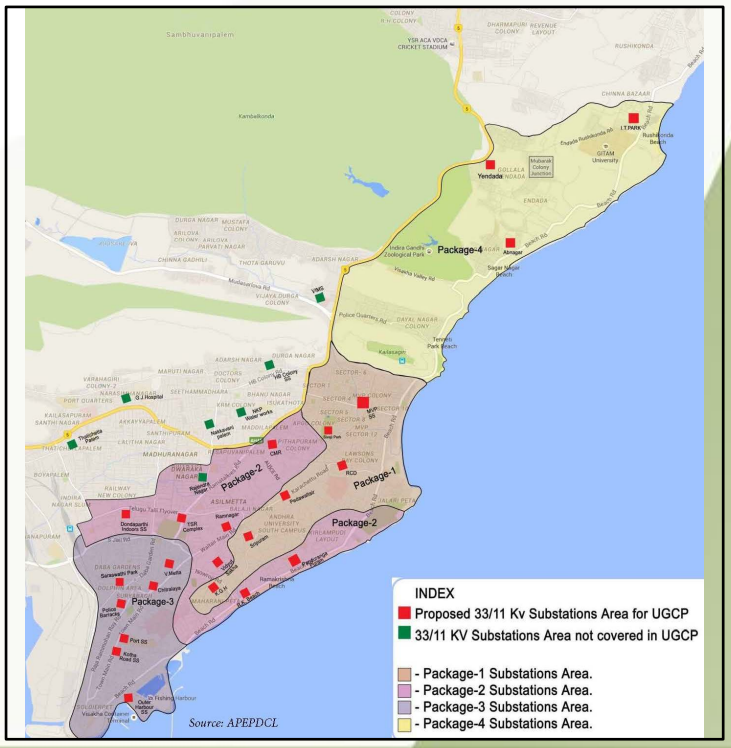
EASTERN POWER DISTRIBUTION COMPANY OF ANDHRA PRADESH LIMITED

CONVERSION OF EXISTING OVERHEAD POWER DISTRIBUTION NETWORK TO UNDER GROUND CABLING SYSTEM OF VISAKHAPATNAM CITY UNDER ANDHRA PRADESH DISASTER RECOVERY PROJECT (APDRP), (WORLD BANK FUNDED PROJECT)

Environmental Impact Assessment Report for Package-II VOLUME II

Updated as on November, 2016



Submitted by

Deccan Consulting Engineers Private Limited

B-98/5A (3rd Floor), Joshi Colony, Behind BALCO Market, I P Extension, Delhi 110 092

Telefax: **91 11 2224 8945, 2224 8946,** Website: **www.deccan.org.in** Email: **info@deccan.org.in**

Sl. No	TABLE OF CONTENTS		Page Nos.
I	**EXECUTIVE SUMMARY**		I-XV
1.	**INTRODUCTION**		1-5
	1.1.	Background	1
	1.2.	About Requirement of ESIA	1
	1.3.	Objectives of ESIA	2
	1.4.	Scope of ESIA	2
	1.5.	Consultant's Appointment and Mobilization	3
	1.6.	Data/Documents Review by Consultants	4
	1.7.	Constraints of Data Base	4
	1.8.	Structure of ESIA Report	4
2.	**PROJECT DESCRIPTION**		6-28
	2.1.	Visakhapatnam – Vulnerability to Cyclones & Wind Speed	6
	2.2.	HUDHUD, 2014	6
	2.3.	Economic Impacts of Natural Calamities	7
	2.4.	Visakhapatnam – The Financial Hub	7
	2.5.	The Project – APDRP	8
	2.6.	Benefits of REN/UG Cable Project	8
	2.7.	Resilient Electrical Network (REN)/ UG Cable Project	10
	2.8.	Project Implementation Unit	10
	2.9.	Resilient Electrical Network/ UG Cable Project (Package 2)	10
	2.10.	REN/UG Cable Route Alignment – Package 2 Area	12
	2.11.	General Arrangement of REN/UG Cables	14
	2.12.	Accidents/Fatality Record of APEPDCL's Operations	25
	2.13.	Decommissioning of Existing OH System Infrastructure	25
	2.14.	Activity Flow chart for UG Cable Laying Operations	26
	2.15.	Maintenance of Underground Cable Network	28

Sl. No	TABLE OF CONTENTS			Page Nos.
		2.15.1	Preventive Maintenance	28
		2.15.2	Corrective Maintenance	28
		2.15.3	Condition Based Maintenance	28
3.	**ENVIRONMENTAL & SOCIAL REGULATORY FRAMEWORK**			29-33
	3.1.	Applicable Environmental Regulations		29-33
		3.1.1.	Legal Framework	29
		3.1.2.	Environmental & Other Regulations Relevant to REN/UG Project	29
		3.1.3.	World Bank Environmental Requirements	33
4.	**BASELINE ENVIRONMENT PROFILE**			34-60
	4.1.	General		34
	4.2.	Operational Area/Corridor of Impact		34
	4.3.	Environmental Screening of REN/UG Project – Package 2 Area		36-37
		4.3.1.	Summary of Environmental Screening within 10 Km Radius of Package 2 Area	36
		4.3.2.	Summary of Environmental Screening within COI/Project Influence Area	37
	4.4.	Environmental Profile of REN/UG Project – Package 2 Area		37-60
		4.4.1.	Climate	37
		4.4.2.	Temperature	38
		4.4.3.	Wind Speed & Direction	38
		4.4.4.	Cloud Cover	38
		4.4.5.	Rainfall	38
		4.4.6.	Humidity	38
		4.4.7.	Thunder, Dust Storms and Visibility	38
		4.4.8.	Vulnerability of Visakhapatnam to Cyclones and Natural Disasters	39
		4.4.9.	Vulnerability of Visakhapatnam based on Wind Speed	41
		4.4.10.	Seismic Hazard Risk and Vulnerability:	41

Sl. No	TABLE OF CONTENTS				Page Nos.
		4.4.11.	Geology and Soil		43
		4.4.12.	Ground Water		43
			4.4.12.1.	Hydrogeology	43
			4.4.12.2.	Water Level Scenario	44
			4.4.12.3.	Status of Groundwater Development	46
		4.4.13.	Ambient Air Quality:		46
			4.4.13.1.	Ambient Air Quality in Package 2 Area	48
		4.4.14.	Ambient Noise Levels in Visakhapatnam		50
			4.4.14.1.	Ambient Noise Levels in Package 2 Area	51
		4.4.15.	National Parks, Wild Life Sanctuaries & Important Bird Areas		52
		4.4.16.	Olive Ridley Turtle Nesting Sites		52
		4.4.17.	Archaeological Monuments and Excavation Sites		56
		4.4.18.	Heritage Resources		56
		4.4.19.	Flora & Fauna		59
		4.4.20.	Sensitive Receptors		59
		4.4.21.	Over ground Pre-existing Infrastructure within Operational Area		60
		4.4.22.	Underground Pre-existing Infrastructure within Operational Area		61
		4.4.23.	Ramps/Steps/Other Structures within Operational Area		61
5.	**ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES**				62-100
	5.1.	General			62
	5.2.	Impacts and mitigation measures due to location			62-65
		5.2.1.	Impacts on Land use		62
		5.2.2.	Impacts on Surface Water Resources		62
		5.2.3.	Impacts on Ground Water Resources		62
		5.2.4.	Impacts on Soil and Geology		64

Sl. No	TABLE OF CONTENTS				Page Nos.
		5.2.5.	Impacts on Flora and Fauna		64
		5.2.6.	Impacts on Weather and Climate		64
		5.2.7.	Impacts on Ancient Monuments/Archaeological Sites		64
		5.2.8.	Impacts on Heritage Structures		65
		5.2.9.	Impacts on Ecologically Sensitive Areas		65
	5.3.	Hazard Risk and Vulnerability			65
	5.4.	Beneficial Impacts of REN/UG Cable Project			65
	5.5.	Impacts and Mitigation Measures during Construction Stage			67-87
		5.5.1.	Site Clearance and Preparation		69
			5.5.1.1.	Impacts	69
			5.5.1.2.	Mitigation Measures	69
		5.5.2.	Excavation of Pavement/Asphalt Layers		73-75
			5.5.2.1.	Impacts	74
			5.5.2.2.	Mitigation Measures	75
		5.5.3.	Excavation of Sub-base and Base Layers		76-77
			5.5.3.1.	Impacts	77
			5.5.3.2.	Mitigation Measures	77
		5.5.4.	Cable Pullout, Lowering and Jointing		79
			5.5.4.1.	Impacts	79
			5.5.4.2.	Mitigation Measures	79
		5.5.5.	Backfilling of Cable Trenches with Fine Sand		80
			5.5.5.1.	Impacts	80
			5.5.5.2.	Mitigation Measures	80
		5.5.6.	Laying of Cement Concrete Slabs		81-82
			5.5.6.1.	Impacts	82

Sl. No	TABLE OF CONTENTS				Page Nos.
			5.5.6.2.	Mitigation Measures	82
		5.5.7.	Road Restoration Works		82-85
			5.5.7.1.	Impacts	85
			5.5.7.2.	Mitigation Measures	85
		5.5.8.	Construction of Cable Joint Inspection Chambers		86
			5.5.8.1.	Impacts	87
			5.5.8.2.	Mitigation Measures	87
		5.5.9.	Cable Jointing		88
			5.5.9.1.	Impacts	88
			5.5.9.2.	Mitigation Measures	88
	5.6.	Opening of Operational Area/COI for Public Use			89
		5.6.1.	Impacts		89
		5.6.2.	Mitigation Measures		89
	5.7.	On site Workforce			89
		5.7.1.	Impacts		90
		5.7.2.	Mitigation Measures		90
	5.8.	Ambient Noise Levels at Operational Area			91-94
		5.8.1.	Impacts		92
		5.8.2.	Mitigation Measures		94
	5.9.	Establishing of Store Yards and Work Camp Sites			94-95
		5.9.1.	Impacts		95
		5.9.2.	Mitigation Measures		95
	5.10.	Impacts and Mitigation Measures During Operation Stage			95-96
		5.10.1.	Impacts		96
		5.10.2.	Mitigation Measures		97
	5.11.	Impacts and Mitigation Measures during Removal of OH Infrastructure			97-98

