presence of signboards at appropriate locations Adequate safety standards 	Weekly	DE Operations	During maintenance of HVDS
	<ul style="list-style-type: none"> Impact on community health and safety due to exposure to electric current 	<ul style="list-style-type: none"> Display danger signs at appropriate locations Display boards with precautions to be adopted by consumers, owners, occupiers, electrical contractors, electric workmen and suppliers Display of instructions for resuscitation of persons suffering from electric shock. 	<ul style="list-style-type: none"> Signboards / instructions are displayed at appropriate places 	Weekly for signboards	DE Operations	During maintenance of HVDS
	<ul style="list-style-type: none"> Disruption of power supply 	<ul style="list-style-type: none"> Agriculture power is provided for 7 hours a day. Maintenance should be undertaken during the rest of the day so power supply is not affected. Provision of AB switches for the transformers to enable maintenance of the transformer without affecting power supply 	<ul style="list-style-type: none"> Work schedule 	Daily	DE Operations	During maintenance of HVDS

Annexure 3 – Checklist for Consultations

Questions for Discomm Staff

- Overall explanation of the project
 - What work is involved (replacing of lines, erecting additional poles, replacing distribution transformers etc.)?
 - Would the work lead to any inconvenience to the users – power outage, obstruction of paths?
 - Are there any risks to users / workers during conversion process (risk of electrocution etc.)?

- Are any poles or transformers being put up on private land?
 - If yes, what is the process for obtaining permission?

- Have any discussions been held with the covered farmers regarding replacing of the lines?
 - If yes, when did the discussion take place; who were part of the discussions; what was the view of the farmers regarding HVDS etc.?
 - If no, do they plan to hold discussions with the farmers?

- What are the advantages of the HVDS; what benefits will the users get?

- Are there any disadvantages of HVDS?
 - For users
 - For maintenance staff?

- What are the challenges you face in implementing the project?

Questions for farmers

- What crops do you grow (season wise)?
- Average size of landholding in the area?
- Do you have access to irrigation or do you depend on rain?
- What sources of irrigation do you have access to?
- Do farmers have access to agricultural pump sets in the village?
 - If yes, how often do you use your agriculture pump set?
- What is the duration of usage at one time?
- Do you have an electricity connection for the pump set?
- Are there any challenges with the electricity supply? Power outages, low voltage, theft of electricity, transformer breakdown etc.
 - If yes, does it affect your agriculture in any way?
- What do you do if there is no electricity to run the pump?
- How do you get water for irrigation if the pump is not working?
- Do you think the HVDS system will benefit you?
 - If yes, what are the benefits?
- Do you think there are any disadvantages to the HVDS system?

Annexure 4 – Details of Consultations

A. Consultations in West Godavari District

1. Meeting with APEPDCL Team in Eluru on 7 July 2016

Overall Project Description

- HVDS scheme includes replacing 415 volt lines with 11kv lines, adding intermediate poles where required, repairing damaged poles, and changing existing 63kva or 100kva transformers with individual transformers of either 16kva, 25kva or 40kva.
- Work on HVDS started in 2006
- 90% of the work is replacing existing LT lines. In the remaining 10% of cases, new feeder lines will be taken if the bore well to be connected is close to an existing 11kv line (in these cases it is easier to add a new line then to replace lengthy LT lines).
- In LVDS, an 11kv line is connected to a mother transformer (63kva or 100kva) from which connections are given for multiple agri pump sets. The LT lines connecting the transformer to the pump sets can be 203 km long. In HVDS, there are transformers (16kva, 25kva or 40kva depending on sanctioned voltage of pumps) for each pump sets. These pump sets are connected to the transformer by a LT line of not more than 192 mts. If there are 2 pumps in close proximity, then a 25kva or 40kva transformer is put and both are connected to it.
- Agriculture power is provided for 7 hours a day; replacement of LT lines is undertaken during the rest of the day so power supply is not affected due to the work. It can take 2-3 months to replace all pump sets connected to one feeder line.
- Crop damage is limited as most of the work takes place in non-agricultural season.
- Poles and lines are placed on farmers' land but they are happy with this as they get power supply.



Benefits of HVDS

- In LVDS due to poor voltage the motors of the pump sets would burn out frequently, with HVDS this is not a problem as the voltage profile improves.
- The water pressure improves as there is no voltage fluctuation so farmers are able to irrigate more land than they could before even with the same power pump.
- There is less overloading of lines as individual farmers are responsible for their own transformer and they would not use faulty motors or let others connect to their transformers.
- Lower line losses are also there which is beneficial for APEPDCL

Challenges in implementing HVDS

- Work is difficult during rainy season and it is mainly done in summers. Further, paddy fields can only be taken up during the off season as flood irrigation makes it impossible to install poles.
- It is difficult to access the farms and transport poles to them
- In very rare cases (5-10%) there could be a problem in securing site clearance for poles. This occurs if the connection to one farmer's land requires poles being put in a second farmer's land. However, in most cases this is resolved by discussions between the farmers and APEPDCL staff. In the rarest of rare cases where there is a dispute over the land ownership the village revenue officer is involved.

2. Meeting with farmers at Amberpeta Village - Eluru on 7 July 2016

HVDS work is ongoing in this location. We interacted with 4 farmers who either had already received HVDS connection or were in the process of getting a connection.

Problems with LVDS

- With LVDS connections there were a lot of interruptions / fluctuations in voltage. This would lead to the motor burning out. Motors had to be replaced / repaired 2-3 times a year because of this and it costs INR 10,000 to rewire a motor once.
- Transformers would also fail 1-3 times a year because of overloading. It would take 2 days to fix a minor problem and up to a week to fix a major problem. There is no back up to run the pumps if the transformer failed and therefore agriculture suffered.
- As there many electric connections were from one transformer in LVDS, the voltage per pump set was low. If everyone was using their motor then voltage would fall even more, especially at the tail end. As the transformer was common it was difficult to monitor the load on it.
- If the transformer failed, then everyone who had a connection to the transformer suffered as they would all lose power for as long as it took to fix the transformer. It would also take longer to raise a complaint and have the problem rectified as it would require coordination between all the people who have a connection to that transformer.
- Water pressure was poor; water would not flow steadily but in spurts. As a result even in 7 hours of power supply they were not able to fully irrigate their fields.



Benefits of HVDS

- As everyone has their own independent transformer there is no problem of overloading and voltage is better.
- Farmers feel more responsible for the transformer as it is their personal property. They ensure that their motor is working properly and there is no overloading.
- If there is a problem with the transformer the farmer can directly approach APEPDCL without needing to coordinate with any other farmer.

- If there is a fault in the transformer only that farmer is effected and not everyone. In such cases a farmer can borrow water from a neighbour until his transformer is repaired. This was not possible earlier as everyone would be without power.
- Water pressure is steady now and in 7 hours the farmers are able to fully irrigate their land. In one case, the farmer claimed he could switch his pump off before 7 hours as there was sufficient water. There is 30% increase in water pressure.
- Small farmers who do not have bore wells also benefit as farmers with bore wells are more willing to share water now that they have sufficient supply.

Disadvantages of HVDS

- None. Farmers were keen to have HVDS implemented as soon as possible
- Have no problem with poles being put on their land or in maintaining clearance for the 11kv lines

3. Meeting with farmers at Nallamadum Village - Tadepalligudem on 7 July 2016

HVDS work was initiated 10 years ago and approximately 70% of farmers are covered. The remaining are to be covered under the World Bank scheme. Group of 17 farmers were interviewed of which some had HVDS while others were yet to be covered.

Problems with LVDS

- With LVDS connections there were a lot fluctuations in voltage leading to the motor burning out. Motors had to be replaced / repaired 2-3 times a year at a cost of INR 20,000 per rewinding (motors in this village were 20hp as opposed to 12hp in Eluru and hence cost was higher). Motor failure prevents farmers from irrigating their fields in a timely manner leading to losses in crop.
- Water pressure is poor, especially for those furthest away from the transformers. If everyone uses their motor, the motors of those further away from the transformer do not work. These farmers need to depend on their relationship with other farmers connected to the same transformer to schedule usage.
- Due to overloading the fuse of the transformer fails once a week. The fuse cannot be replaced during the time power is supplied as the line needs to be shut down. Hence replacement takes place in off-power time and the farmers loose a day of water. Further, if the transformer itself is burnt then it takes 2-3 days to fix.
- If the transformer fails during harvest time then it can damage the entire crop. One farmer claimed to have lost his crop due to this.
- As it is a common transformer, it is difficult to prevent people from overloading it. Can't stop people from adding on to the transformer (theft).



Benefits of HVDS

- Prevents crop damage as the motor will not fail as often due to good voltage profile and steady supply of water.
- Farmers with HVDS claimed they now had sufficient water to irrigate their fields while earlier it was barely enough. With HVDS it is possible to cultivate more land with the same pump due to increased water pressure. However, there is no change in duration the pump is used, they run it for 7 hours.
- Farmers are more responsible as they have individual transformers. Also overloading is not a problem. If one transformer fails everyone does not suffer.

Disadvantages of HVDS

- Even though 11kv line requires more clearance, farmers are willing to cut / prune their trees as the benefit from HVDS outweighs the negligible loss.
- Farmers did mention that they may need higher power motors in the future as ground water depth increases. Therefore they suggested that the individual transformers provided under HVDS be of higher voltage to provide flexibility for future enhancement of motor capacity.
- Farmers also said that the transformers should have AB switches to enable repairs to be made without shutting off the entire power supply. APEPDCL informed the farmers that while HVDS transformers installed under earlier schemes did not have such switches, the proposed scheme does provide for them.

4. Meeting with farmers at Yerngudam Village - Nidadavolu on 7 July 2016

HVDS work was initiated 10 years ago and approximately 30% of farmers are covered. The remaining are to be covered under the World Bank scheme. Group of 19 farmers were interviewed of which some had HVDS while others were yet to be covered.

Problems with LVDS

- With LVDS there is a common transformer for multiple users. In this scenario it is difficult to coordinate with people when the transformer fails. No one wants to take the responsibility of reporting the problem.
- It is difficult to prevent overloading of the transformer; no matter how high the capacity of the transformer, people will overload it as it is a collective property and no one person is responsible for it. Theft is also more in LVDS
- With collective transformers, it is also difficult to force someone to cut / trim their trees if they are coming in way of the lines. This effects everyone.
- If there is a failure of the transformer everyone is effected and it cannot be repaired while power supply is there; repairs are done in the off-power time and hence the farmers lose water for that day.
- Motors fail about 2 times a year due to voltage issues and it costs approx. INR 12,000 to repair a motor. More motors are damaged when they are connected to a common transformer. If one motor on the transformer is faulty it can blow the transformer effecting everyone.
- Voltage is low, especially for users at the tail end. Due to low voltage, farmers schedule their usage to ensure that their motors run.
- Due to low voltage a vicious cycle forms. Farmers install higher power pumps to deal with low voltage and this in turn reduces the voltage leading farmers to install yet higher power pumps and so on.