Sl. No	TABLE OF CONTENTS			Page Nos.
		5.11.1.	General	98
		5.11.2.	Impacts	98
		5.11.3.	Mitigation Measures	98
	5.12.	Work Sites Safety During Laying of Underground Cables		98-99
		5.12.1.	Safety in Pits and Trenches	98
		5.12.2.	Occupational Health and Safety During Laying of Underground Electrical Cables	98
		5.12.3.	Safety Working in the Vicinity of Traffic	99
		5.12.4.	Public Safety	99
	5.13.	Occupational Health & Safety During Maintenance		99
6.	**ANALYSIS OF ALTERNATIVES**			101-105
	6.1.	General		101
	6.2.	With or Without Project Scenario		101
	6.3.	Cable Route Alternatives		102
	6.4.	'Operations Area' Alternatives		102
	6.5.	Economic Impacts & Benefits of REN/UG Cable Project		105
7.	**PUBLIC CONSULTATION & INFORMATION DISCLOSURE**			106-117
	7.1.	General		106
	7.2.	Stake Holder Consultations		106
	7.3.	Issues Raised During Stakeholder Consultations		107
8.	**ENVIRONMENTAL MANAGEMENT PLAN**			115-148
	8.1.	General		115
	8.2.	Budgetary Costs for EMP Implementation & Supervision		115
	8.3.	Environmental Management Plan		113
9.	**INSTITUTIONAL ARRANGEMENTS FOR EMP IMPLEMENTATION SUPERVISION & GRIEVANCE REDRESS MECHANISM**			149-162
	9.1.	General		149

Sl. No	TABLE OF CONTENTS			Page Nos.
	9.2.	Institutional Arrangements for EMP Implementation Monitoring		14
	9.3.	Roles & Responsibilities		149-151
		9.3.1	Role of Team Leader - Environment	149
		9.3.2	Role of EHS Officers – Environment	151
	9.4.	Qualification and Experience Requirements		153
	9.5.	Monitoring Frequency and Responsibility		154
	9.6.	Grievance Redress Mechanism		160

Sl No.	LIST OF TABLES	Page Nos.
1	Substation Area wise Type and Length of cable Trenches under Package 2	II
2	National and State Environmental Regulations Relevant to REN/UG Cable Project	III
3	Relevant and Applicability of WB Safeguard Policies for REN/UG Project – Package 2	V
2.1	Damages & Cost of Restoration of Electrical Distribution (OH) Infrastructure due to HUDHUD in Visakhapatnam	7
2.2	REN/UG Cable Project Implementation Schedule	12
2.3	Substation Area Wise Type & Length of Cable Trenches under Package 2	14
2.4	Electrical Accidents/Fatality of APEPDCL's Operations	25
2.5	Existing Over Head Infrastructure to be decommissioned under Package 2 Area	26
3.1	Environmental Regulations Relevant to REN/UG Project	29
3.2	Relevant & Applicability of WB Safeguard Policies for REN/UG Project – Package 2	33
4.1	Frequency of Depressions, Cyclonic and Severe Cyclonic Storms along Visakhapatnam District	39
4.2	Month Wise Storms That Crossed Andhra Pradesh Coast (Between 1891 to April 2014)	40
4.3	Cyclone Prone Districts* of Andhra Pradesh	41
4.4	Comparison of Average Depth to Ground Water Levels & Rainfall of January 2015 to 2016, Visakhapatnam, Andhra Pradesh	45

4.5	Status of Groundwater Development in Visakhapatnam	46
4.6	Ambient Air Quality Monitoring Data (Annual Averages) of Visakhapatnam (2014-15)	47
4.7	Ambient Air Quality Monitoring Data within Package 2 Area, March 2016	48
4.8	Annual Average Values of Ambient Noise Levels at Visakhapatnam & Suburbs (2014-15)	50
4.9	Ambient Noise Levels Monitoring Data within Package 2 Area, March 2016	51
4.10	Turtle Nesting and Conservation along Vishakhapatnam Coastline- 2015	53
4.11	Heritage Sites in Package 2 Area	56
4.12	Enumeration of Trees within 2.5 m wide operational area of Package 2 Area	59
4.13	List of Sensitive Receptors & Other Structures along Cable Route Corridor	60
4.14	Enumeration of Poles along Cable Route Corridor under Package 2 Area	60
4.15	Details of Structures likely to impacted under Project-Package 2	61
5.1	Total Water Requirement for REN/UG Cable Project-Package 2	63
5.2	Water Requirements for Laying 500m Length of UG Cable	63
5.3	Work Completion Time UG Cable Laying in a 500m Long Segment	67
5.4	Pavement (Asphalt & Cement Concrete) Cut Materials for Package 2 – REN/UG Cable Project	74
5.5	Excavated Quantities of Base & Sub-Base Layers under Package 2 – REN/UG Cable Project	77
5.6	Requirement of Fine Sand for Backfilling of Trenches for Package 2 – REN/UG Cable Project	81
5.7	Requirement of Cement Concrete Slabs for Laying in Cable Trenches	81
5.8	Pavement Types & Options for Road Restoration under REN/UG cable Project (Package 2)	83
5.9	Estimated Quantities of Pavement – Layer wise for Road Restoration under REN/UG Cable Project (Package 2)	84
5.10	Cable Joint Chambers under Package 2 – REN/UG Cable Project	87
5.11	Workforce Requirements for UG Cable Laying under Package 2 – REN/UG Cable Project	90
5.12	Permissible Duration for Workers Exposed to Specific Noise Levels	90
5.13	Potential Noise Sources & Corresponding Sound Power Level	92
5.14	Noise Modeling Scenario	93
5.15	Noise Attenuation Effect of M.S Barricade used under REN/UG Cable Project	93
7.1	Summary of Stakeholders Composition at both Package & Substation Area Consultations	107
7.2	Issues Raised during Public Consultations & its Redress in EMP	108

8.1	Abstract of Budgetary Provision for EMP and RAP Implementation and Supervision for Package 2 Area under REN/UG Cable Project	116
8.2	Summary Budgetary Provision for EMP & RAP Implementation & Supervision for Package 2 Area under REN/UG Project	117
8.3	Environmental Management Plan (EMP) for Package 2 of REN/UG Cable Project, Visakhapatnam	124
9.1	Monitoring Frequency and Responsibility for REN/UG Cabling Project	154
9.2	Illustrative Checklist for Opening up of Operational Area	156
9.3	Illustrative Checklist for Closing of Operational Area	158
9.4	Checklist for Development of Work Site Safety Management Plan	159

Sl No.	LIST OF FIGURES	Page Nos.

2.1	Package wise spread of REN/UG Cabling Project within Visakhapatnam	11
2.2	The package 2 area of REN/UG component	13
2.3	REN/UG Cable Route Alignment in all 7 Substation Areas within Package 2	15
2.4	REN/UG Cable Route within Kailasametta Substation Area	16
2.5	REN/UG Cable Route within Maddilapalem Substation Area	17
2.6	REN/UG Cable Route within Vidyut Sakha Substation Area	18
2.7	REN/UG Cable Route within Indoor Dondaparty Substation Area	19
2.8	REN/UG Cable Route within RK Beach Substation Area	20
2.9	REN/UG Cable Route within TSR Complex Substation Area	21
2.10	REN/UG Cable Route within Pandurangapuram Substation Area	22
2.11	Configuration of Cable Trenches under Package 2 of REN/UG cable Project	23
2.12	Activity Flowchart for Underground cable Laying Operations – REN/UG cable Project (Package 2 Area)	27
4.1	Barricaded operational area/corridor of impact for UG cable laying operations	35
4.2	Vulnerability of Visakhapatnam Coast to Cyclones	39
4.3	Major Cyclones along Coastline of Andhra Pradesh in Recent Years	40

4.4	Wind & Cyclone Hazard Map Relevant to Package 2 Area	42
4.5	Hydrogeology of Visakhapatnam District	43
4.6	Ground Water Yield Potential – Visakhapatnam District	44
4.7	Depth to Groundwater Level in Andhra Pradesh	45
4.8	Groundwater Levels Fluctuation in Andhra Pradesh	46
4.9	Ambient Air & Noise Monitoring Stations within Package 2 Area	49
4.10	Kambalakonda Wild Life Sanctuary, Ecotourism Park & Zoological Park in Visakhapatnam	54
4.11	Location of Turtle Nesting Sites along coastline of Visakhapatnam	55
4.12	Locations of Heritage Resources within Package 2 Area	57
4.13	Locations of Heritage Resources within Package 2 Area (shown along with cable route)	58
5.1	Typical Design for Barricade for Operational Area	72
6.1	Barricaded Operational Area/Corridor of Impact for UG Cable Laying Operations	104
6.2	Corridor of Impact/Operational Area for Trench Excavation	105
9.1	Institutional Arrangement for Implementation & Supervision of ESMP & RAP	150
9.2	Grievance Redressal Mechanism under REN/UG Project	162

Sl. No.	LIST OF ANNEXURES	Page Nos.

1.	Test Reports of Ambient Air Quality & Noise Monitoring by Bhagavathi Ana Labs & Teamlabs	163
2.	Methods for Recycling of Existing Asphalt Pavement	176
3.	Noise Level Contour Maps	183
4.	Details of Public Consultation along with list of Participants and Photographs	196

LIST OF ABBREVIATIONS	
ADE	Assistant Divisional Engineer
APDRP	Andhra Pradesh Disaster Recovery Project
APEPDCL	Eastern Power Distribution Company of Andhra Pradesh Limited
CRZ	Coastal Regulation Zone
DPR	Detailed Project Report
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
ESIA	Environmental & Social Impact Assessment
ESMF	Environmental & Social Management Framework
ESR	Environmental Screening Report
GIS	Geographic Information System
GPR	Ground Penetrating Radar
GRM	Grievance Redress Mechanism
GVMC	Greater Vishakhapatnam Municipal Corporation
PFC	Power Finance Corporation
PIU	Project Implementation Unit
RAP	Resettlement Action Plan
REN	Resilient Electrical Network
RFP	Request for Proposal
SIA	Social Impact Assessment
SMP	Social Management Plan
APSDMA	Andhra Pradesh State Disaster Management Authority
BMPTC	Building Materials & Technology Promotion Council
IMD	India Meteorology Department
XLPE	Cross Linked Polyethylene
APCRZMA	Andhra Pradesh Coastal Regulation Zone Management Authority
APPCB	Andhra Pradesh Pollution Control Board
APWALTA	Andhra Pradesh Water, Land & Tree Act
BIS	Bureau of Indian Standards
CFE	Consent for Establishing
CFO	Consent for Operate
CGWB	Central Ground Water Board
CPCB	Central Pollution Control Board

CPR	Cultural Property Resources
HTL	High Tide Line
SEIAA	State Environmental Impact Assessment Authority
APIIC	Andhra Pradesh Industrial Infrastructure Corporation
COI	Corridor of Impact
DBH	Diameter at Breast Height
ESMF	Environmental & Social Management Framework
IUCN	International Union for Conservation of Nature
KWS	Kambalakonda Wildlife Sanctuary
NAAQ	National Ambient Air Quality
NAAQMP	National Ambient Air Quality Monitoring Program
NAAQS	National Ambient Air Quality Standards
NABL	National Accreditation Board for Testing & Calibration Laboratories
NAMP	National Air Quality Monitoring Program
NDMA	National Disaster Management Authority
OFC	Optical Fiber Cable
PMSS	Probable Maximum Storm Surge
RTNMS	Real Time Noise Monitoring Station
STPF	Sea Turtle Protection Force
VSPCA	Visakha Society for Protection & Care of Animals
VUDA	Visakhapatnam Urban Development Authority
CPCR	Central Plant Cold Recycling
FRLS	Fine Resistant & Low Smoke
HDPE	High Density Polyethylene
IBA	Important Bird Area
IRC	Indian Road Congress
KVA	Kilo-volt-ampere
LED	Light Emitting Diode
OSHA	Occupational Safety & Health Administration
PPE	Personnel Protective Equipment
PVC	Polyvinyl Chloride
RCC	Reinforced Cement Concrete
RMC	Ready Mix Concrete
WBM	Water Bound Macadam

WMM	Wet Mixed Macadam
BSNL	Bharat Sanchar Nigam Limited
IIAM	Integral Institute of Advanced Management
NGO	Non-Governmental Organisation
AAQ	Ambient Air Quality
AIDS	Acquired Immune Deficiency Syndrome
EHS	Environment Health & Safety
EPC	Engineering, Procurement & Construction
HIV	Human Immunodeficiency Virus
MOEF&CC	Ministry of Environment, Forest & Climate Change
OMC	Optimum Moisture Content
PAP	Project Affected Persons
PCC	Plain Cement Concrete
PMU	Project Management Unit
PUC	PUC
GRC	Grievance Redressal Committee
WSMP	Worksite Safety Management Plan

EXECUTIVE SUMMARY

1.0 INTRODUCTION

Eastern Power Distribution Company of Andhra Pradesh Limited (APEPDCL) is the project implementation unit (PIU) designated for implementation of the Resilient Electrical Network or Underground Cable Project under the Andhra Pradesh Disaster Recovery Project (APDRP) with funding assistance of the World Bank.

The Resilient Electrical Network(REN) or Underground cable project is one of the seven components under APDRP and comprise conversion of all existing 33kV, 11 kV and 415 volts overhead (OH) lines into underground cable network within the municipal limits of Visakhapatnam city. The REN or UG cable project has been divided into four packages for operational requirements and is scheduled for completion by August 2018.

M/s Deccan Consulting Engineers Private Limited, appointed by APEPDCL has conducted an Environmental and Social Impact Assessment (ESIA) of the REN/UG cable project.

The ESIA studies aimed at effective assessment of the likely environmental and social impacts and their management through efficient and appropriate management measures, in order to protect or enhance the quality of the environment and social settings within the REN/UG cable project influence area and also facilitate implementation of REN/UG cable project in an environmentally and socially sustainable manner ensuring the implementation of REN/UG cable project is in compliance with the environmental and social management framework under APDRP as well as in compliance with the environmental and social safeguards requirements of the World Bank.

2.0 PROJECT BACKGROUND

Andhra Pradesh, is the second largest in the country with 972 km of coastline after Gujarat. By virtue of long coastline and geographical location, many stretches of its coastline are vulnerable to multiple natural disasters in India.

The Hudhud in October 2014 has caused a loss of nearly Rs 8,000 crores to the State affecting the infrastructure, public and private properties within Visakhapatnam and elsewhere in Andhra Pradesh alone. This is apart from the loss of lives, livestock, damages to standing crops and farm land among others.

During Hudhud, APEPDCL also suffered extensive loss to the tune of Rs 500 crores due to the damages caused to its power distribution infrastructure in Visakhapatnam. An estimated 4800 transformers, 50 sub stations and 57,000 electric poles among other utilities were damaged during Hudhud and several kilometres of transmission line conductors were disrupted /damaged.

The Andhra Pradesh Disaster Recovery Project (APDRP) constitute large multi- sector engagement on risk and vulnerability reduction, with assistance for restoring and improving rural connectivity, public services and livelihood opportunities. REN/UG cable project is one of the seven components under APDRP, earmarked to be exclusively implemented within Visakhapatnam city.

3.0 PROJECT DESCRIPTION

The Package 2 of REN/UG cable project will cover seven substations areas namely Indoor Dondaparty, Kailasametta, Pandurangapuram, Maddilapalem, RK Beach, TSR Complex and Vidyut Sakha and is spread over an area of 5.19 sq.km. The underground cables will be laid along existing roads, adjacent to footpaths or along road edge, where footpaths do not exist. The cable routes, during project preparation have been finalized after due consideration of several factors like most optimal length, minimum social and environmental concerns among other influencing factors.

The underground cables under the package will be laid in four types of cable trenches, (width varying between 1.0 to 0.5m and depth varying between 1.25 to 0.85) with a cumulative length of 87.61 km length and through 4.54 km of RCC ducts, where cable trenches are not feasible. Thus, the total length of underground cable under Package 2 will be 92.15 kms (Ref Table 1).

Table 1: Substation Area wise Type and Length of cable Trenches under Package 2

S.No	Trench Configuration (Width X Depth in mm)	VIDYUT SAKHA	RK BEACH	KAILASAMETTA	TSR COMPLEX	DONDAPARTY	MADDILAPALEM	PANDURANGAPURAM	Total Length(Km)
1	Type 1: 1000mm X 1250mm	5.5	0.81	1.63	3.8	0.6	5.82	0	**18.16**
2	Type 2: 600m X 1000mm	7.67	3.24	2.44	11.28	5.86	9.48	3	**42.97**
3	Type 3: 600mm X 1000mm	2.18	1.09	0.77	2.52	2.49	1.26	1.83	**12.14**
4	Type 4: 500 X 850mm	4.66	0.81	0.25	2.69	0.91	2	3.02	**14.34**
5	Total Trench Length	20.01	5.95	5.09	20.29	9.86	18.56	7.85	**87.61**
6	RCC Duct	1.37	0.2	0.41	0.95	0.15	1.46	0	**4.54**
7	**Total Length in Km**	**21.38**	**6.15**	**5.50**	**21.24**	**10.01**	**20.02**	**7.85**	**92.15**

Source: APEPDCL

4.0 Benefits of REN/UG Cable Project

The notable and most anticipated benefits of REN/UG cable project to Visakhapatnam City and its residents are:

- Areas to be covered under REN/UG cable project is expected to practically remain unaffected in future from power disruptions and associated implications during or after cyclone/high wind speeds or natural calamities/inclement weather conditions.
- REN/UG cable network is safer to public lives and property during calamities/disasters/thunders/lightening instances.
- Underground cables do not require any dedicated corridor to be kept permanently clear as in case of an overhead line for safety, maintenance and repair
- Underground cables will vacate space over ground, which improves aesthetics, higher public acceptance, convey environmental benefits and as well spurt an increase in

property values. Thus, underground cable project has potential to induce knock-on effect" - that all other local communities might want "their" network put underground.

- Underground cables do not create obstacles over ground like in case of overhead lines. Also, underground cables pose no hazard to avifauna and low flying aircraft
- Underground cables are not affected by momentary interruptions, occurring from lightning, crow faults and falling of tree branches on overhead lines, which de-energize and then re-energize the circuit moment later, a most common feature in overhead lines
- Typically, outrages in underground cable network are about half of their equivalent overhead networks. Also, operating and maintenance costs are estimated to be around one tenth of the cost of overhead network. Thus, advantage of underground network is of fewer interruptions and lower maintenance costs.
- Underground cables have no pilferage, whereas overhead cables provide scope for pilferage/power thefts, which can lead to safety hazards and accidents at times.

Visakhapatnam, an important financial hub or commercial capital of Andhra Pradesh has been selected to be developed as one of the SMART cities by the Government of India under its SMART CITIES MISSION. The core infrastructure elements in a smart city essentially include uninterrupted and assured electricity supply among all other infrastructure. Thus, Visakhapatnam needed to have a resilient urban infrastructure that can assure safety to public life and property during calamities with least down time and save recurring the losses to state exchequer.

5.0 ENVIRONMENTAL REGULATORY FRAMEWORK

5.1 Government of India and Andhra Pradesh Environmental Regulations

The environmental regulations of Government of India as well as Andhra Pradesh State, which are relevant to Package 2 of REN/UG cable project have been given in **Table 2**.