Benefits of HVDS

- Every farmer has an individual transformer so there is less load and better voltage. Easier to prevent overload / theft as each farmer is responsible for his transformer.
- As farmers will be more responsible they will also not use motors that exceed the sanctioned load limit. Farmers will also take better care of their motors to ensure a faulty motor does not blow their transformer. Theft of electricity is also eliminated.
- If someone is not willing to cut / trim trees on their land it will effect only their transformer and not everyone. Similarly if a transformer fails it will effect only one farmer and not everyone.
- As voltage is better farmers do not need to schedule their usage but can irrigate their land based on need.
- It is easier to replace an individual transformer as it is the individual farmer's responsibility to ensure it is done.
- Small farmers will benefit the most as they have only one motor and if that fails the cost for them is huge. Large farmers may have up to 5-6 motors so even if one fails they can manage. Also, large farmers are more influential so they can get a better rate for repair of their motors; small farmers do not have such influence and hence pay a higher rate for repair of motors.
- Clearance under the LT line has to be maintained by the farmers themselves while the clearance under the HT line will be maintained by EPDCL

Disadvantages of HVDS

- No disadvantages, want HDVS to be implemented as soon as possible. Only issue is to ensure there are AB switches to allow repairs to take place while power supply is on. APEPDCL clarified that under the scheme AB switches would be provided.

B. Consultations in East Godavari District

5. Meeting with APEPDCL Team in Rajahmundry on 8 July 2016

Overall Project Description

- HVDS scheme includes replacing 415 volt lines with 11kv lines, adding intermediate poles where required, repairing damaged poles, and changing existing 63kva or 100kva transformers with individual transformers of either 16kva, 25kva or 40kva.
- 90% of the work is replacing existing LT lines. In the remaining 10% of cases, new feeder lines will be taken if the bore well to be connected is close to an existing 11kv line (in these cases it is easier to add a new line than to replace lengthy LT lines).
- Agriculture power is provided for 7 hours a day but in 3 shifts 2 during the day and one at night. Any repair / replacement work that takes place happens during off-power times
- Poles and lines are placed on farmers' land but they are happy with this as they get power supply. Also, the poles are normally placed along the bunds where no crops are planted; in rare cases the poles need to be put in the middle of the farm land. In one case a farmer objected to poles being put on his land as it would lower the land value and APEPDCL is re-routing the line.

Benefits of HVDS

- In LVDS due to poor voltage the motors of the pump sets would burn out frequently, with HVDS this is not a problem as the voltage profile improves.
- There is less overloading of lines as individual farmers are responsible for their own transformer and they would not use faulty motors or let others connect to their transformers.
- Farmers in areas further from the Godavari in particular benefit as they do not have access to canal irrigation and the ground water level is deeper in these areas. These farmers would often suffer if rains were poor or there was a cyclone. HVDS allows them to plan their irrigation / farming better.

Challenges in implementing HVDS

- No real challenges. Any minor challenge related to the route or site clearance is resolved at the ADE / AE level. In general farmers are very happy with the HVDS and are eager for it to be implemented in their farms.

6. Meeting with farmers at Muggalla Village – Rajahmundry on 8 July 2016

The location has already had 2-3 phases of HVDS implementation. Under the World Bank sanctioned project, APEPDCL aims to cover the remaining farmers in the area. The interaction was with a group of 41 farmers some of whom had HVDS connections and others who had LVDS.

Problems with LVDS

- Earlier with LVDS there was a problem of low voltage; because of the length of the LT lines, motors that were far away from the transformer would not run.
- The low voltage would also cause the motors to burnout frequently.
- Earlier there was theft of energy and unauthorised motors would be added to the same transformer leading to overloading.
- When there are multiple motors connected to one transformer, no one person takes responsibility for the transformer so overloading occurs and it is difficult to coordinate for repairs

Benefits of HVDS

- As people have independent transformers there is greater responsibility.
- Theft of energy has also reduced and unauthorised motors cannot be “hooked” onto the line.
- Water pressure has also improved; however farmers still need to use their motors for the full 7 hours that power is available.
- Better voltage profile is also good for the motors as they will not burnout as often.

Disadvantages of HVDS

- There are no disadvantages related to HVDS specifically; however the farmers made the following comments:
 - Even with HVDS in some cases 3-4 motors are connected to one 40kva transformer. The farmers feel that this again will cause the same problem seen with LVDS; i.e. that no one will take responsibility for the transformer if it develops a fault. They felt it would be better if each motor was given an individual transformer so the farmers would have individual responsibility.

The APEPDCL staff clarified that in the region the motors were very low power 5-7hp as the ground water level is fairly high. Therefore if bore wells were close to each other (within 195m of the transformer), multiple motors could be connected to a 40kva transformer without the voltage being affected.

- While voltage with HVDS is good, the night supply of electricity is not convenient, farmers requested that the night slot be moved to the daytime as this would help them more. APEPDCL staff clarified that this was a government policy and not in their control.
- Farmers did mention that in areas where palm oil trees were cultivated farmers had to cut / prune their trees to maintain clearance for the 11kv lines under HVDS. However, they all stated that this was a small price to pay in comparison to the benefits they receive from the HVDS system. They farmers are willing to negotiate the clearance with APEPDCL wherever required.
- Farmers made a strong request for AB switches to be installed for all HVDS transformers. The AB switch would allow repairs to be made to the transformer during the time power is being supplied. At present if there is a fault with a transformer, it cannot be rectified until the off-power time and this means that farmers will lose the chance to water their fields.
APEPDCL claimed that putting AB switches could lead to more theft of transformer coils as it will be easier to disconnect the transformer. They suggested that one AB switch be provided for 3 transformers instead. When APEPDCL asked the farmers if they were willing to take responsibility of preventing theft once AB switches were installed the farmers stated that they could not take responsibility for government property.
- Farmers also said that at present the same capacity fuse carriers are used for 16kva, 25kva and 40kva transformers. They suggested that higher capacity fuses be used for the 40kva transformers.

7. Meeting with farmers at Alamuru Village – Ramchandrapuram on 8 July 2016

The location has already had 2-3 phases of HVDS implementation. Under the World Bank sanctioned project, APEPDCL aims to cover the remaining farmers in the area. The interaction was with a group of 16 farmers, none of whom had HVDS connections.

Problems with LVDS

- Under LVDS the LT line can be up to 3km long so if any problem occurs along the line it is difficult to identify where the problem is and fix it. Especially if a fault occurs during the night it is impossible to identify where it is and fix it; as a result the farmers lose that slot for watering their fields.
- The main problem with LVDS is the length of the LT line. Voltage at the tail end of a 3km line is very low causing damage to motors. If the motor fails, in addition to not being able to water their fields, they farmers also suffer losses in the form of wages paid to agricultural labour. These labourers are engaged in advance and have to be paid whether there is water for work to take place or not.
- Voltage levels are poor under LVDS and as a result motors burn out frequently (up to 3 times a year). Most motors in the region are 5hp and the cost of repairing them is INR 5,000 each time. Farmers in the region are far from the canal and depend on bore wells for irrigation and hence face a lot of problems if their motors burn out.

- As there are multiple motors connected to one transformer, a fault with one can affect all those connected to the mother transformer. If there is a fault in the transformer it can take 3-4 days to rectify. In this time the farmers cannot water their crop and as a result the fields may dry up leading to loss of entire paddy crop.
- Also, there are many industries in the area and if an industrial transformer develops a fault it is given preference over the agricultural transformers. This means that it takes even longer for agricultural transformers to be fixed.
- In some cases the agriculture and residential loads are mixed; i.e. the same line supplies power for agriculture and for domestic usage in the village. Therefore if there is a problem in the village, the agricultural supply is disrupted to fix it.
- One farmer claimed that when his motor doesn't work he is forced to try and manually irrigate his fields; which is not feasible in reality.

Benefits of HVDS

- All the farmers were interested in HVDS connections. They feel that they will receive better voltage and as a result their motors will not burn out.
- HVDS would also reduce the chance of transformer failure.
- As it is in their own interest to get HVDS they are willing to provide site clearance for poles / lines. While they would prefer that the poles and lines to go through government land, they were willing for their land to be used if needed.

Disadvantages of HVDS

- No disadvantages of HVDS. However, farmers requested that AB switches be provided for every transformer. They said they are willing to take the responsibility for ensuring that there is no theft as the cost of the theft is much higher for the farmers (in terms of losses in agriculture) than it is for the government.

8. Meeting with farmers at Gandepalli Village – Jaggampeta on 8 July 2016

The location has already had 2-3 phases of HVDS implementation. Under the World Bank sanctioned project, APEPDCL aims to cover the remaining farmers in the area. The interaction was with a group of 18 farmers, some of whom have HVDS connections and other who have LVDS connections.

Problems with LVDS

- Due to poor voltage, motors used to burn out as often as 4 times a year.
- Under LVDS there are multiple connections to one transformer and hence no one takes responsibility for the transformer.
- If a fault occurs in the line during the night it is very difficult to coordinate with the other farmers and find the fault is to fix it.
- Some farmers are on the same line as industries and hence the voltage they receive under LVDS is so low that their pumps don't work.
- If the transformer fails, not only do the farmers lose the chance to irrigate their fields but they also suffer losses in terms of wages paid to agricultural labour. Each labourer has to be paid INR 500 per day even if there is no water.

Benefits of HVDS

- Everyone is very keen to have HVDS connections. They see them as beneficial as they get better voltage so their motors don't burn out.
- With HVDS there is greater individual responsibility for the transformers and therefore less failures.
- Water pressure is better with HVDS but farmers still need to use their pumps for the either 7 hours that power is available.
- HVDS is so beneficial that farmers do not have a problem giving site clearance for poles and lines on their land or cutting / pruning trees to maintain clearance for the 11kv lines. If cutting a few trees means the whole farm is irrigated the farmers are willing to do that.

Disadvantages of HVDS

- The farmers don't see any disadvantages to HVDS and are very happy with it; however, they had the following comments:
 - Even with HVDS in some cases 2-3 5hp motors are connected to one 25-40kva transformer. The farmers feel that this again will cause the same problem seen with LVDS; i.e. that no one will take responsibility for the transformer if it develops a fault. They felt it would be better if each motor was given an individual transformer so the farmers would have individual responsibility.
The APEPDCL staff clarified that in the region the motors are of high power, i.e. 25hp as the ground water is 200-300 ft. below the surface. Therefore, in the area each motor already has its own transformer
- Farmers want AB switches for each transformer as without this they feel they still face some of the problems they had with LVDS; i.e. if the transformer does fail it cannot be repaired till the off-power time and this results in loss of water and labour wages. If the AB switches are installed then repairs can take place during the period power is available. The APEPDCL staff brought up the issue of theft but the farmers felt it would be no higher than it is currently. Even now if someone is determined to steal the transformer coil they interrupt the power supply by short-circuiting the power lines. With the AB switch theft of transformer coils will not be more than earlier and the wires will not be damaged. Further, the farmers claimed that the new transformers use aluminium coils rather than copper coils. As aluminium is not as valuable the incentive to steal is less.

C. Consultations in Vishakhapatnam District

Meeting with farmers at Etikoppaka Village – Yelamanchili, Vishakhapatnam on 11 July 2016

HVDS work is ongoing in this location. We interacted with 17 farmers, out of which 13 farmers have HVDS.

Problems with LVDS

- Previously with the LVDS line there was problem of low voltage. Once people closer to the transformer switch on their motors. The motors at the tail end won't start.
- Due to fluctuation and frequent interruptions, motors used to get damaged at least twice in a year.
- Each repair costed the farmers around INR 6000.

- After three repairs farmers had to get their motors replaced.
- While there was no electricity, due to some problem in the transformer. Farmers used diesel generators as an alternative to irrigate their fields.
- As there are more power interruptions during summer. Motors that are away from the transformer won't even start. So, the farmers used diesel engines as alternative which costed them INR 10,000 per paddy crop.
- In LVDS it was very difficult to identify the cause of power failure.