Table 2: National and State Environmental Regulations Relevant to REN/UG Cable Project

Sl. No	Environmental and Other Regulations	Relevance to REN/UG Cable Project	Regulatory Clearances Required, if any	Authority
1	Environmental Impact Assessment Notification, 14th September 2006 and subsequent amendments	This notification is NOT applicable as REN/UG cabling project is not listed in the Schedule of the notification and therefore out of the purview of notification	NONE	MoEF, GoI and SEIAA, GoAP

Table 2: National and State Environmental Regulations Relevant to REN/UG Cable Project				
Sl. No	**Environmental and Other Regulations**	**Relevance to REN/UG Cable Project**	**Regulatory Clearances Required, if any**	**Authority**
2	Air (Prevention and Control of Pollution) Act, 1981	This act is applicable for construction phase to manage ambient air quality at work camp sites with hot mix plants, macadam mix plants and concrete batch mix plants etc for road restoration work.	Consent for Establish (CFE) is to be obtained prior to establishing work camp sites. Consent for Operate (CFO) is to be obtained prior to commencement of operations at work camp sites	APPCB, Government of Andhra Pradesh
3	Coastal Regulation Zone(CRZ) Notification, 2011 and subsequent amendments	The package 2 area of REN/UG cable project is within 500 metres from High Tide Line. The landward area of REN/UG cable project, which is within 500 metres from HTL is in municipal limits, fully developed and has been provided with drainage and approach roads. As per the notification, such areas are classified under CRZ-II areas. Laying of underground cables under REN/UG cable route will be confined to existing city roads and will not ingress into beach areas (shoreline) along coastline.	CRZ clearance is NOT required for REN/UG cable project as it does not require water front and foreshore facilities. The UG cabling work will be confined on existing paved road	APCRZMA, Government of Andhra Pradesh and MoEF&CC, Government of India
4	Water Prevention and Control of Pollution) Act,1974	This act is applicable for construction phase to manage to manage liquid waste discharges at work camp sites with hot mix plants, macadam mix plants and concrete batch mix plants etc.	Consent for Establish (CFE) is to be obtained prior to establishing work camp sites. Consent for Operate (CFO) is to be obtained prior to commencement of operations at work camp sites	APPCB, Government of Andhra Pradesh
5	Noise Pollution (Regulation and Control Act),2000	This act will be applicable for all construction equipment/plant and machinery including vehicles deployed for implementation of REN/UG cable project-package 2 area for regulation of ambient noise levels	NONE but noise levels are to be regulated during construction and maintenance of proposed REN/UG cable project in conformity with permissible standards	APPCB, Government of Andhra Pradesh

Table 2: National and State Environmental Regulations Relevant to REN/UG Cable Project				
Sl. No	**Environmental and Other Regulations**	**Relevance to REN/UG Cable Project**	**Regulatory Clearances Required, if any**	**Authority**
6	Construction & Demolition Waste Management Rules, 2016	This rule shall be applicable to waste resulting from excavation of trenches for cable laying operations such as excavated pavement materials, cement concrete roads, other construction debris and rubble etc	Construction waste management plan, prior to commencement of construction (cable laying operations)	Greater Visakhapatnam Municipal Corporation (GVMC)
8	Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996	To ensure safety and welfare measures for workers employed at building and other construction sites. The REN/UG project is covered under Other construction category	NONE. Safety and welfare measures for work force employed at construction sites are to be regulated in conformity with the Act	Andhra Pradesh Building and Other Construction Workers' Welfare Board

5.2 World Bank Safeguards Policy Requirements

The safeguard policies of the World Bank relevant to Package 2 of REN/UG cable project is given in **Table 2**.

Table3: Relevant and Applicability of WB Safeguard Policies for REN/UG Project-Package 2				
S.No	**World Bank Safe Guard Policy**	**Policy Objective**	**Policy Applicability to REN/UG Project**	**Policy Triggered Or Not**
1	Environmental Assessment (OP/BP 4.01)	Overall governing policy intended to ensure Bank-financed projects are environmentally sound and sustainable	All potential impacts due to REN/UG cable project are to be assessed and necessary mitigation measures are to be incorporated	Triggered
2	Natural Habitats (OP/BP 4.04)	Policy is intended to prohibit Bank financing of projects that degrade or convert critical habitats and supports projects that affect non-critical habitats only if no alternatives are available and if acceptable mitigation measures are in place.	REN/UG cable routes will be along existing city roads, which are under the jurisdiction of Greater Visakhapatnam Municipal Corporation and does not pass through forest areas/national parks/sanctuaries or known wildlife crossing points.	Not Triggered
3	Forests (OP/BP 4.36)	Policy is intended to support sustainable and conservation-oriented forest management, harness potential of forests to reduce poverty in a sustainable manner, integrate forests into sustainable economic development, and protect vital local and global environmental services and values of forests.	REN/UG cable routes will not pass through or involve in any activity in forests/plantation areas.	Not Triggered

4	Physical Cultural Resources (OP/BP 4.11)	Policy is intended to ensure that projects identify and inventory cultural resources that are potentially affected by the project. Projects should include mitigation measures, when there are adverse impacts on physical cultural resources.	The REN/UG cable routes will be along city roads and will be aligned to avoid/bypass all cultural property resources (CPR) and therefore does NOT warrant shifting or affect CPRs.	Triggered

6.0 OPERATIONAL AREA/CORRIDOR OF IMPACT

The underground cables are intended to be laid in trenches alongside of existing roads. The mechanical excavation of cable trenches will require a minimum of 2.5 metre wide space, which can also serve to stack and handling of materials, cable pull out and lowering operations, backfilling of trenches, construction of inspection chambers, road restoration and thus largely confine/limit all underground cable laying operations works to this 2.5 metre strip along road side. Therefore, 2.5 m wide strip is considered as required operational area for trench excavation and cable laying, along the footpath, one side of this 2.5 metre strip being footpath or road edge, and other side of strip extending towards the other side of road or median, in case of dual carriageway. This arrangement will avoid fouling with other pre-existing road side over ground infrastructure like electric/ telecom/street light poles, road side trees and underground OFC cables laid by multi telecom operators.

Also, during cable laying, this 2.5-metre-wide operational area will be barricaded on both sides, with temporary intermediate access provided to buildings, wherever required and all cable laying operations are to be limited to this barricaded operational area. Thus, the barricaded operational area will be the direct Corridor of Impact (COI), as a consequence of cable laying operations. The entire road width (in case of single carriage way) or up to median (in case of divided carriageway) along cable routes will be Project Influence Area, which will be subjected to some incidental construction phase impacts and inconveniences like increased dust, noise levels and traffic disruptions due to constricted carriageway due to barricading of operational area among others.

7.0 ENVIRONMENTAL SCREENING OF PACKAGE 2 AREA

As part of the EIA, an environmental screening for Package 2 area and its surrounding within a 10 km radius was carried out in accordance with the guidelines and formats of ESMF under APDRP and based on latest secondary data base available in public domain, supplemented by field visits for ground truth verification, wherever required.

The environmental screening of corridor of impact and project influence area along cable routes was also carried out through transect walks and all environmental features along cable routes were captured in specially prepared strip plans. The screening also included inventory of environmental features, sensitive receptors and physical cultural resources along the cable routes. A videography of the corridor of impact area was also carried out during the environmental screening.

The environmental screening summary of Package 2 area, up to 10km radius indicate;

- There are no biosphere reserves, national parks, tiger/elephant reserves, coastal areas with coral reefs, wetlands, important bird areas and/or any other ecologically sensitive areas within a radius of 10km of the package 2 area of REN/UG cable project
- The Kambalakonda wild life sanctuary, Kambalakonda eco-tourism park and Indira Gandhi Zoological Park are at an aerial distance of 3 km from outer edge of Package 2 area.
- The coastline along Visakhapatnam between R K beach and Bheemili is known to have sporadic nesting sites for Olive Ridley turtles (*Lepidochelys olivacea*), which are protected under Schedule I of Wildlife Protection Act and listed as vulnerable in IUCN list. However, the nesting site within the package 2 area is Yoga village, where VSPCA has an ex-situ hatchery facility, due to excessive beach front activities on like tourism, heavy lighting, pollution and predators such as crows, eagles, jackals and beach dogs. Cable routes under REN/UG project are along city roads through fully developed areas and do not extend into coastal sands (beach areas).
- The package 2 area of REN/UG cable project skirts within 500 metres from High Tide Line and thus will be under the purview of CRZ Notification. The landward area of REN/UG cable project, which is within 500 metres from HTL is in municipal limits, fully developed and has been provided with drainage and approach roads. As per the notification, such areas are classified under CRZ-II areas. Laying of underground cables under REN/UG cable project will be limited to existing roads, which are pre-existing to the date of CRZ notification and does not extend into sand and/or beach areas (shoreline) along coastline.

The environmental screening of the corridor of impact/project Influence area within Package 2 area indicate that cables can be laid along the proposed routes without resorting to shifting of any of the pre-existing road side over ground infrastructure and/or felling of road side trees (all types and sizes). At all such locations, the cable routes can be re-aligned with minor deviations, to avoid any such requirements.

The underground cable routes do pass through existing roads, which have sensitive receptors like hospitals, schools / educational institutions and temples, however none of them will be affected as cable routes are away from them and neither require shifting of any physical cultural resources. The construction phase impacts and inconveniences in terms of dust, noise levels and traffic disruptions at all such stretches are to be managed through appropriate management measures.

The underground cable routes will intersect various pre-existing underground utilities like sewer lines, water supply lines, telephone lines among others and likely to affect them during underground cable laying. The REN/UG cable project is also likely to affect above ground utilities like demolition of ramps/steps and part structure of shops/kiosks of street vendors, many of which are illegal and have been extended onto roads. During the screening survey, all such illegal extensions within the corridor of impact have been enumerated.

8.0 BASELINE ENVIRONMENTAL PROFILE OF PACKAGE 2 AREA

Climate: Climatologically, Vishakhapatnam experiences tropical sub-humid type of climate with moderate summer and good seasonal rainfall. The southwest monsoon sets in second week of June and lasts till September end. October and November months receive rainfall

from northeast monsoon. Winter seasons are generally cool and fine weather prevails from December to February followed by summer season extending up middle of June.

The mean annual rainfall is 968.8 mm, occurring over 52 days in a year. In a normal year, October is the wettest month with an average rainfall of 205 mm over 10 rainy days. Visakhapatnam receives lowest monthly rainfall of less than 10 mm per day in between December and March.

The annual daily mean temperature within Visakhapatnam ranges between 23.7°C and 32.5°C. May is the hottest month with a daily mean maximum at 36.2°C and January is the coldest month with the daily mean minimum at 18.0°C.

Wind speed in Visakhapatnam range between 1-19 kmph for about 250 days in a normal year and between 20-61 kmph for about 50 days in a normal year, remaining are calm days/period. Visakhapatnam, experiences thunders over 62 days in a year, squall over 10 days in a year but no dust storms have ever been recorded.

Vulnerability of Visakhapatnam to Cyclones and Natural Disasters: Visakhapatnam is designated to be highly prone to cyclones and a rating of P2 has been proposed based on the hazard criteria by an expert sub-committee constituted by the National Disaster Management Authority, P4 being highest. Also, Visakhapatnam is placed under very high damage risk zone with wind speeds ranging between 180 kmph to 200 kmph, the highest along the east coast as per BMPTC, which has been mandated by GoI to advise on vulnerability and risk assessment and on formulation of relief, reconstruction and rehabilitation programs for disaster mitigation and assist in capacity building for disaster preparedness across India.

Seismic Hazard Risk and Vulnerability: Vishakhapatnam is under the zone II of seismic zoning classification as notified by the Seismic Zoning Committee, Government of India, which is the most and therefore not susceptible to any seismic risks.

Geology and Soil: Geologically, the entire Package 2 fall under the middle pediplains and coastal plains. The soil is pre-dominantly covered by red loamy soils (nearly 70% of the area), whereas sandy loamy soils are the next dominant soils, followed by sandy soils and black cotton soils. The soils in the region are poor textured, easily drained with low fertility index.

Status of Groundwater Development: The present level of groundwater development in Visakhapatnam urban district encompassing Package 2 area is just 28% of the annual replenishable resource and is placed under safe category by Central Ground Water Board. The depth to ground water level within Visakhapatnam, including Package 2 area as of January 2016 varies between 3-8 m bgl (below ground level) and the seasonal fluctuation of ground water levels between May 2015 to January 2016 (pre-monsoon and post monsoon) indicates rise between 2-4 meters, which indicate a good level replenishing of ground water resources.

Ambient Air Quality: Ambient air quality within Visakhapatnam city is being monitored at 11 locations both by CPCB and APPCB under National Ambient Air Quality Monitoring Program as well as State Programs. The annual average PM_{10} levels exceed National standards in 5 out of 11 locations. The annual average levels for $PM_{2.5}$ are available only for two locations and the levels exceed the standards at both these locations, one being

commercial and the other is industrial category. All other monitored parameters like SO_2, O_3 and NH_3 levels at all 11 monitored locations are within the National standards.

As part of baseline assessment, ambient air quality in and around Package 2 area was monitored at nine locations and PM_{10} levels exceed the NAAQS at all nine locations, whereas $PM_{2.5}$ levels and other monitored parameters like SO_2, NO_2, CO were within the respective National Standards.

Ambient Noise Levels in Visakhapatnam: Andhra Pradesh Pollution Control Board has two real time noise monitoring stations in Visakhapatnam and only one station (Andhra University) lies within the boundary of the Package 2 area. The ambient noise levels (for year 2014-15) at both these stations exceed during day time as well as night time. As per data available in public domain and monitoring carried out by independent scholars/researchers indicate that noise levels within Visakhapatnam exceed permissible limits during both day and night times at all category areas including sensitive receptors barring a very few.

As part of baseline assessment, ambient noise levels were monitored at nine locations in and around package 2 area. The day time ambient noise levels at 2 (one commercial and one res/comm) out of 9 locations exceed the permissible limits. Whereas the night time ambient noise levels are exceeding the limits at 4 (2 commercial, 1 res/comm and 1 sens/comm) out of 9 locations.

National Parks, Wild Life Sanctuaries and Important Bird Areas: The Kambalakonda Wildlife Sanctuary (KWS), Kambalakonda Ecotourism Park and Indira Gandhi Zoological Park, are all located at an aerial distance of 3 km away from the outer edge of Package 2 area of REN/UG cable project. Visakhapatnam including its suburbs is not known to have designated Important Bird Areas.

Olive Ridley Turtle Nesting Sites: The beach areas along coastline of Visakhapatnam between RK Beach and Bheemili Beach is known to have sporadic nesting sites for Olive Ridley Turtles (*Lephidochelys olivacea*), which are protected species in Schedule-I of Wildlife Protection Act, 1972 and listed as Vulnerable in IUCN red list). However, the nesting site within the package 2 area is Yoga village, where VSPCA has an ex-situ hatchery facility, due to excessive beach front activities on like tourism, heavy lighting, pollution and predators such as crows, eagles, jackals and beach dogs. Cable routes under REN/UG project are along city roads through fully developed areas and do not extend into coastal sands (beach areas).

Visakha Society for the Protection and Care of Animals (VSPCA), an animal welfare organization based in Visakhapatnam has deployed a beach surveillance team, designated as Sea Turtle Protection Force (STPF) for protection of mother turtles and their eggs during nesting activities, spread between January and March month (breeding season).

The Package 2 area of UG cable project has one known turtle nesting site i.e Yoga village, where VSPCA has an ex-situ hatchery facility, due to excessive beach front activities like tourism, heavy lighting, pollution and predators such as crows, eagles, jackals and beach dogs.

Archaeological Monuments and Excavation Sites: The Package 2 area do not have any ancient monuments and/or archaeological site(s), protected under the Ancient Monuments and Archaeological Sites and Remains (Amendment and Validation) Act, 2010 or by the

Department of Archaeology and Museums, Government of Andhra Pradesh.

Heritage Resources: The Package 2 area has 9 heritage structures and none of them are protected either at State or National level. However, these structures are guarded and well encased within their property boundaries, away from roadside as well as cable routes.

Flora & Fauna: The environmental screening of operational area/corridor of impact across Package 2 area has indicated trees and other road side infrastructure/utilities are generally within 0.45 metre from the foot path/road edge. Therefore, cable routes are proposed to be aligned beyond this 0.45 m from footpath/road edge to avoid tree feeling as well as shifting of utilities (of all types and sizes). Although, underground cables will be aligned to avoid trees (of all types and sizes), an enumeration has indicated that there are 208 trees along cable routes within Package 2 area.

Sensitive Receptors: The 92.15 km long underground cables under Package 2 has several sensitive receptors, some of which are on the same side of the road along which cable routes are aligned, while some are on the other or opposite side of the road. The sensitive receptors include educational institutions, hospitals, religious places, function halls among others. During the environmental screening and baseline surveys, an enumeration of all such sensitive receptors have been carried out and all of these are well encased within their respective property boundaries and away from cable routes. During cable laying operations, some of these might get exposed to inconvenience in terms of constricted traffic movement, dust and noise levels, if not managed.

9.0 ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

The impacts due to laying of underground cables under Package 2 has been assessed under following scenarios and appropriate mitigation measures have been included under Environmental Management Plan along with cost provisions, wherever required.

Impacts due to location: The package 2 area has no significant impacts due to location, as the underground cables are laid in trenches along existing city roads and these trenches will be restored to its previous state (including road restoration) after completion of cable laying operations. Therefore, there will not be any impacts on geology, soil, land use, climate, archeological monuments and /or heritage structures.

The construction water requirement Package 2 area is estimated at 6.82 kld for both operational and onsite sanitation requirements, which is an insignificant quantity (equals daily water requirement of 10 households with 5 persons per household as per national standards) and very minimal as compared to the presently available ground water resources within Visakhapatnam. The present level of groundwater development in Visakhapatnam is just 28% of the annual replenishable resource and is placed under safe category by Central Ground Water Board. Thus, there will be no impact either on surface or ground water resources as a consequence of this project implementation. No fresh surface water sources will be used for meeting the water requirements of the project

Impacts during construction stage: The construction stage impacts will be largely confined to operational area/corridor of impact and comprise dismantling of ramps and steps, which has been often illegally extended onto roads for ease of access by building owners, temporary disruption in access to buildings across cable corridor, damage/disruption to underground existing utilities like water supply, sanitary pipe lines and other similar

underground utilities. The environment, safety and health aspects of work force during construction phase will also be an area of concern

Under the project, all ramps and steps, which are dismantled (either illegal or legal) will be restored to its previous state in consultation with the respective building owners. Similarly, all damaged underground utilities as a consequence of excavation of cable trenches will be restored through a provision of dedicated crew comprising plumber, mason, carpenter/sheet metal fabricator. The crew will be provided with a mobile van (SUV type) for ease of mobility all operational areas within Package area and will be equipped with all tools and equipment and a mobile phone.

The 2.5 metre wide operational area along cable route will be barricaded and all cable laying operations will be confined to this barricaded area, which will also enable to limits the impacts. At any given point of time, only 7 operational areas across the package, will be opened up for cable laying operations, which would keep sequentially shifting ahead in 500 metres long segments as the work progress. All works, except laying of bituminous layers to allow for natural compaction will be completed in the previous segment, prior to opening up of next operational area segment. Road restoration will be subsequently taken within a period of 3 to 4 weeks, within which adequate compaction is expected to take place.

All operational areas will be access controlled and provided with onsite sanitation arrangements for workforce through mobile toilets and drinking water kiosks, work force will be provided with PPEs (hard hats, safety boots, reflective jackets) for trained/oriented for safety at work place. The dust levels at all operational areas will be controlled through fine spray of water. Traffic wardens will be deployed for ensuring smooth vehicular, particularly near intersections close to operational areas. Thus, the construction stage impacts due to excavation of cable trenches, cable laying and up to road restoration activities have been assessed and all required mitigation measures have been identified and included in the environmental management plan along with cost provisions, wherever required.

Impacts and mitigation measures during operation stage: The commissioning and operation of the REN/UG cable project in Package 2 area will not involve any activities that will have environmental impacts. On the contrary, the network will be resilient and/unaffected due to any natural calamities/cyclones, in line with the project development objective. However, if underground cables are subjected to higher loads than design, or due to poor quality of cables or due to poor workmanship of jointing, faults in cables may occur.

The cable faults occurring at joints will not have any environmental impacts and rectification of joint can be completed in 3-4 hours and for this period, an area of 1.2 m x1.2 m, surrounding the manhole cover needs to be cordoned off with temporary barricades and opened up after work is done and site is restored. As result, there could be minor inconvenience to vehicular and/or pedestrian traffic limited for few hours only, depending upon location of specific inspection chamber and frequency of cable faults. Most importantly, fault in underground cables, either at joint or at any other location does not cause fire or any other hazard.