Benefits of HVDS

- With HVDS the problem of low voltage profile has improved.
- Power interruptions are rare now, only during the times of cyclones, tree fall etc.
- Now, the community doesn't get affected. It's an individual farmers who are responsible for their transformers and motors.
- Since HVDS, farmers have stopped using diesel engines.
- Previously, it was very difficult to identify problems during power failures and interruptions. Problem identification has become easier as there is small coverage area for each transformer.
- Theft has decreased.
- Due to HVDS lines whenever there is an accidents i.e tree falls on the line. It becomes easier to identify the accidents. As the sound is usually very loud and that is how people inform the lineman.

Disadvantages of HVDS

- Farmers don't see any disadvantages of HVDS.
- They don't allow any construction during crop season. They only do it in off season.
- The only disadvantage they see is now is that they have to INR 1 lac for a new connection.
- Farmers are fine with pole construction and clearances.

9. Meeting with farmers at Makavarapalem, Vishakhapatnam on 11 July 2016

Under the World Bank sanctioned project, APEPDCL aims to cover the farmers in the area. The interaction was with a group of 15 farmers. None of the farmer in the village has HVDS. In LVDS there are 15 connections in single transformer. Over the period of time most of the farmers have switched from 3 HP motors to 5 HP motors. Farmers have borewells and there is no alternate source of irrigation.

Problems with LVDS

- There are regular power interruptions. Once in three days there is a power failure due to which farmers don't irrigate their land.
- In LDVS the wires are low hanging which leads to frequent problem.
- Due to recurrent power disruptions motors gets affected. Motors have to be repaired twice in a year
- Anyone who switches on their motors in last. There motors don't start, as the transformer gets overloaded.
- One farmer said 11 KV lines are very old. Until they change the line completely there will be more interruptions.



Benefits of HVDS

- Farmers are interested in getting HVDS in this area. Unless there is some major issue all the motors won't get affected.
- Once they get HVDS, they don't have to get their motors repaired.
- If the transformer gets affected then it will impact less number of people in comparison to LVDS.
- According to one farmer who has HVDS, water pressure has also become better. Earlier he was growing crops that required less water but now he has switched to water intensive crops.
- Any fault in the transformer won't affect the entire community.

Disadvantages of HVDS

- There are tall trees in their farms which might touch the HVDS lines.
- Farmers don't see any disadvantages with HVDS. They don't have any problem with the poles and clearances.
- They think once all of them have HVDS then the burden will come on an individual. Unlike LVDS they won't complain in a group, a group complaint has a potential to get solved sooner than an individual complaint.

10. Meeting with farmers at Chodauram, Vishakhapatnam on 11 July 2016

We interacted with 15 farmers. They were aware about HVDS but none of them have it. They knew about it as their neighbours are using it. In Chodauram Village, agriculture and village load is on the same transformer. Whenever there is a problem then they complain in a group. Under the World Bank sanctioned project, APEPDCL aims to cover the farmers in the area.

Problems with LVDS

- The electricity is not separated for the village and agriculture land. Whenever there is a problem in the village it leads interruptions in agriculture and vice versa.
- In LVDS the lines are long and low hanging.
- Whenever there is a problem with the transformer then none of the motors work.
- The tail end motors gets tripped every hour. They have to keep switching it on.
- Due to recurrent disruptions motors keep getting damaged. Farmers have to get their motors repaired twice a year.
- One repair costs around INR 4000. They have to replace the motors after 3 to 4 repairs, as post repair motors becomes slow.
- There is no alternative for irrigation. During winters they somehow manage the harvest. But in summers due to repeated power failures harvest is impacted.
- People who switch on their motors first gets access to water. Out of 10 motors 3 who switch on their motors in last, the motors don't work. It is purely dependent on chance.
- Crop grown in this village is paddy and sugarcane.



- When there is not enough water due to frequent power failures. Farmers don't expect profitable returns from a portion of their crop.
- Recurrent tripping of motors affects the transformer in the long run.

Benefits of HVDS

- Once HVDS is implemented agriculture and village load will be separate.
- Farmers believe that once they get HVDS the water pressure will become better.
- Few farmers also mentioned that if they have HVDS, they don't mind sharing water with their neighbours.
- The number of accidents will decrease as LVDS lines are low hanging.

Disadvantages of HVDS

- The farmers don't see any disadvantages of HVDS.
- They don't mind leaving space for the poles. However, the poles should go by the boundaries of the fields.
- Everyone in the village wants HVDS. They believe their problems will reduce after HVDS.

11. Meeting with farmers at Padmanabham Village – Vishakhapatnam on 12 July 2016

Under the World Bank sanctioned project, APEPDCL aims to cover the farmers in the area. The interaction was with a group of 7 farmers, 3 of them HVDS connections and 4 didn't have HVDS connections. HVDS connection has been there for 3 years now.

Problems with LVDS

- In LVDS, there is a lot of problem with voltage. Also due to maintenance work there are frequent disruptions.
- Fuse burning is an issue. Every 2 days the fuse blows and there is an interruption.
- It is difficult to turn on the motor, especially motors at the tail end due to low voltage.
- Mother transformer is very far away causing frequent interruptions.
- LDVS line supplies in village and for agriculture purposes, the line is very long. As the number of services is more and length of line is long. Hence, interruptions are more.
- Motor overheats due to poor voltage. Every year once the motor burns and fuse cut outs have to be changed. The service wire also gets damaged.
- Motor repair and rewinding cost is INR 10,000. Each fuse set is of INR 1000. Once a year the fuse set has to be replaced. Service wire replacement cost is INR 800.
- Right now voltage is less than 50% only 150 volts out of 440 volts at the tail end.
- Farmers approach the electricity department lineman for rectifying line interruptions. The lineman usually responds within few hours.



- In times of power interruptions they don't get compensatory power supply.
- Farmers have to pay the labour whether there is power or not.

(Farmers with HVDS)

- Motors would not run for most of the time earlier. On a 100KVA transformer there were 20 motor connections. The length of LDVS line was long.
- Farmers would leave some part of the land without cultivation, because of power failures.
- Earlier it used to take 2 to 3 days to fix if the transformer burnt out. Though normally no interruptions with the LVDS line, the problem was with low voltage.
- There was no alternative for motors. In case of emergency they would run diesel generators. Only 2-3 farmers purchased diesel sets, while others would lose their crop. The government used to give compensation to the farmers who faced losses.
- Single phase motors were being used against the department rules.

Benefits of HVDS

- Now, voltage is maintained and there is uninterrupted power supply.
- Farmers are willing to switch to HVDS as soon as possible.
- Water discharge improves with HVDS.
- In HVDS, there is no fuse burning. Transformer is very close to the motor. The transformer for agriculture and domestic purposes will be separate. Hence, interruptions will be minimised.
- There is 100% crop cultivation on the land. Now, farmers don't leave the land without cultivation.
- There is no problem of interruptions and maintenance in HVDS.
- No more single phase motors are used.
- No problem in the HVDS transformer in the last three years.

Disadvantages of HVDS

- Farmers don't see any disadvantages of HVDS. They are willing to give permission for poles and cut trees if needed to put line.

D. Consultations in Vijaynagam District

12. Meeting with farmers at Akkivaram Village, Vijaynagam on 12 July 2016

We interacted with 6 farmers in the village. Agriculture started recently in this village. This is a new installation. Everyone has HVDS connection here. There is no alternate source of irrigation, so whenever the motors get damaged farmers just share the water.

Benefits of HVDS

- Water pressure is good.
- In summers they use the motors for complete 7hrs, otherwise they switch it off when they don't need water.
- They don't have any problem with the poles. Clearances are also easily given.



- They file a group complaint in case of power failure which is very rare.
- Current is consistent with very few power interruptions.
- There has never been an accident related to the HVDS line.
- They run their motors for complete 7 hrs.

Disadvantages of HVDS

- Some motors have gotten damaged after HVDS. The cost of repair is between INR 3000-4000. This is due to some problem with the bushes of few transformers.
- Farmers don't see any disadvantage of HVDS.

13. Meeting with farmers at Golapeta Village – Challavanithota, Vijaynagram on 12 July 2016

Under the World Bank sanctioned project, APEPDCL aims to cover the farmers in the area. The interaction was with a group of 14 farmers, none of whom had HVDS connections. There are 24 mother transformers, on each transformer 24 motors are allotted. They grow rice and maize.

Problems with LVDS

- All the 24 motors cannot run simultaneously. Once 10 motors are started then the other 14 would not start.
- Farmers tried rotation system for switching on their motors, but this system could not work out.
- It's a matter of chance who gets to switch on the motor first. If someone is late then they have leave to the day without irrigating their fields.
- Due to recurrent fluctuation motors get damaged twice a year. The cost of repair is INR 5000 to 6000 per repair.
- Frequently, the transformer also trips due to overload.
- If there is a complaint and lineman is nearby, then the problem gets fixed within few hours. Otherwise it takes a day to fix a complaint.
- During the time of harvest, there are frequent power failures. Because of which farmers are not able earn profits in fact they are losing money in agriculture.



Benefits of HVDS

- All the farmers in the village want HVDS.
- There will be consistent electricity and all the problems they are facing due to LVDS will be resolved.

Disadvantages of HVDS

- Farmers don't see any disadvantages of HVDS.
- They are alright with clearance, poles and even if they have to trim the trees.

14. Meeting with farmers at Ramabhadrapuram Village – Ramabhadrapuram Mandal, Vijaynagram on 12 July 2016

Under the World Bank sanctioned project, APEPDCL aims to cover the farmers in the area. The interaction was with a group of 33 farmers, none of whom had HVDS connections. One transformer has 33 motor connections.

Problems with LVDS

- Due to frequent interruptions motors get damaged. They have to repair the motor 1 to 3 times in a year. The size of motor is 3 HP to 5 HP. The cost of repair is INR 3000 to 4000 each time.
- If motor winding gets damaged then it takes a week to repair it.
- Farmers use kerosene generators as an alternate source of electricity.
- Whenever there is interruptions then farmers don't share water among each other.
- Some farmers replace their motors after 3 repairs and some don't. Replacement depends on the financial capability of the farmers.
- Transformer gets tripped frequently due to overload.
- Usually a complaint is solved within half an hour when the lineman is available. Otherwise problems are solved within a day.
- Due to tree fall or thunder etc there are power failures which affects 10-15 motors at a time.
- Mostly complaints are made in a group, individual doesn't approach the lineman.
- 400 V lines are low hanging which are prone to accidents
- They use the water for complete 7 hrs which is not sufficient for them due to recurrent interruptions.



Benefits of HVDS

- All the farmers are interested in HVDS.
- They said once HVDS will come then the crop harvest will increase as there won't frequent power failures.
- Accidents will not be there as the HVDS lines are laid at a high level.

Disadvantages of HVDS

- Farmers don't see any disadvantages of HVDS.
- They are fine with paying money for new connections.
- They don't have problems with the poles and clearances.

15. Meeting with farmers at Paradhi Village – Bobili Mandal, Vijaynagram on 12 July 2016

Under the World Bank sanctioned project, APEPDCL aims to cover the farmers in the area. The interaction was with a group of 25 farmers, none of whom had HVDS connections. One transformer has 15-20 motor connections. Not all the farmers knew about HVDS in detail. Few of them are aware about it as people in the neighbouring village have it.