Impacts due to dismantling of overhead infrastructure: After commissioning underground cables under Package 2 area, all existing overhead power distribution infrastructure, within the same package area will be dismantled and transported to APEPDCL's designated store yards at Simhachalam substation and special maintenance

shed for transformers. The overhead infrastructure comprises all types and sizes of conductors, insulators, straight and V-cross arms, guard wires, cement concrete poles, guy wires, power and distribution transformers and four pole structures for mounting of transformers among others.

At the store yards, all the removed infrastructure and brought to store yards will be subjected to technical assessment for its serviceability and balance life. All serviceable materials will be re-deployed elsewhere in non-cyclone affected areas and unserviceable materials will be disposed as scrap by APEPDCL.

None of the overhead infrastructure, which is removed and transported to designated store yards, will cause significant environmental impacts, except for the insulating oil in the transformers, which needs to be handled with adequate caution. Mitigation measures required to minimise impacts and ensure safety of work force as well as public during dismantling of over head infrastructure have been identified and included in the EMP along with cost provisions wherever required.

10.0 ANALYSIS OF ALTERNATIVES

An analysis of various alternatives for aligning cable routes along existing roads were carried out prior to arrive at a technically feasible route with minimal environmental and social impacts. The main issues along the Operations Area/COI along cable routes are the physical obstacles like unauthorized ramps/steps of private and/or government buildings, which have been extended on to roads for ease of access, existing over ground poles (telecom/ electricity/street light) and road side trees among others. The other issues were disruptions to underground public utilities like water supply, sanitary and drainage connections across cable route corridor, safety to pedestrians as well as road users apart from work force, who are directly involved for cable laying operations.

The factors, which were considered during finalization of route alignment of the REN/UG cable project included most optimal cable length, alignment to avoid or minimize relocation/shifting requirements of existing utilities along route, avoidance of trees, avoid or minimize road crossing points, minimum diversions to traffic as well as pedestrian traffic among others.

In order to minimize disruptions to both pedestrian as well as to vehicular traffic during project operations, it was found utmost necessary to limit the area of operation required for trenching, cable pullout, lowering, jointing, prior to refilling and restoring trench to its previous state and at the same time ensure minimum working space is available for completing work in a timely manner. Therefore, several cable trench excavation methods were assessed and a 2.5-meter-wide corridor has been determined as an optimal requirement for ‘operational area or corridor of Impact’ along the footpath, which will be barricaded in 500-meter-long segments for cable laying operations.

11.0 PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

Stake holder public consultation meetings were conducted at two stages during EIA i.e. one at package area level to involve a broader section of stake holders at package or even beyond at city level and second stage consultations at respective substation areas along the UG cable routes, to involve directly the community, who will be in some way or the other will be affected by the project.

For the package level consultations, which was held on 21st October, 2016, local leaders, elected representatives, prominent persons, NGO representatives, concerned govt. department officials from across the city were invited. All the invitees were handed over project brochures both in local language and English at the venue of consultation meeting and prior to the commencement of the consultation meeting and comprehensive power point presentation was made to enable invitees a complete understanding of the project dimensions and its possible implications. Altogether, 116 people, comprising both women and men, constituting local residents including women, Residents (Colony) Welfare Association Representatives, Public Representatives, BSNL, Traffic Police and officers from APEPDCL among others attended consultation meeting.

The stake holder consultations at respective substation area levels were conducted at 6 locations on various dates between April 30, 2016 and May 4, 2016. All the stakeholders attended the consultation meeting were handed over handouts providing information about the project and requirement for laying of underground cables under the project.

The issues raised by the stakeholders at both package as well as at substation area level were almost similar except for the intensity and depth of awareness of project dimensions and associated issues. The stakeholders at package level were more outspoken, completely aware of the project dimensions and issues associated with project whereas the stakeholders at substation area levels were directly concerned with the likely inconveniences that they are likely to face during project implementation. Thus, two stage stakeholder consultations gave an insight to a wide ranging perception of the community about project.

The most relevant, prominent and common issues raised during both stakeholder consultations have been included in the EMP along with cost provisions wherever required to ensure all issues raised during stakeholder consultations are addressed/implemented during project implementation.

12.0 ENVIRONMENTAL MANAGEMENT PLAN AND BUDGETRAY PROVSIONS

The EMP includes all relevant measures for avoiding or mitigating environmental impacts, anticipated during construction, operation and maintenance of the Package 2 of REN/UG cable project along with budgetary provisions for implementing the EMP.

The implementation of many of the mitigation measures included in EMP largely constitute good construction practices and therefore, such measures are considered as incidental to works are deem to be included in the quoted tender/bid price by the contractor. However, some measures are considered as additional requirement to mitigate or avoid environmental, health and safety concerns, and adequate cost provisions for such measures have been included in EMP. The budgetary provision for EMP implementation in Package 2 area is estimated to be INR 490 lakhs.

The EMP will be integrated in the contract/bidding documents as mandatory contractual obligations. and EPC contractor is thus expected to be fully conversant with the EMP requirements of REN/UG cable project and accordingly make required provisions for implementation of EMP at the bidding stage itself.

13.0 INSTITUTIONAL ARRANGEMENTS FOR EMP IMPLEMENTATION SUPERVISION

The REN/UG cable project will be implemented by Project Implementation Unit housed within APEPDCL. Within the PIU, EMP implementation supervision is proposed to be carried out through a two tier system, common for all four packages, which are concurrently implemented by APEPDCL. At tier 1, PIU will appoint an Environmental cum Social Safeguards Specialist position, who will be responsible for all four packages to oversee EMP implementation at field level through the second tier positions. The second tier positions for field level supervision of EMP will comprise two environmental officers and one safety officer and these officers will be assigned to supervise EMP implementation at field level day to day basis for all four packages. The EPC contractor will be contractually bound to deploy one EHS Officer per package, who will be primarily responsible for implementation of EMP at package level.

14.0 GRIEVANCE REDRESS MECHANISM

The Package 2 of REN/UG cable project will not involve any land acquisition and therefore grievances related to inadequate compensation and associated issues are not anticipated. However, the most common/potential grievances could be but not limited to the following;

- Inadequate/inappropriate arrangements for access to occupants of buildings across barricaded area
- Damaged utilities like water supply, sewer/sanitary/drainage pipes among others during trench excavation and being non-responsive and/or time delays in restoration
- Noise and dust levels during construction
- Damaged ramps, steps and associated small structures during trench excavation, which are being either shabbily restored and/or done without considering their views and/or not matching with previous condition
- Safety to pedestrian and vehicular traffic and public safety as a consequence of project operations
- Works are being executed at a slower pace, causing undue delays, which in turn extended period of their inconveniences

APEPDCL through its PIU for REN/UG cable project will establish a robust and responsive grievance redress mechanism to handle all types grievances within in a designated time frame and in a responsible way. The absence of a responsive grievance mechanism could trigger public resentment, despite the benefits, that the project can usher on society.

The PIU will be primarily responsible for implementing the GRM, the contractor will also be severally and jointly responsible to receive and resolve complaints in a time-bound and effective manner and in close co-ordination with PIU.

The PIU-EHS, the package level in-charge for EMP implementation and supervision will establish a procedure for receiving grievances both online (through APEPDCL's web site) and offline at respective operational areas. APEPDCL will widely publicize and extend its present online compliant registration system as well as 24x7 call centre number 1912(displayed on barricades at operational areas) to receive complaints/grievances related to REN/UG cable project. The GRM will include procedure for recording/documenting key information, and evaluating and responding to the complaints as per time frame stipulated in

GRM. All concerns received/raised through the GRM are to be addressed earnestly, transparently and in a time bound manner, without retribution to the grieved/affected person(s).

The PIU and contractor periodically will inform the general public along the cable route alignments, which have been opened up for cable laying on the available grievance redress procedure(s), whom to contact and when, where and how to file a grievance, time likely to be taken to redress minor and major grievances, etc.

The type and number of grievances received, resolved and outcomes are to be displayed /disclosed at PIU and included in the periodic progress reports and documented for the entire project implementation phase.

1.1 Background

The Eastern Power Distribution Company of Andhra Pradesh Limited (APEPDCL) is the designated Project Implementation Unit (PIU) for implementation of the Resilient Electrical Network or Underground Cable Project under the Andhra Pradesh Disaster Recovery Project (APDRP), with funding assistance of the World Bank. The Resilient Electrical Network(REN) or Underground(UG) cable project is one of the seven components under APDRP and constitutes conversion of all existing 33kV, 11 kV and 415 volts overhead (OH) lines into underground cable network within the municipal limit of Visakhapatnam city. The REN or UG cable project has been divided into four packages for operational requirements.

APEPDCL is responsible for managing sub-transmission, distribution and bulk supply of power in the operation circles of Srikakulam, Visakhapatnam, Vizianagaram, East and West Godavari districts and 20 Operation Divisions of Coastal Andhra Pradesh. APEPDCL is mandated to supply power to over 5.107 million consumers of different categories through a network consisting of 656 sub-stations of 33/11 KV level, 2704 feeders of 11 KV level and more than 151,447 distribution transformers of different levels and capacities.

APEPDCL had appointed M/s Power Finance Corporation (PFC) Consulting Limited, New Delhi in order to study the existing OH system and prepare DPR for replacement of existing OH system with underground cables in entire Visakhapatnam city area, duly carrying out the load flow studies of existing OH system (at 2015 levels) and propose underground cable network for load condition of year 2022.

PFC has prepared the REN/UG cable project in four packages to convert all OH 33KV, 11KV and 415V distribution network into underground cable network. At present, APEPDCL is preparing to implement Package 2 of the REN/UG project and envisage completing all 4 packages by August 2018.

1.2 ABOUT REQUIREMENT OF ESIA

APEPDCL desired to conduct an Environmental and Social Impact Assessment (ESIA) of the REN/UG cable project, covering all four packages spread across Visakhapatnam city municipal limit (GVMC area).

The ESIA study is aimed at effective assessment of the likely environmental and social impacts and their management through efficient and appropriate management measures, in order to protect or enhance the quality of the environment and social settings within the REN/UG cable project influence area and also facilitate implementation of REN/UG cable project in an environmentally and socially sustainable manner.

The ESIA study has also been carried to ensure the implementation of REN/UG cable project in compliance with the environmental and social management framework under APDRP as well as in compliance with the environmental and social safeguards requirements of the World Bank.

1.3 OBJECTIVES OF ESIA

APEPDCL has set out the following objectives of the ESIA studies:

- To conduct an Environmental and Social Impact Assessment (ESIA) of each package of the REN/UG cable project by collecting required data, conducting necessary field investigations and primary surveys and assessing environmental, social, health and safety impacts of each package
- To recommend suitable mitigation measures; both for environmental and social impacts based on the detailed ESIA.
- To identify and recommend suitable measures for the disposal of various unserviceable materials generated due to the project such as electrical cables, transformers, electric poles, soil and other waste or recyclable/reusable materials.
- To submit compliance report after completion of REN/UG cable works of each of the four packages.

1.4 SCOPE OF ESIA

The scope of the ESIA studies includes:

- Preparation of transect walk strip plans (based on strip plans provided by APEPDCL) with all features along the UG cable alignment to be marked on the plans.
- Taking videograph of entire UG cable alignment.
- Develop a detailed strip plan of the proposed underground cable alignment providing various features that are located along alignment and its immediate vicinity, at least double the width of the trench
- Preparation of environmental and socio-economical profile of the project (corridor of impact), through primary and secondary information (comprising demographic, socio-economic, physical, biological and ecological environmental features, etc).
- Conduct a socio-economic survey of the households along the alignment duly covering all indicators for the present and future evaluation and assessment.
- Preparation a questionnaire or instruments for the ESIA study and share the same with World Bank for review.
- Based on the strip plan and field visits, develop an inventory of impacts of both temporary and permanent structures, trees and other environmental sensitive receptors such as schools, religious places and other common property resources and any other issues, which may be affected, while laying the underground cable network and during operation and maintenance.
- Identification of various other issues such as disposal of excess excavated earth, waste, disposal/ reuse of old overhead electric cables, dismantling/ disposal of electrical poles, disposal of excess transformers (if any), disposal of transformer oil (if any), etc.
- Assessment of the health and safety impacts of laying the underground cable network, both during construction and operation phase of the project.

- For all the impacts/ issues identified above, recommend elimination or mitigation/ management measures to be implemented by the project implementation agencies and the construction contractors, in line with the Environmental and Social Management Framework (ESMF) of APDRP.
- Study & inclusion of measures and plans mitigating temporary/ permanent impacts to the structures and communities along the cable alignment and prepare site specific EMP to mitigate environmental impacts, RAP (if there are resettlement/ rehabilitation issues) and/or Social Management Plan (SMP) for mitigating social impacts and community engagement.
- Identify various regulatory clearances that may be required for the project, such as CRZ clearances, tree cutting permissions, “no objections” from state / national agencies, utility agencies, etc.
- Preparation of a monitoring plan with reference to ESIA.
- A grievance redressal mechanism (GRC) is to be developed in accordance with the ESMF under APDRP and as per World Bank guidelines.
- Conduct formal stakeholder public consultations (minimum of three), to understand the impacts anticipated by the communities and also to explain measures proposed under project to implement to mitigate such impacts. These public consultations are to be conducted with the communities for information dissemination and their feedback. At least one such consultation will be carried with women in each community. The World Bank and the APEPDCL need to be informed before conducting these consultations for possible participation.
- Finalize EMP and RAP/SMP for implementation incorporating comments received from APEPDCL and the World Bank.

1.5 CONSULTANT’S APPOINTMENT AND MOBILIZATION

APEPDCL appointed M/s Deccan Consulting Engineers Private Limited(Consultants) to carryout ESIA studies of the proposed REN/UG cable project in accordance with the set out scope of work and Terms of Reference (ToR) issued as part of RFP.

The agreement between APEPDCL and Consultants was signed on 19th December 2015 and Consultants mobilized their team on 22nd December 2015 and initiated activities in accordance with the set out scope of work for ESIA studies. The Consultants team constituted key experts; HARI PRAKASH, Environmental Expert and DINESH GODIYAL, Social Expert. The key experts were supported by other junior professionals (non-key experts) and field personnel as indicated in the proposal on requirement basis.

Upon mobilization, key experts of Consultants held a startup meeting chaired by ED/WB Projects & QC, Divisional Engineer (DE), Assistant Divisional Engineer (ADE and Assistant Engineer (AE) along with other with concerned officials of APEPDCL.

During the meeting, the consultants were briefed by PIU officials about the REN/UG cable project, status of project preparation activities and package wise DPRs prepared and submitted by PFC for REN/UG cable project along with and APEPDCL’s intended work program for an early implementation of this underground cable project and therefore the requirement of preparation of the ESIA in timely manner.

1.6 DATA/DOCUMENTS REVIEW BY CONSULTANTS

Subsequent to start up meeting, APEPDCL provided the following data/documents as available with PIU, APEPDCL for Consultants review and understanding of the envisaged project.

- Cable route/drawings showing proposed for all 33/11KV lines under each of the 7 sub-stations within Package 2
- Environmental and Social Management Framework for the Andhra Pradesh Disaster Recovery Project (APDRP)

1.7 CONSTRAINTS OF DATA BASE

The Consultants have the following observations on the drawings of Package 2: 33/11kV Substations at Indoor Dondaparty, Kailasametta, Maddilapalem, RK Beach, TSR Complex and Vidyut Sakha

- The alignment of cable routes indicated in the DPR are deemed to have been finalized after due consideration of several factors like most optimal length, analysis of alternatives, minimum obstacles among other influencing factors. Therefore, UG cable routes as proposed in the DPR drawings is considered as final for assessment of the likely environmental and social impacts. This is also evident from the fact that scope of work for preparation of DPR includes consideration of all such factors for finalization of cable alignment (ref Page 19/Chapter 3-Scope, Approach and Methodology of DPR for Package 2 submitted by PFC)
- Drawings does not provide information of the underground utilities along as well as across the proposed UG cable routes. Understandably, no Ground Penetrating Radar(GPR) surveys have been conducted under this component of APDRP, which could have otherwise provided information about the pre-existing underground utilities along and across the proposed cable routes
- The GIS maps show only the road and proposed cable alignments and does not contain information on existing utilities along cable routes like drains, obstacles among others, which are along cable routes, although this is one of the obligations of APEPDCL to provide such information to Consultants under this assignment
- APEPDCL has informed that it has no other information about the existing underground utilities along or across the proposed UG cable routes

1.8 STRUCTURE OF ESIA REPORT

The ESIA for REN/UG cable project – Package 2 area has been structured into four standalone volumes as hereunder:

i. **Volume I -** Environmental Screening Report (ESR)

ii. **Volume II -** Environmental Impact Assessment (EIA) Report and Environment Management Plan (EMP)

iii. **Volume III -** Social Impact Assessment (SIA) Report

iv. **Volume IV -** Resettlement Action Plan (RAP)

This report presents the **Volume II - Environmental Impact Assessment (EIA) Report** and has been structured into **9 Chapters** as hereunder.

Executive Summary

Chapter 1 – Introduction: This chapter describes background of project and its components; need/requirement, objectives and scope of ESIA studies; and structure of the EIA report.

Chapter 2 - Project Description: This chapter summarizes the REN/UG cable project design and proposed configurations for laying of underground cables under the resilient electrical network component of APDRP.

Chapter 3 - Environmental Regulatory Framework: This chapter describes the applicable environmental policies and regulations of Government of India, Govt. of Andhra Pradesh and the World Bank Policies, which are applicable to the REN/UG electrical cabling project.

Chapter 4 - Existing Environmental Profile: This chapter describes baseline environmental profile of the Package 2 area, within which the REN/UG cable project will be implemented. The baseline environmental conditions of the Package 2 area have been assessed based on both secondary data base and supplemented by primary investigations wherever required.

Chapter 5- Environmental Impacts: This chapter identifies and evaluates the anticipated environmental impacts due to the proposed REN/UG cable project. The Chapter also includes suggested mitigation measures in order to avoid/minimize the likely impacts during pre-construction, construction and operation phases of REN/UG cable project.

Chapter 6- Analysis of Alternatives: This chapter describes the alternatives considered in the project design in order to minimize and/or avoid the potential environmental as well as social impacts due the implementation of REN/UG cable project.

Chapter 7- Public Consultations and Information Disclosure: This chapter provides information on the public consultations carried out along underground cable routes as well as multi stakeholder consultations at city level. The chapter summarizes the various issues/concerns raised by general public at large and how the same has been addressed in EMP.

Chapter 8- Environmental Management Plan: This chapter describes an Environmental Management Plan (EMP) in order to minimize and/or avoid the impacts of the REN/UG cable project. The chapter also includes budgetary provisions as required for implementing the EMP and its supervision by PIU.

Chapter 9- Institutional Arrangement for EMP Implementation Supervision & GRM: This chapter provides a suggested institutional arrangement for EMP implementation supervision and monitoring mechanism during REN/UG cable project implementation phase.

This chapter also include a responsive grievance redress mechanism, given the nature of this project, which will be implemented within city limits and along busy roads/commercial areas and residential areas and therefore its potential to disrupt public utilities, water, sanitary utilities, impact upon street vendors/squatters among others and trigger public resentment, despite the benefits, that the project can usher on society.

2.1 VISAKHAPATNAM - VULNERABILITY TO CYCLONES AND HIGH WINDS

Andhra Pradesh is endowed with 972 kms of coastline, the second largest in the country after Gujarat. By virtue of its long coastline and geographical location, many stretches of its coastal line are vulnerable to multiple natural disasters in India.

Visakhapatnam city is designated to be highly prone to cyclones by the National Disaster Management Authority. An expert sub-committee constituted by the National Disaster Management Authority, has proposed a **rating of P2 for Visakhapatnam coast** based on the hazard criteria, P4 being highest for coastal stretches in Gujarat, Karnataka, Tamil Nadu, Kerala, Odisha among others.

The wind and cyclone hazard map prepared by the Building Materials and Technology Promotion Council (BMTPC) has placed Visakhapatnam under **Very High Damage Risk Zone** with high speed winds ranging between 180 to 200 kmph, the highest along the east coast of India. The Government of India has mandated BMTPC, among other objectives to advise on vulnerability and risk assessment and on formulation of relief, reconstruction and rehabilitation programs for disaster mitigation and assist in capacity building for disaster preparedness for coastal states across India.