Problems with LVDS

- The motors gets burnt 2 to 4 times in a year. Farmers never replace their motors as it's not affordable.
- Oil engines are used as an alternative whenever there is no electricity. Also, people don't share water as there is no extra water.
- Usually rice or sugarcane is grown. When there is not enough water then maize, and if there is not enough water for maize then they switch to cotton.
- The average size of the motor is 3 HP to 5 HP. If all the people switch on their motors at the same time then the transformer trips. Repair of the transformers takes from 2 hrs to a day.
- LVDS wires are low hanging which makes the area prone to accidents.
- Sometime people complain in group or sometime individually.
- Due to frequent interruptions and power failures farmers leave some portion of land without cultivation. They face financial losses because of this.



Benefits of HVDS

- Everyone wants HVDS in the village.
- They believe once HVDS is in the village farmers will be able to cultivate the entire land.

Disadvantages of HVDS

- They don't see any disadvantages of HVDS.
- They are alright with poles and occasional clearance of trees.
- They are fine with paying money for new connections

16. Meeting with farmers at Bejjipuram Village – Laveru, Srikakulam on 13 July 2016

Under the World Bank sanctioned project, APEPDCL aims to cover the farmers in the area. The interaction was with a group of 17 farmers, none of whom had HVDS connections. Farmers are aware about HVDS. The average size of the motors is 3 HP to 5 HP. There are 12 to 15 connections on one transformer.

Problems with LVDS

- If everyone switches on their motors at the same time then either the motors get burnt or transformer gets tripped.
- People closer to the transformer gets better voltage and those who are far on line do not get good voltage.

- Motors gets damaged twice in a year, once in six months. The cost of each repair is above INR 3000.
- It takes 5 to 10 days to get the motors repaired. There is no alternate source of irrigation with the farmers, so during this time they don't irrigate their fields.
- There are fixed number of wells in the village. They use water as long as the well supports it i.e 4 hrs.
- Due to water scarcity they cannot share water.
- Because of interruptions and power failure, the crop yield decreases by one third in the season.



Benefits of HVDS

- Everyone in the village wants HVDS as soon as possible.
- As there will be individual transformers it would lead to greater responsibility
- The crop yield will improve once everyone gets HVDS.

Disadvantages of HVDS

- There is no disadvantage of HVDS as such.
- As long as it's not a crop growing season farmers are fine with the construction of poles and clearances.

17. Meeting with farmers at Arangi Peta Village, Srikakulam on 13 July 2016

Under the World Bank sanctioned project, APEPDCL aims to cover the farmers in the area. The interaction was with a group of 10 farmers, none of them had HVDS connections. Farmers are aware about HVDS. The average size of the motors is 3 HP to 5 HP. There are 25 to 30 connections on one transformer. Crops grown in this village are sugarcane, rice, sunflower and chillies.

Problems with LVDS

- The problem with LVDS is motors get burnt and transformers gets tripped due to overload.
- If everyone switch on their motors together then none of the motors work.
- They have made rotation for using motors so that everyone gets water to irrigate their fields.
- Sometime when there is no electricity they use diesel engine as an alternative. The cost of using the generator is INR 400 per hour.
- Once in a while farmers are fine with sharing water with their neighbours.
- Farmers do collective complaint for any problem. It takes 2 to 3 days to get a problem fixed because there is no allotted lineman for this village.
- Out of seven days they don't get water for three days due to interruptions.

Benefits of HVDS

- As there will be individual transformers it would lead to greater responsibility
- Current wires in LVDS are low hanging. It will be safer in HVDS as the lines are on a higher level.

- Framers are fine with poles, clearances and paying for the new connections.

Disadvantages of HVDS

- They don't see any challenges of HVDS.
- One farmer had HVDS, parts of his transformer was stolen.

18. Meeting with farmers at Mabugam Village, Srikakulam on 13 July 2016

Under the World Bank sanctioned project, APEPDCL aims to cover the farmers in the area. The interaction was with a group of 14 farmers, some of them had HVDS connections. Farmers are aware about HVDS. The average size of the motors is 5 HP. There are 24 connections on one transformer. Crops grown in this village are pulses, sugarcane and rice. There are 100 per cent bore wells in this village.

Problems with LVDS

- The major problem of LVDS is motors gets burnt frequently. The cost of repair of motor is INR 5000.
- After 3 to 4 repair of the motor, farmers replace it. Usually within 2 to 3 years a motor is replaced.
- Farmers have to pay extra to the motor mechanic so that they get it back within a day or two.
- Transformer gets tripped on a daily basis due to overload. It takes them two hours to get it fixed as the lineman is mostly present.
- On an average, out 7hrs there loss of 2 hrs of electricity on a daily.
- Whenever there is a problem with the transformer no one takes an initiative to complaint. So it takes a lot of time in a complaint to get registered.
- Due to inconsistent water supply farmers lose almost one fourth to one third of crop yield every year.
- The poles right now are spaced out and the wires are low hanging. Often, these wires break and burn the crop. Every year 5 acres of crop is burnt like that.
- First two months of crop season, they use water for 2 hrs only. Rest they use it for complete 7 hrs. Whenever they don't need water, motors are switched off.
- Till the time motor gets repaired, they share water for irrigation.



Benefits of HVDS

- Everyone wants HVDS. They want it as soon as possible.
- Farmers are more responsible as they have individual transformers. Also overloading is not a problem. If one transformer fails everyone does not suffer.
- In HVDS, line are placed at a higher level. They won't break and burn the crop.
- People will start taking responsibility for their own motors and transformers.

Disadvantages of HVDS

- Farmers don't see any disadvantages of HDVS.
- They are fine with construction of poles, clearances and trimming of trees.

18. Meeting with farmers at Maikivalasa, Srikakulam on 13 July 2016

Under the World Bank sanctioned project, APEPDCL aims to cover the farmers in the area. The interaction was with a group of 13 farmers, some of them had HVDS connections. Farmers are aware about HVDS. The average size of the motors is 5 HP. There are 15 connections on one transformer. Crops grown in this village are sugarcane and rice.

Problems with LVDS

- In LVDS motors are getting burnt and transformer is getting tripped frequently.
- The cost of repair of motors is INR 5000. It takes 5 to a week to get a motor repaired.
- In total, 80 motors are connected to LDVS. In every season, 7 to 8 motors gets damaged.
- Whenever the motor is not working, farmers just leave their fields as there is not alternative for irrigation.
- Usually it takes a day to a week to repair a transformer. It depends upon the availability of the lineman.
- People have to take an individual initiative to complaint. They never file a complaint in a group which leads to a delay.
- They have to leave some part of the land without cultivation due to the missing days of water availability.
- Every year, 50 to 60 per cent crop yield is affected due water shortage.
- Farmers are not even getting back the investments they are making in agriculture. Most of them are running losses.
- They don't have excess water, so they don't share when someone's motor is not working.



Benefits of HVDS

- Everyone in the village wanted HVDS,
- After HVDS, they will be able cultivate in more area. And probably be making profits out of their agricultural land.
- Some farmers said, there is no change in water pressure after HVDS. But the water remains for complete 7hrs.

Disadvantages of HVDS

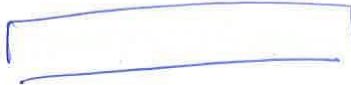
- They don't see any disadvantages of HVDS.
- Farmers are fine with construction of poles, clearances and paying for the new connection.



7/7/2016

Yerang dam

Name	umber	Sign
GADDE VENKATA RAMMO (1)		K. Rao
GADDE SATYA NARAYANA		G. Satyanarayana
KARUMANCHI-SWAMIJI		R. Nomin
9666918337		Passion
P. n 250 250		8333 3999
P. ah		8
G. Prasad Rao.		9441172 406.
K. Surya narayana		77 2 1772.
V.V. Satyanarayana.		9491554024.
P.D.V. Prasad		9440329038
B. Sreedev.		9581160555
		9492064343.
P. Rama koti		8187825477
K. S. Rao		
P. Raju.	80193 740	9573521320
K. Bullabhere		Rup
P. Bell	mmgag	94 0656393
9441055223		



71

Uamaden Ingatasa Mandak

Name		Sign ..
Pathuiventkala mrapra	949172 907	
Seemi		
58-824	9 353882	
2 20 57550000		
Y.R.K.P. BABU	9948451899	00
200007 800000	441 267	
820000-8000000000	949 56	
S.V. Srikumar	85 4 92	
8400000000	995182 566	
825 0.2 50000000	9493474428	
Ch. Venkatesh	9441610460	
Ch. V. Ramesh	9441330010	
	9491142994	
2000085500	9441055882	
	944 31439	
V. Jaw ai	949 9 136	
S. Sathya	9000456778	



MAKAVARAPALEM

No.

Date: / /

11/7/2016

NARSIPATIYAM

Name		Phone Number	Sign.
1. N. Pandalu	T.S. pata	9502031922	N. Pandalu
2. P. Satyanarayana	G. Koduru	9573289811	P. Satyanarayana
3. P. Appa Rao	G. Koduru	9573289811	P. Appa Rao
4. J. Ganga babu	G. Venkatapuram	9704777098	J. Ganga babu
5. K. Ramana	G. Koduru	9849700362	K. Ramana
6. S. Ganga Raju	G. Koduru	9010891277	S. Ganga Raju
7. V. Srinivasulu Reddy	G. Koduru	9909489689	V. Srinivasulu Reddy
8. H. Venkata Srinivasulu	G. Koduru	8374476185	H. Venkata Srinivasulu
9. D. Ravi Kumar	G. Koduru	9490942506	D. Ravi Kumar
10. Vagi Sreenu Vasu	G. Koduru		V. Srinivasulu Reddy
11. V. Srinivasulu Reddy	G. Koduru	9010910221	V. Srinivasulu Reddy
12. P. Prasad	AEI/Construction	9440812649	P. Prasad
13. P. Satyanarayana	AEI/Construction	9440812509	P. Prasad
14. K. NARENDRA	AEI/Construction/AICP	9440812597	K. Prasad
15. T. Seidher	AEI/Construction/VSP	9440812512	T. Seidher

11/7/2016

NAME	PHONE No.	Sign.
1) R PADMAVATHI	9966633279	R. Narasimha
2) S.K. Beebi	9640701337	S. K. Beebi
3)		
4)	8106533146	
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6) K. S. S. S. S.	7056942130	
7) B. Sankar.	986623854	B. Sankar
8) K. Dasu	8790300838	K. Dasu
9) J. Dammu	9247202090	J. Dammu
10) B. Appanna		
11) Chuvu R.	9848141022	Chuvu R.
12) H. Sityanjan	9666434886	H. Sityanjan
13) K. Sankara Mur	7382299937	K. Sankara Mur
14) B. Sateen.	9441160982	B. Sateen.
15) S. Appa Rao	9000121995	S. Appa Rao



Padmanabham

No.

Date: / /

Covered under HVDR:

Name

Phone No

Sign

Bhugata Sunibabu

09754 9720 20

Bhugata Selj. rajya

Bhugata Ramasamma

Not Covered in HVDR:

Bhugata Adinarayana

Bhugata Sureshbabu

Bhugata Bangaru Naidu

Kantubolu Sureshbabu

K. SORIBABU 970129 0174

Akkiravaram Village

Date: AKKIRAVARAM Panchayat
Dunturda (Mandal)

Name

Phone No

Signature

1) Patilwada Atchinnaidu - AKKIRAVARAM (Village)

2) Kovada NARISI - "

3) Patilwada Ramana - "

4) Patilwada Rama - "

5) Patilwada Atchinaidu - "

6) Kovada - Appanna - " 15 15061



P. Rega. Section
 Kallivada (Gollapata) (Kerala)
 (Panchayat)

No.

① Karumatti Satyam - K. Ramulu

② Nadupura Kumbalangi

③ Nadupura Sree

④ Nadupura Gounda

⑤ Nadupura Satyam

⑥ Nadupura Ramana

⑦ Chilla Satyam

⑧ Ranthu Narayana

⑨ Nadipura Venkita Ramana - N. V. Ramana

⑩ Nadipura Raja Rao

A. Appana

C.H. Ramakrishna

C.H. Satyam Gounda

C.H. Satyam

Ch. Ramulu

Ch. Govinda

KCMG Passadhi

No.

Date: / /

No	Name	Sign
1)	T. Girish Kumar	T. Girish Kumar
2)	S. S. S. S.	S. S. S. S.
3)	M. S. S. S.	M. S. S. S.
4)	G. S. S. S.	G. S. S. S.
5)	G. S. S. S.	G. S. S. S.
6)	P. V. S. S. S.	P. V. S. S. S.
7)	B. S. S. S.	B. S. S. S.
8)	S. S. S. S.	S. S. S. S.
9)	G. S. S. S.	G. S. S. S.
10)	S. S. S. S.	S. S. S. S.
11)	S. S. S. S.	S. S. S. S.
12)	B. S. S. S.	B. S. S. S.
13)	K. S. S. S.	K. S. S. S.
14)	K. S. S. S.	K. S. S. S.
15)	S. S. S. S.	S. S. S. S.
16)	S. S. S. S.	S. S. S. S.
17)	S. S. S. S.	S. S. S. S.
18)	A. S. S. S.	A. S. S. S.
19)	A. S. S. S.	A. S. S. S.
20)	S. S. S. S.	S. S. S. S.

20)	S. S. S. S.	S. S. S. S.
21)	S. S. S. S.	S. S. S. S.
24)	S. S. S. S.	S. S. S. S.
25)	S. S. S. S.	S. S. S. S.
26)	S. S. S. S.	S. S. S. S.



LAVERU (MANDAL)

No.

Bogji Puzam (VILLAGE)

Date: 13/07/2016

mc

Sign

ETADA CHILAMB

x

ETSETTI APPALA NADU

x

VALPALLI SATTAM

V. SATTAM

PA TAVETT NADU

ETTLI APPALANADU

NADU PAETI NADU

x

ETSETTI PETA KAM

NADU SATTAM

NADU SURVA NADU

D. SATTAM

NADU KANDAVIA

D. SATTAM

NADU MALLETA

D. SATTAM

NADU MADU

D. SATTAM

NADU APPALU

K. SATTAM

NADU SUDANADU

SATTAM

ETPALLI APPALU PANDU

x V. SATTAM

KALIBETS THANDU

x K. SATTAM

NADU THANDU

D. SATTAM

Aranggi Peta

Name	Sign
1) A. Madhukar Reddy	A. Madhukar Reddy
2) S. Janaki Reddy S. Janaki Reddy	S. Janaki Reddy
4) P. Venkayya	P. Venkayya
5) S. S. Venkatesh Reddy	S. S. Venkatesh Reddy
6) S. S. Venkatesh Reddy 7) S. S. Venkatesh Reddy	S. S. Venkatesh Reddy
8) K. Venkatesh Reddy	K. Venkatesh Reddy
9) A. Srinivas Reddy	A. Srinivas Reddy
10) A. MURALI	A. MURALI

S.No	Name	Sign.
1)	K.R.M.S. SRINIVASARAO	K. Srinivasarao
2)	ಶ್ರೀ. ಸತ್ಯನಾರಾಯಣ ಶರಣಪ್ಪ	
3)	ಶ್ರೀ. ಸತ್ಯನಾರಾಯಣ ಶರಣಪ್ಪ	P. Chandra
4)	ಶ್ರೀ. ಸತ್ಯನಾರಾಯಣ ಶರಣಪ್ಪ	P. Srinivasarao
5)	ಶ್ರೀ. ಬಿ.ಜಯರಾಮ	P. B. Jayaram
6)	P. S. Srinivasarao	
7)	ಶ್ರೀ. ಬಿ.ಜಯರಾಮ	B. Jayaram
8)	ಶ್ರೀ. ಸತ್ಯನಾರಾಯಣ ಶರಣಪ್ಪ	P. Srinivasarao
9)	ಶ್ರೀ. ಸತ್ಯನಾರಾಯಣ ಶರಣಪ್ಪ	P. Srinivasarao
10)	ಶ್ರೀ. ಸತ್ಯನಾರಾಯಣ ಶರಣಪ್ಪ	P. Srinivasarao
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13)	ಶ್ರೀ. ಸತ್ಯನಾರಾಯಣ ಶರಣಪ್ಪ	
14)	K.V.R. Srinivasarao	K.V.R. Srinivasarao

Name	Sign
y. vama Gendara Surberch	vama
y. Saktida Maji	Saktida
y. Sainivasa ren	Saini
S. Sasi Kumar	Sasi Kumar
y. Paratu	Paratu
R. Gnanadatan	YANAGI ANAPU
R. Sui Gnanadatan	Tat P. Gnan
Ch. Ariswara	Ch. Ariswara
Ch. Ariswara	Ch. Ariswara
Ch. Ariswara	Ch. Ariswara
Ch. Ariswara	Ch. Ariswara
Ch. Ariswara	Ch. Ariswara
Ch. Ariswara	Ch. Ariswara

Annexure 6 – Safety Plan

1. Safety

Safety is the proper planning of work, proper usage of safety tools, following proper safety procedures and exercise of good judgment and intelligent supervision and working with full concentration. Experience proves that majority of the accidents are preventable

2. Fundamentals of Safety

Prevention of accident requires the whole hearted cooperation of all employees of the organization. A capable mentally alert employee will avoid accidents. A careless person is a liability to the Organization. He is dangerous to himself, his fellow workers, the public and the Organization. Accidents do not just happen. Accidents are the result of unsafe acts of the persons engaged in the work or unsafe conditions where the persons are engaged in the work or a combination of both.

3. Unsafe Acts: Accidents, occur due to

3.1. Non-adherence of the safety rules

These are due to the fault of the persons engaged in the work which may cause accidents, such as:

1. Opening and closing of switches without authority or warning, operating hoists and trucks without warning, failure to place warning signs or signals where needed.
2. Working unsafely such as throwing materials or tools, at another worker, jumping from vehicles and platforms or unnecessary haste.
3. Making safety devices inoperative.
4. Using unsafe equipment, wrong tools for the job, or using hands instead of hand tools.
5. Working on live electrical equipment that could conveniently be de-energized.
6. Taking unsafe position or posture too close to opening and lifting while in awkward position.
7. Distracting, teasing, practical joking, horseplay, quarrelling or annoying.

3.2. Non usage of proper safety gadgets for the specific work.

Failure to use safe clothing or protective equipment such as rubber gloves, helmets etc. as specified for the work or energized equipment.

4. Unsafe Conditions:

The conditions which may result in accidents include the following:

1. Unguarded floor openings and excavations, exposed live circuits
2. Improper illumination such as insufficient light or unsuitable location producing glare or objectionable shadows.
3. Ignorance of potential hazards
4. Not explaining the anticipated hazards. Most of the accidents occur due to unsafe acts & unsafe conditions rather than natural calamities as given below

5. General Instructions for Safety

5.1 Responsibility of Individuals

Definite responsibility of individuals is to act so as to provide

1. Safety to himself
2. Safety to his fellow employees
3. Safety to the public
4. Protection to the property of the Organization.
5. Protection to public property

Before attempting any work in a condition that he considers to be unsafe, he is required to bring them to the attention of the person in charge of the work and seek his advice. Every employee is expected to understand the work completely before the commencement of the work and communication from the supervisor should be complete and fully understood by the employee.

5.2 Taking Chances

Before commencing any work that may be hazardous, care shall be taken to establish a safe procedure. When more than one employee is engaged in the same job, all employees concerned shall understand the procedures to be followed (tailboard conference).

5.3 Overconfidence

Overconfidence is one of the major causes for accidents. Every employee should bear in mind that the Electricity never excuses. Under no circumstances shall safety be sacrificed for speed. Employees shall always try to place themselves in a safe and secure position. It will be the duty of every employee to report promptly to his Section Officer any dangerous or improper condition of equipment / lines he notices.

6. Personal Conduct:

6.1 Use of Alcoholic Beverages and Drugs:

Use of intoxicating liquor while on job is strictly prohibited. No employee shall report for work while he is under the influence of liquor and no Section Officer shall knowingly permit a man to go to work while he is under the influence of liquor. Such acts call for strict disciplinary action without any prejudices.

6.2 Smoking

Smoking is strictly prohibited in the areas where it may cause fire hazards. Specifically, in the areas like battery rooms, and locations where the flammable liquid/materials are stored and used or other areas where combustible materials are kept, Absence of "No Smoking" signs shall not excuse smoking in dangerous places.

6.3 Mobile Phones:

Avoid using mobile phones in the work area especially during working. The distraction by unnecessary phone calls and other than those connected with the work may result in accidents. It is advisable to switch off the mobile phones when one is engaged in the work and it should be used only to the extent of essential communication.

6.4 Dress Code

The clothing of the employees is as decided by the management from time to time considering the safety aspects and nature of work to be performed by the employees. All

the metallic parts should be removed from the body commencing the work in the vicinity of the exposed energized parts of the line or equipment. The metallic parts like key bunches, watch chains, rings, bracelets, arm bands etc. may become the cause for inadvertent contact with the live line or lead to shock hazard due to induction effect or they may obstruct the normal working while attending on a pole or structure etc., Even while wearing gloves, metal articles like rings, watches, bracelets and other objects should be removed from the hand as they may damage the gloves and defeat the purpose of wearing the gloves.

6.5 Joking, Teasing

Practical joking and horseplay while on the job is strictly prohibited as it may lead to distraction of mind and may lead to accident or may compromise the safety of employees or the public.

6.6 Working in a hurry

Generally it is observed that the employees dawdle their time at the beginning and finally attempt to finish the work in a hurry. This leads to accidents. No employee shall distract the attention of another worker from his job unless he thinks that the worker is doing something, which is dangerous to his person, other workman or to the equipment. Even while bringing these dangerous conditions to the knowledge of the employee who is at work, care must be taken to see that the person does not get perturbed all of a sudden which itself may lead to accident.

Any employee who endangers his own or other's safety by violating the foregoing requirements of personal conduct shall render himself liable to disciplinary action

6.7 Always Be Careful (ABC):

The workman should place himself in a safe position while working to avoid falling, stumbling, or moving backwards against live parts. The workman should satisfy himself regarding the safe working conditions before starting the work. The care exercised by others should be checked.

7. House Keeping

Workmen are frequently injured by tripping, stumbling, stepping on or bumping into tools, material and other objects left lying around or by carelessly placed objects falling from above. Every employee should contribute to good housekeeping and to ensure this, following precautions should be observed.

1. The place of work both within the building and around the work area in the outside yard should be kept neat and clean.
2. Handling and usage of flammable liquids, oils, cleaning solvents should be carried out as per the prescribed manner so that they will not become the potential source of fire hazard.
3. The storage area should be neatly maintained and the materials should be stored systematically and in an orderly manner to prevent their falling or spreading and to eliminate tripping and stumbling hazards.
4. Clothing or any other type of material should never be hanged behind the space of the panels or on the poles or structures, switchboards etc.
5. Growth of Vegetation/Weeds should never be allowed in and/ or around the neighbourhood of substations, pole yards, buildings, oil tanks, or other structures.
6. Pathways, aisles, stairways, fire escapes surrounding area near the distribution boards, control panels etc. and all other passages shall be kept clear of all obstructions.

7. Tools and materials should not be placed where they may cause tripping or stumbling hazards or here they may fall and strike any one below.
8. Puddles of oil and water create a slipping hazard and should be cleaned up promptly.
9. Nails in boards, such as those removed from packing boxes, etc., constitute a hazard and should be removed. The boards should be carefully stacked or stored.
10. Dirty and oily waste rags should be disposed-off as soon as practicable to avoid fire hazard.
11. Broken light bulbs, glass, metal scrap and other sharp objects should be dumped in places provided specially for them.
12. Discarded fluorescent and other gas filled tubes shall be disposed-off safely.
13. Structures like poles, ladders, walkways, or portion of tree or any other elevated structure like crane or derrick etc should not be used as the support for men, material or equipment unless it is ensured that they are firmly secured and adequate enough to take the load.

8. Handling of Heavy Objects and Storage

1. Employees shall not attempt to lift beyond their capacity. Necessary assistance should be obtained if it is inevitable or use equipment like crane, lifting shackles, pulley blocks etc.
2. Extra care should be exercised during lowering and lifting when two or more persons carry a heavy object
3. It is always necessary that the persons carrying the load should face the direction in which the object is being moved when two or more persons are carrying an object.
4. Employees should avoid twisting or excessive bending when lifting or setting down loads.
5. Pushing should be resorted when moving a load horizontally, rather than pulling it.
6. Gripping, grasping, and lifting with just the thumb and index finger should be avoided and whole hand and all the fingers should be used.
7. Storage of materials and equipment closer to energized lines or exposed energized parts of equipment should be avoided. If it becomes necessary, it should be stored in keeping the safe clearance taking into account the system voltage, sag, side swing etc. so that at no circumstance there will be any chance of the stored material coming into contact with the live lines.

9. Responsibilities of the contractor

Contractor shall be responsible for ensuring that work is done in safe manner. It is the responsibility of the Contractor to ensure safety to all his personnel working under him. Contractor has the definite responsibility of ensuring the following:

9.1 Safety of the personnel working under him.

1. Properly planned work performed in safe manner.
2. Clear work instructions and ensuring that his men understand clearly the following
 - i. Work to be done
 - ii. Hazards that may be encountered
 - iii. Proper procedure for doing the work safely
3. Application of the general and special safety instructions by their workmen.
4. Immediate steps to correct any violation of safety rules observed or reported to him.
5. He shall have complete knowledge of his personnel and their capabilities, strengths and weaknesses.

6. He shall assign jobs to employees, which they are capable of doing safely depending on their capability.
7. Accordingly, Section Officer has to brief the work depending on the capability of the person to whom he assigns the work.
8. He will be responsible to ensure that the workmen under him work with all the safety precautions and use necessary safety gadgets as needed.

9.2 Provision and maintenance of Safety equipment:

Contractor shall have the responsibility of

1. Providing necessary equipment and its use.
2. Properly maintaining tools and equipment in his area of responsibility.
3. Well maintained safety gadgets
4. Auditing the conditions of the safety gadgets from time to time and take action to replace them as and when required.
5. Taking action to test the safety gadgets time to time as prescribed.
6. Taking responsibility of ensuring the availability of safety gadgets sufficient in quantity at the specified places so as to avoid any chances of workmen neglecting the use of safety gadgets for the simple reason that it is not available at the required moment.
7. Initiating action to indent/ test/replace the safety gadgets in his jurisdiction of work area.

9.3 Working environment: Contractor shall ensure

1. Safe working condition
2. Frequent and periodic inspection of construction, operation and maintenance equipment, work areas, conditions and methods to prevent fires and other accidents by taking advanced corrective actions.
3. Review and suggest/upgrade of the conditions, procedures and human actions wherever needed.
4. To have complete knowledge of the potential hazards that may lead to accident and he shall take advance corrective actions needed to avoid accidents.

9.4 Awareness on Safety

1. Once in a fortnight, before the start of work, he shall explain about Safety and its importance to all the linemen under his jurisdiction.
2. During this briefing he shall explain to all the linemen about the importance of Safety equipment like Hand Glove, Safety Belt, Earthing Rod, Helmet etc.
3. He shall prevail upon and insist the use of specified safety gadgets/ equipment during the work.
4. He shall also instruct the linemen not to take up the work without proper Line Clear, Work Permit and Safe Zone.

10. Workmen Awareness on safety

1. General safety awareness
2. First aid
3. Emergency procedures including shock treatment
4. Use of Personal Protective Equipment
5. Safety precautions while handling electro-mechanical equipment
6. Use of different types of fire-fighting equipment
7. Response in the event of emergencies including fire, floods, landslides, earthquakes etc.
8. Site specific hazards
9. Relevant Safety acts, rules and regulations

10.1 General Safety Precautions

All voltages shall be considered dangerous even though it may not be high enough to produce serious shock. All electrical circuits are to be treated as live and no work (maintenance, repairs, cleaning) is to be carried out on any part of electrical apparatus or circuit unless such parts are:

1. Dead
2. Isolated and all practicable steps taken to lock off from live conductors.
3. Efficiently connected to earth between such points and points of work.
4. Released for work by taking of Line clear
5. By checking that equipment for its de-energized condition.

10.1.1. Working conditions requiring more than one workman:

On some hazardous work it is not desirable for one man to work alone. It shall determine when additional men are needed to protect workmen against accidents or to render assistance in case of unforeseen circumstances.

10.1.2. Warnings:

1. Any warning signs from anybody around the work spot shall be heeded and attended.
2. When the persons are seen in a dangerous situation they shall be warned without creating panic to the person leading to accident.
3. Unconcerned employees/persons who are not required to be near potentially dangerous places shall keep away from them.
4. Hang "Danger" boards at all strategic places to ensure safety at work spot

10.2 Safety Precautions for Work on overhead Mains, Service Lines

10.2.1 Working on Dead line and equipment:

1. No person shall work on line supports or conductors unless they are discharged and earthed as follows:
 - a. The circuit or conductor to be worked on shall be made dead by switching off or opening the isolator links or fuses and by locking isolator/links in the off position. A danger notice board with the words
2. "MEN ON LINE" should be fixed securely, below the switch or links/ isolators.
3. After switching off the supply before touching the lines, each of the conductors shall be tested for pressure (voltage) by 18 discharge rod. The discharge wires should be kept at least two feet away from the body. The procedure is necessary in order to make

- sure that the line to be worked on is actually the line that has been isolated. Rubber gloves or preferably gauntlets should be used on both hands.
4. All the conductors shall then be short circuited together and adequately earthed; this shall be done at the points on each side of the place thereby creating a safety zone where the work is carried out. Rubber gloves or gauntlets shall be used while doing this work. Poles on which work is actually to be carried out should also be earthed.
 5. A working section at either end of which the conductors are earthed shall not exceed 0.5 km in length.
 6. In the case of lines meeting or crossing at any pole which forms the site of work, all the lines crossing or ending at that pole shall be earthed as stated above unless work on the one line with any or all the remaining lines alive is otherwise permissible and so specified in the LC form.
 7. Ensure that there is no possibility of back feed.
 8. All phases shall be earthed even if work is to be carried out on one phase only.
 9. When work is to be carried out on lines of all insulated conductors where grounding points are not provided at point of work, temporary grounds shall be connected at point of work to an efficient portable earth spike driven into the ground. The line shall also be grounded at the nearest line grounding point on either side of the point of work.
 10. Where two or more crews are working independently on the same line or equipment, each crew shall properly protect themselves by placing their own temporary earths.

10.2.2 Working on lines and equipment adjacent to live equipment or lines:

1. When working near live lines or apparatus, each man should plan his moves and take extreme care in moving from one position to another
2. Where impractical to erect barriers between men at work and live parts within reach of their hands and objects being handled, continuous watch shall be kept by the Contractor or someone specifically designated by him for that purpose.
3. When a truck is used near live parts, all workmen, except the driver, should stay away from the truck, Driver should see that truck is clear from live lines before leaving and entering the truck.
4. Work on Double Circuit Overhead lines & HT/LT lines with one circuit alive shall not be carried out.

Safety precaution to be followed during construction

General Precautions

- All the safety measures to avoid accidents shall be followed strictly in accordance with the safety rules and regulation laid down by the government authorities.
- The contractor shall take all safety precautions and shall provide proper scaffolding, life-belts, ladder shock proof helmets, etc. to avoid accidents and to ensure safety, of not only his personnel but also the safety of the staff and workers of other contractors working at the same site.
- The contractor shall ensure that the safety equipment are in good condition and also ensure that the workers positively use such safety equipment as necessary for the job that they are performing.
- The contractor shall take necessary precautions to ensure that no building/structure is damaged or disfigured due to negligence on his part while carrying out the work. In case of excess damage, the same shall be made good by the contractor immediately at his own cost.
- The contractor shall strictly instruct his site staff and workers to abide by the regulations in force at the site regarding all precautions to be taken to avoid fire hazards.
- The Contractor shall keep the site of work in a clean and sanitary condition. After the completion of the entire work, the contractor shall arrange to remove all the temporary structures, surplus materials, dirt, debris, etc. from the site and finished work shall be handed over the employer in a clean and complete shape.
- The contractor shall hang "Danger" boards at all strategic places to ensure safety at work spot
- The construction site shall be properly lit during night time. Also, alternate pathways shall be provided, where possible, in case of blockage of access roads during construction.
- Tools and materials shall not be placed where they may cause tripping or stumbling hazards or where they may fall and strike any one below.
- The contractor shall ensure that unconcerned persons who are not required to be near potentially dangerous places shall keep away from them.

Precautions taken during excavation of pits and erection of poles

- The contractor shall ensure that there are no unguarded floor openings, excavations and exposed live circuits. Appropriate danger signs shall be displayed marking the floor openings, excavations and exposed live circuits
- Wherever the foundation is being constructed on unstable earth, the workmen shall not be permitted to enter the excavated pit unless shoring is done
- Sufficient care shall be taken during pole erection to see that more than the minimum numbers of workmen are not deployed. This will minimise injury due to exposure of falling objects on workmen. Proper protection such as use of helmets, safety belts etc., shall be insisted upon.

- Other than the supervisory staff and such of the workmen required to guide and assist in the erection, no one else shall be permitted to come under a pole being erected.
- Wherever cranes are used for erection, the same shall be set on firm foundations. The outriggers of the cranes shall be used wherever available. The wheels shall be locked in position to prevent dislocation during handling.
- Suitable tie ropes shall be used to maintain control of pole being raised and positioned wherever possible and proper care shall be taken to see that they do not create a greater hazard. The wire rope used for support shall not be detached before the pole is adequately secured.
- The erection or maintenance work shall not be carried out during high wind, thunderstorms or unfavourable weather condition, which would make the work hazardous, except during emergency restoration procedures where utmost precautions, shall be taken to avoid any accidents.
- Adequate traffic control shall be maintained wherever erection work is being carried out at road crossings. The permissions required from the concerned authorities should be obtained.

Precautions to be taken during stringing or removal of conductors

- Before commencing the stringing operations or removal of conductors, a briefing shall be held by the supervisor with the workmen setting forth the following:
 - Plan of operation,
 - The type of equipment and tools and plant to be used
 - Grounding devices and procedures to be followed,
 - Crossover methods to be employed, and
 - The clearance authorisation required.
- Before doing any work on dead lines or equipment where there is a possibility of their becoming energized from any source, such line or equipment should be short circuited and grounded between the location of work and all possible sources of energy. The following precautions should be kept in mind:
 - Conductors to be grounded should be checked for potential by an approved method before the ground is installed.
 - Temporary grounding cables shall be flexible stranded copper not less than No.10 and shall be equipped with approved clamps at each end.
 - Grounding cables should be inspected before each use
 - When grounding lines or equipment, the connection to the ground shall be made first and that to the circuit or equipment last. In removing grounds, first remove the connection to the circuit or apparatus and then remove the ground connection. Insulated hot-sticks should be used in making the ground connection to the circuit or apparatus.
 - Grounds shall be placed on all phases even if work is to be carried out on one phase only.

- Where two or more crews are working independently on the same line or equipment, each crew shall properly protect themselves by placing their own temporary grounds
- In the event of the near approach of lightning or thunderstorm all work on overhead lines shall cease immediately.
- Wherever there is a possibility of the conductor being handled coming in contact with an energised conductor, or there is a possibility of a dangerous voltage build-up due to induction, the conductor being handled shall be grounded, unless a provision is made to insulate or isolate the employee. If the existing line is deenergised, a Line Clear Permit shall be obtained and the line grounded on both sides of the cross over. In case the Line Clearance Permit cannot be obtained the Line shall be considered as energised for all practical purposes.
- While executing the work of crossing over an existing Line, suitable guard structures with rope nets shall be installed to isolate the conductors and workmen coming within the required minimum clearances specified for the voltage. In addition the line being handled shall be grounded on either side of the cross over.
- The wire ropes, come-along clamps, anchors, guys, hoists shall have ample capacity to prevent failure and accidents. The load rating specified by the manufacturers for stringing equipment, pulley blocks and all other load bearing hardware and tools shall not be exceeded during operations. These shall be inspected regularly and replaced and repaired when damaged or when dependability is doubtful.
- During stringing or removal of conductors, no workmen shall be permitted to come directly under overhead operations.
- Each conductor shall be dead-ended at both ends before commencing stringing of the conductor in the next section

Precautions to be taken during tree-trimming

- The public shall be protected against hazards of tree trimming along public streets & highways by placing danger signs & signals. In addition, the following are to be followed:
 - Before climbing a tree, the trimmer should look it over carefully to decide how best to climb it.
 - The limbs should be carefully inspected to make sure that they could hold the trimmers weight.
 - Axes should not be used aloft, always use saw or bill hooks.
 - All tools should be raised & lowered by hand lines in such way as to avoid Conductors.
 - Before cutting down the tree all limbs should be cut off for sufficient height to avoid striking electric lines. Where there is danger that the tree may be strike & damage property, block & tackle should be used to control the direction of fall.
 - Felling operation once started, should be finished before the crew leaves for break etc.

Precautions to be taken installation of transformers

- When work is to be carried out on a transformer, both low and high tension breakers and isolators shall be opened. Similarly, during isolation of transformers to which potential transformers are connected, such potential transformers shall be isolated.
- Before starting any work on a transformer installation, it is important to check carefully for back feed, abnormal voltage or other dangerous conditions. Unusual circuit conditions may exist which require special consideration.
- Whenever transformers are replaced, the new transformer should be checked carefully for voltage, polarity and phase sequence before taking into service.
- Area should always be cordoned off & Safety tagging should be done prior to starting the job on transformer.

Safety precaution to be followed during Operation & Maintenance

1. Under no circumstance shall an employee hurry or take unnecessary chances when working under hazardous conditions, neither shall he attempt to perform hazardous work when extremely tired or exhausted
2. Employee must use the standard protective equipment intended for each job.
3. Only experienced persons shall be permitted to go near work place or to clean around energized or moving equipment.
4. Employees working in an elevated position should use a suitable safety belt or other adequate means to guard against falling.
5. Circuits should be tagged, marked or lettered unless clear identification by other means exist.
6. As per IE Rules 1956, the minimum safety working clearances for the bare conductors or live parts of any apparatus in outdoor sub-stations, excluding overhead lines, of HV and EHV installations shall be as follows:
 - *System Safety Working Voltage (KV) Clearance (Metres)*
 - LT 1.2 Mts (4 feet)
 - 11 KV 2.6 Mts (8 feet 8 inches)
 - 33 KV 2.8 Mts (9 feet 4 inches)
 - 132 KV 3.5 Mts (11 feet 8 inches)
 - 220 KV 4.3 Mts (14 feet 4 inches)
 - *Clearance from buildings of low and medium voltage lines*

Where a low or medium voltage, overhead line passes above or adjacent to or terminates on any building, the following minimum clearances from any accessible point, on the basis of maximum sag, shall be observed:-

 - Vertical clearance - 2.5 Mts from the highest point,
 - Horizontal clearance - 1.2 Mts from the nearest point
 - *Clearances from buildings of high and extra high voltage lines*

Where a high or extra-high voltage overhead line passes above or adjacent to any building or part of a building it shall have on the basis of maximum sag a vertical clearance of

 - a) 3.7 metres for high voltage lines up to and including 33,000 volts
 - b) 3.7 Mts plus 0.30 metre for every additional 33,000 volts or part thereof for Extra-high voltage lines

The horizontal clearance between the nearest conductor and any part of such building shall, on the basis of maximum deflection due to wind pressure, be not less than

 - a) 1.2 metres for high voltage lines up to and including 11,000 volts
 - b) 2.0 metres for high voltage lines above 11,000 volts and up to and including 33,000 volts
 - c) 2.0 metres plus 0.3 metre for every additional 33,000 volts or part thereof for extra-high voltage lines.
7. However no employee should go or take any conduction objects within the distance given from any exposed live part at the voltages specified.

8. Telephone conductors and ground wires of lightning arresters though they may be at or near ground potential are liable to develop high induced voltage under fault conditions. Suitable precautions should be taken when working on or near such circuits.
9. When fighting fires near exposed live parts, employees should avoid using fire extinguishing liquids, which are not insulating. If necessary, all neighbouring equipment may be killed or made dead.
10. Do not depend upon tripping of circuit breaker for isolation of lines and equipment from supply mains. The isolation must be in air media by an air break switch or isolator preferably visible.
11. No signal system like waving hands, flags and whistle should be resorted to communicate intelligence or convey instructions.
12. Insulation - Adequate isolation should be provided where any part of the body is likely to come in contact with - Live lines or equipment; Part of equipment or apparatus, which may develop dangerous potential due to surges, arcs or insulation failure though such parts may normally be at or near ground potential.
13. Do not use bare fingers or hands to determine whether a circuit is live.
14. Do not depend upon insulation of cables for safe working.

Lock out - Tag out:

1. Before starting work on any circuit or equipment, including that is supposed to be dead, employees shall assure themselves that the apparatus is physically rendered inoperative and that a standard Warning Board/Hold Card/Tag/ Danger Board and/or lockout device is properly attached to the equipment control.
2. No switch, or any other device used to put a circuit into service shall be operated while such a danger board/ warning board/ Hold Card or similar device is attached to it.
3. A Hold Card/danger board/warning board or similar device, that has been placed for the protection of workers shall be removed only by authorization of the person in whose name it was placed, and then only after the work has been completed and workers and tools are cleared.

Repair work on HT lines and equipment:

1. Handling and working on live electric circuits are hazardous occupations and shall be done only by workmen who are qualified by training and experience to do the work safely and only after authorization.
2. Repair work on HT lines on poles where LT is also running under HT should be carried out only after switching off the LT effectively. Work on the LT line should not be carried out unless there is an efficient earth screen between HT and LT lines or in the absence of such a screen, unless the HT line is switched off or in the opinion of the Section Officer, the work is otherwise safe.
3. Any line wherein the pressure does not exceed 250V to earth may be worked on live line by an authorized person provided the person
 - a. Uses a safety belt.
 - b. Wears rubber gloves or gauntlets
 - c. Has not to push any part of the body, except that portion of the arms protected by the gauntlets or gloves through any conductor other than that worked upon.
 - d. Is accompanied by an assistant with an effective torch light if working at night

- e. Before a worker undertakes any work on a pole or any other line support, he should first make a complete inspection from the ground of the position of all live wires, in order to determine the amount of precautions to be adopted and should inspect his insulating equipment and operating tools and tackles for their good condition before he attempts to do the actual work.

Work on Poles, Towers and construction work on lines:

1. Before climbing an elevated structure every employee shall first assure himself that the structure is strong enough to sustain his weight safely.
2. If poles or cross arms are apparently unsafe because of decay or unbalanced tensions of wires on them, they shall be properly braced or guyed before they are climbed.
3. In choosing the climbing side, the side of the pole where the ground wire is attached should not be used.
4. The workman should avoid using conductor, insulators, pins and so forth as hand holds and should not rest on street light fixtures or other apparatus on the poles or structures. Wherever available the workman shall rest himself on the foot cross arm firmly.
5. Linemen shall wear their safety belts while working on the poles and towers.
6. Wire hooks shall not be attached to linemen's' belts or safety straps
7. Safety straps should be placed above the top cross arm when it is at the top of the pole.
8. When two or more men are ascending a pole the second man should not start climbing until the first man is in safe position or when descending until the first man is on the ground.
9. On arriving at the working position, the worker should put his safety belt around the pole or some other suitable supports and make sure that the belt is properly secured. Care should be taken to prevent the straps on safety belt coming in contact with anything that may open the snap and thus release the safety belt. Safety belts should not be attached to insulator pins, conductor, stay wires etc.
10. Linemen's tools should be so secured that they will not fall out of the tool belts. A worker should carry only the minimum number tools in his belt. All other tools should be kept on the ground until they are required and then raised by means of a material bag attached to a hand line
11. Ordinarily no worker should work vertically below another worker on the same pole except under emergencies. When this condition is necessary, extreme care should be taken to prevent tools or other objects being dropped upon the man below.
12. When transferring wires and equipment from an old pole to a new pole, the old pole should either be locked to the new pole or guyed or both, as the condition may demand.
13. Before a worker cuts an overhead conductor he should make sure that it will fall clear. Where there is a possibility of the falling line coming in contact with another wire or doing other damage it should be lowered with a rope.
14. All light equipment and tools to be used aloft should be raised and lowered by means of a hand line and canvas bucket, or other suitable container. Men on the ground should stand clear of overhead work to prevent being struck by falling objects.
15. Tools and materials should not be thrown from the ground to a worker working aloft, nor should worker throw tools and materials from working place to the ground

16. Nobody shall work in such a manner that his arms or any tools extend beyond the body of tower when working on the live side.
17. Broken insulators or other sharp edged material shall not be left in vacant lots, along the right of way or in the location where the hazard of cutting feet could be caused for men or animals.
18. When stringing wires across streets and highways, avoid interfering with traffic or causing injury to workmen or pedestrians. Danger signs should be erected on both sides of the work location and where conditions warrant, flag-men should be stationed.
19. Hand line, materials, tools or equipment must not be scattered around streets, side-walks, highways, etc. but must be kept in a neat and orderly manner where they will not be liable to cause accidents.
20. In handling wires on a pole, they should be raised or lowered with a dry hand line and extreme care should be exercised.
21. A leather belt should be used when working on overhead locations. In its absence, belts of flexible hemp or manila rope may be permitted round the waists of the workman and tied to cross arm or pole as an alternative to the use of leather belt, under exceptional circumstances. The ropes should be kept in good condition and scrapped when not safe. It is necessary that the rope is twisted round the pole once or twice in order that release of tension on the pole may not cause it to slip down the pole.
22. Use ladders of suitable lengths to go up the poles to renew fuses or to carry out other minor works on feeders.
23. Hauling Poles:
 - a) Poles must be securely held on trucks to assure that the binders will not be released in rough going.
 - b) The speed of trucks hauling poles must be restricted to a point assuring safety to the operators of trucks and the traveling public.
 - c) A red flag by day and red light by night must be attached to the end of poles being hauled. The red light must be visible in any direction.
24. Pole storage:
 - a) When poles are stored on pole racks they shall be properly blocked to keep them intact on the rack.
 - b) Poles of different sizes should not be mixed but stored separately.
 - c) When poles are stacked temporarily near a road, they should be placed as close as possible to the edge of road.
 - d) Poles should not be stored at points in the road where there are short turns.
 - e) Poles stored on the highways should not have cross arms attached.
25. Excavation of Pole Pits:
 - a) The pole pits should not be excavated much in advance of erection as the pits cannot be left without being back-filled immediately.
 - b) Within town and village limits the pits excavated should be covered with planks so that no one accidentally falls into it.
 - c) Danger lamps should also be put up during night time surrounding the place.
 - d) As far as possible, the pit is to be excavated without resorting to blasting as it is dangerous to the adjacent buildings and roads where there is traffic.

- e) If blasting is un-avoidable, special precautions should be taken by covering the pit with bamboos and planks carrying out blasting at time when there is no traffic on the road.

26. Erection of Poles:

- a) This should be done under direct supervision of Foreman /SLI/LI
- b) Care should be taken to see that the ropes used are in sound condition and they are tied securely to the pole and tackle.
- c) When side guys are used in the setting of poles or structures, they shall be attached to crowbars driven into the ground.
- d) The FM/SLI/LI shall not assist in the setting of poles, but must give his entire attention to the Supervision to assure that the work is being safely performed.
- e) In obstructing a highway during the erection of poles, suitable signs or warnings shall be used on each side of the work to advise approaching traffic of the obstruction. Where traffic is heavy, flag men should be used for this purpose. Signs or signals must be moved along as the work progresses.

27. Installation of Stay Wires:

- a) When insulators are used, they should be connected into the stay wire line before the stay wire is set in place. Rubber gloves should be worn while installing stay wires through live circuits.
- b) In new work, stays should generally be installed before line wires are strung. In reconstruction work stays should be installed before any changes are made in the line wires and care must be taken not to place excessive pulls on the pole and wires already in a position.
- c) Stay sets should be so installed as not to interfere any more than necessary with the climbing space and should clear all high tension wires as far as practicable.
- d) Guy strain insulators should be provided wherever necessary to secure the required amount of insulation.
- e) Stays should be carefully installed on poles to prevent them from becoming loose.
- f) All stays which are anchored should be installed so that the stay does not interfere with street or highway traffic.
- g) Stay wire, containing snarls or kinks should not be used for line work. Stay wires should not contain any splices

28. Removal of stays:

- a) Before wires and stays are removed, the condition of the pole must be determined.
- b) If the pole is found to be weak, it should be securely braced before any changes in pole stain are made.
- c) Side stay, etc., should not be removed until sufficient stamping has been done to prevent the falling of the pole.

29. Dismantling Poles:

All poles must be supported at least three ways by means of ropes before any other work proceeds on the pole. This can be done by:

- a) Make two turns around the pole with a sling and tie securely.
- b) Tie three ropes around the sling at the proper angles
- c) Insert a pike pole under two sides of the sling and work the sling well up the pole.

- d) Snub off securely by means of crow bars driven into solid ground on any other substantial snub.
- e) Worker may then climb up the pole safely and release all conductors and other equipment and the pole may then be slowly brought down.

30. Stringing Wires:

- a) In stringing of wires care must be taken not to put kinks into any part. Kinks reduce the strength of the wire and may result in snapping of wire later on.
- b) In handling and stringing of weather proof covered wires, care must be taken not to injure the weather proof covering.
- c) A worker must not change the strains on a pole by adding wires until he is satisfied that the poles will safely stand the altered strain.

31. Tree Trimming:

- a) The public shall be protected against hazards of tree trimming along public street and highways by placing danger signals and signs
- b) Before climbing, the limbs or branches should be carefully inspected to make sure that they will hold the trimmers weight.
- c) Dead or decayed limbs are not safe to support any weight.
- d) Axes shall not be used aloft. Always use saws or bill hooks. Tools should be raised and lowered by hand line only.
- e) Part of trees/branches cut off in contact with live wires should be handled as live wire.
- f) Before cutting down a tree, all limbs should be cut off for a sufficient height to avoid striking electric lines. Where there is danger that the tree may strike and damage property block and tackle should be used to control the direction of fall.
- g) Felling operation, once started, should be finished before the crew leaves for the night or lunch hour.

32. Right of Way Clearing and Trimming:

- a) When walking through slush, use ankle high canvas boots to prevent injury to feet from broken insulators thorny undergrowth, shells, etc.
- b) Trees should be carefully felled to prevent them falling on transmission lines or adjacent buildings.
- c) Avoid starting grass fires or forest fires.

33. Patrolling lines:

- a) Emergency line patrol, trouble shooting on distribution lines and similar work should always be done with the greatest caution. Patrol men should be particularly alert at night to avoid walking into the fallen wires or metal fences which may be energized by fallen conductors.
- b) Be careful with lighted cigarettes and matches, which may cause a fire along distribution line right of way. Break matches and crush cigarette butts into earth on discarding.
- c) Patrolmen should be alert from stumbling hazards and from poisonous plants and snakes.

34. Line Work under Adverse Weather Conditions:

- a) In the event of the near approach of lightning storm all work on overhead lines shall cease immediately.

Earthing:

• Objective of Earthing

Prime Objective of Earthing is to provide a Zero potential surface in and around and under the area where the electrical equipment is installed or erected.

To achieve this objective the non-current carrying parts of the electrical equipment is connected to the general mass of the earth which prevents the appearance of dangerous voltage on the enclosures and helps to provide safety to working staff and public.

• Importance of Earthing & Practices

1. The earthing is provided for
 - a) Safety of Personnel
 - b) Prevent or atleast minimise damage to equipment as a result of flow of heavy fault currents.
 - c) Improve reliability of Power supply
2. The earthing is broadly divided as
 - a) System earthing (Connection between part of plant in an operating system like LV neutral of a Power Transformer winding and earth).
 - b) Equipment earthing: Connecting frames of equipment (like motor body, Transformer tank, Switch gear box, operating rods of Air break switches, etc) to earth.
3. Factors that change the requirement of earth electrode
 - a) If an electrical facility can expand in system, it creates different routes in the electrode. What was formerly a suitable low earth resistance can become obsolete standard.
 - b) More number of metallic pipes, which were buried underground become less and less dependable as effective low resistance ground connection.
 - c) In most of the locations, the water table is gradually falling. In a year or two, the area will end up with dry earth of high resistance. These factors emphasize the importance of a continuous, periodic program of earth resistance testing.
4. The earth resistance shall be as low as possible and shall not exceed the following limits:
 - Power Stations - 0.5 Ohms
 - EHT Substations - 1.0 Ohms
 - 33KV Stations - 2.0 Ohms
 - DTR Structures - 5.0 Ohms
 - Tower foot resistance - 10.0 Ohms

To keep the earth resistance as low as possible in order to achieve safe step and touch voltages, an earth mat shall be buried below ground and the mat shall be provided with grounding rods at suitable points. All noncurrent carrying parts at the Substation shall be connected to this grid so as to ensure that under fault conditions, none of these parts are at a higher potential than the grounding grid.

• Temporary Earthing:

This covers the detailed procedures for providing temporary earths while carrying out operation and maintenance works on the already existing lines or construction of new lines for the protection of workmen and property

Temporary earths:

Temporary earths are those applied at the actual location of the work during repair or construction of installations for the protection of workmen and property. Following feature of temporary earthing equipment shall be kept in view by persons using it:

1. Earthing devices shall be of approved types, comprising properly designed clamps attached to insulated sticks of sufficient lengths to enable the clamps to be securely clamped to the conductors being earthed without an employee's hand approaching closer than the minimum safe working distances. Each such line clamp is to be connected by a flexible copper earthing lead or of equivalent copper section of aluminium cable to an adequate earth clamp or other device for attaching to permanent connection or to a temporary earthing spike.
2. All earthing jumpers shall be of annealed bare and stranded copper equivalent aluminium conductor. Earthing leads for use at substations and lines shall have a cross section of at least 0.645 sq. cm (0.1 sq. inch) copper equivalent.
3. Earthing connections shall be continuous.
4. Electrodes for installation of temporary earths shall be of iron or steel rods of at least 1.905 cm (3/4") in diameter and 1.524 mtrs. / (5ft.) in length. These shall have clear metal surfaces free from rust or any coating of paint or any other poor conducting material and be driven to a depth of at least 0.914 mtrs. (3ft) in a spot considered to give good earth.
5. Copper wire/cable used for earthing conductor shall be examined by the employees every time before use.

General Precautions to be taken in connection with the application of temporary earths:

1. No electric apparatus or line shall be earthed until all reasonable precautions have been taken to ensure that it has been disconnected from all sources of supply.
2. The connections for earthing of an apparatus or line shall be applied or removed only by competent persons.
3. Earthing leads shall be connected to the system before being secured to the conductors.
4. Earthing leads shall not be applied in any cell or compartment in which there is an exposed live conductor.
5. When it is necessary to cut a line, bus bar or loop or to repair a broken conductor or damaged loop, earths shall be placed on both sides of the work.
6. Before working on underground cables, they shall be disconnected from the source of energy, discharged and then earthed. To discharge them use an earthed wire and make contact with it to each terminal in turn repeatedly.
7. When connecting earthing leads they shall be connected to the earth first and the conductors last. The removal shall be carried out in a reverse order to that adopted for the connection of various conductors to earth.
8. All works on dead circuits shall be done between two sets of temporary earths.
9. Earths shall never be attached or removed with bare hands. Rubber gloves, gauntlets or approved protective equipment shall always be used.
10. In so far practicable, the person applying the earths on poles and structures shall maintain his position below the level of conductor to be earthed in order to keep the body away from any arc that may occur when the earthing device is applied.
11. Employees shall keep off the earth wire.
12. No temporary earths shall be removed from the equipment while the work is in progress.
13. Employees shall not touch any conductors from which protective earths have been removed.
14. Earthing of one conductor does not render other conductors safe for work. All phases shall be earthed even if work is to be carried out only on one phase.

15. Temporary earth connections should not be connected to neutral wire or any other metal parts of the structure.
16. The meaning of temporary earth is that it is done for the purpose of carrying out the specific work by creating a safety zone for the protection of working personnel from electric shock.
17. The earthing connection to the lines should be as close to the point of work as possible.

Thank you