Thus, Visakhapatnam coast is vulnerable to both cyclone and high speed wind hazards. The historical data indicate that September and October are the most probable months for occurrence of depressions, cyclones and severe cyclonic storms in Visakhapatnam and other coastal districts of the state.

2.2 HUDHUD, 2014

On October 12, 2014, a very severe cyclonic storm “Hudhud” made landfall on the coast of Visakhapatnam. At the time of landfall, the maximum sustained surface wind speed associated with the cyclone ranged between 180-220 kmph and height of the waves surged up to 3 meters. The tide gauge at Visakhapatnam reported maximum storm surge of 1.4 meters above the astronomical tide. By October 14, “Hudhud” drifted northwards toward Uttar Pradesh and weakened into a well-marked low-pressure area over east Uttar Pradesh and neighbourhood.

The Government of Andhra Pradesh (GoAP) was proactive in preparing for cyclone “Hudhud”. With continuous updated and feedback from India Meteorological Department (IMD), the intensity and magnitude of the cyclone were continuously tracked at Andhra Pradesh State Disaster Management Authority (APSDMA) and a range of advance actions/preparatory measures were launched to face the cyclone. Relief and rescue team were deployed in the coastal districts most likely to be impacted and regular warnings to vulnerable populations were issued through various channels. These timely advance actions, supplemented by the evacuation of about 250,000 persons, mostly living in vulnerable kutcha houses or low-lying areas, helped in limiting death toll from the cyclone to just less than 100.

Cyclone “Hudhud” and the floods that followed the associated heavy rainfall caused extensive devastation in all the affected districts, uprooting vast number of trees, damaging

roads, public buildings, livelihoods and disrupting telecommunications and power infrastructure transmission and distribution network.

2.3 ECONOMIC IMPACTS OF NATURAL CALAMITIES

The Hudhud in October 2014 has caused a loss of nearly Rs 8,000 Crores affecting the infrastructure, public and private properties within Visakhapatnam and elsewhere in Andhra Pradesh alone. This is apart from the loss of lives, livestock, damages to standing crops and farm land among others. Such is the extent of the damages caused; Prime Minster of India visited the affected areas and announced an interim relief of Rs 1000 Crores for immediate relief works and to bring back normalcy to the state.

During Hudhud, APEPDCL also suffered extensive loss to the tune of Rs 500 crores due to the damages caused to its power distribution infrastructure in Visakhapatnam. As many as 4800 transformers, 50 sub stations and 57,000 electric poles among other utilities were damaged during Hudhud and several kilometres of transmission line conductors were disrupted /damaged and had to be restored on a war footing to restore power to the affected areas at an earliest possible time. The damages and restoration costs incurred by APEPDCL during Hudhud is given in **Table 2.1.**

Table 2.1: Damages and Cost of Restoration of Electrical Distribution (OH) Infrastructure due to HUDHUD in Visakhapatnam

S.No.	Name of the Asset	Full Damage		Partial Damage		Total Amount in Rs. Lakhs
		Nos	Amount in Rs. Lakhs	Nos	Amount in Rs. Lakhs	
1	33/11 Substation	6	750	44	1540	2290
2	33 kv Transmission Tower	4	50	0	0	50
3	Electrical Poles	44401	13320	12407	3722	17042
4	Conductors	830	830	4470	4470	5300
5	Insulators	161187	2015			2015
6	Transformers	3439	18915	1353	4283	23197
	Restoration Cost of Damages (in Rs Crores)					**498.94**

Source: APEPDCL

In summary, despite taking advance preventive actions by the State Government, Hudhud caused an estimated economic loss to the State to the tune of 8,000 Crores, as per the information released in the media by the State Government during and after Hudhud.

2.4 VISAKHAPATNAM - THE FINANCIAL HUB

After the formation of the new state, Visakhapatnam has reinforced its position and importance as financial hub or commercial capital of Andhra Pradesh. Visakhapatnam has also been selected to be developed as one of the SMART cities by the Government of India under its SMART CITIES MISSION. The core infrastructure elements in a smart city essentially include uninterrupted and assured electricity supply among all other infrastructure.

Thus, Visakhapatnam needs to have a resilient urban infrastructure that can withstand the frequently recurring natural calamities, assure safety to public life and property during calamities with least down time and save recurring the losses to state exchequer.

2.5 THE PROJECT- APDRP

The Andhra Pradesh Disaster Recovery Project (APDRP) constitutes a large multi-sector engagement on risk and vulnerability reduction, with assistance for restoring and improving rural connectivity, public services and livelihood opportunities in targeted communities of Andhra Pradesh, and increase the capacity of the State Entities to respond promptly and effectively to an eligible crisis or emergency. APDRP is part of a broader package to support the GoAPs reconstruction and recovery efforts and to strengthen its capacity to manage future events.

The APDRP through its different components will provide both direct and indirect benefits to 49.4 million inhabitants of Andhra Pradesh state. Direct beneficiaries include populations of the vulnerable coastal areas, particularly the four heavily impacted districts of Srikakulam, Vizianagaram, Visakhapatnam and East Godavari with a total approximate population of 13.3 million residents.

The APDRP has the following seven components:

I. Resilient electrical network/underground cable project;

II. Restoration of connectivity and shelter infrastructure;

III. Restoration and protection of the beach front;

IV. Restoration of environmental services and facilities and livelihood support;

V. Capacity building and technical support for disaster risk management;

VI. Project implementation support; and

VII. Contingency emergency response.

Among these, the resilient electrical network/underground (REN/UG) cable project is earmarked to be exclusively implemented within Visakhapatnam city limits.

2.6 BENEFITS OF REN/UG CABLE PROJECT

The most notable and anticipated benefits of proposed REN/UG cable project to Visakhapatnam City and its residents are described below:

- The areas covered under REN/UG cable project is expected to practically remain unaffected in future from power disruptions and associated implications during or after cyclone/high wind speeds or natural calamities/inclement weather conditions, hence resilient to natural disasters, the main project development objective of APDRP
- Underground cables have lower transmission losses and can absorb emergency power loads. Underground cables have lower maintenance costs and emit no electric field and can be engineered to emit a lower magnetic field than an overhead line;
- While the upfront investment required for an underground cable distribution system is higher, the recurring expenses are lower and therefore a fair financial comparison with overhead lines should consider the NPV of both types of costs over a long planning period *e.g.* 25 to 30 years. In most cases, underground cabling turns out to be cost effective in a financial sense.
- It is established fact that REN/UG Cable network will lower the transmission losses, which will result in energy saving and subsequently reduction in green house gases

(GHG) for generation of saved energy/electricity for REN/UG Cable network.

- REN/UG cable network is safer to public lives and property particularly of vulnerable sections of society, during calamities/disasters/thunders/lightening instances.
- The implementation of REN/UG cable project will not result in enhancement of power tariff for local consumers and costs are entirely borne by the State's resources.
- Save state' revenue in re-construction of damaged electrical network during every calamity – CONSERVES STATE's Resources
- Resilient underground electrical cable network will help to retain/restore water and sanitation of the city during or after calamities/cyclones.
- Helps State administration to restore other damaged infrastructure during natural calamities with least down time.
- Visakhapatnam, being now the financial hub or commercial capital in the newly formed Andhra Pradesh will essentially need such resilient electrical distribution network and thus aid in State's economic growth and enable to become attractive and destination to investors.
- Will help in improving aesthetic of the city through conversion of all over ground electrical distribution network into resilient underground infrastructure.
- Visakhapatnam has already been selected for developing it into one of the SMART cities under its SMART CITIES MISSION by GoI. The REN/UG cable project is another forward step in developing Visakhapatnam into a definite SMART CITY, an ambitious program of both GoAP as well as GoI.
- The present REN/UG cable project will concurrently enable to up-rate transmission and distribution network to future demands by at least 10 years by installing the XLPE cables, which are far superior then the conventional overhead conductors, thus will avoid upgrading/up-rating of existing OH network
- Trefoil configuration of underground cables in REN/UG cable project will enable to improve current distribution, reduce sheath losses, minimize magnetic field around conductor and reduce heat-up of cables, all of which will further improve efficiency of underground cable network
- Underground cables do not require any dedicated corridor to be kept permanently clear as in case of an overhead line for safety, maintenance and repair
- Underground cables will vacate space over ground, which improves aesthetics, higher public acceptance, convey environmental benefits and as well spurt an increase in property values. Thus, underground cable projects have a potential to induce knock-on effect" - that all other local communities might want "their" network put underground.
- Underground cables do not create obstacles over ground like in case of over head lines. Also, underground cables pose no hazard to avifauna and low flying aircraft
- Underground cables are not affected by momentary interruptions, occurring from lightning, crow faults and falling of tree branches on overhead lines, which de-energize and then re-energize the circuit moment later, a most common feature in over head lines
- Typically, outrages in underground cable network are about half of their equivalent

overhead networks. Also, operating and maintenance costs are estimated to be around one tenth of the cost of overhead network. Thus, underground network results in fewer interruptions and lower maintenance costs.

- Underground cable network eliminates the possibility of electrical accidents due electrocution and electrical shock, resulting saving of lives.
- Underground cables have no pilferage, whereas overhead cables has scope for pilferage/power thefts, which can lead to safety hazards and accidents at times

2.7 RESILIENT ELECTRICAL NETWORK/ UG CABLE PROJECT

The objective of the REN/UG cable project is to reduce the vulnerability of the Visakhapatnam city's overhead electrical distribution network by its conversion to underground the power distribution system through laying of underground cables. Under this component, all 33kV, 11 kV and 415 volts network lines are to be converted to underground cable network starting from consumers meter board and going up to 11kV and 33 kV feeders, prioritised from seaside to landward areas. The REN/UG cable project will also include provision for high-speed data/voice transmission cables along with the underground power cables.

The REN/UG cable project has been divided into four packages for operational requirements as shown in **Figure 2.1**.

APEPDCL had appointed M/s Power Finance Corporation (PFC) Consulting Limited, New Delhi in order to study the existing over head (OH) distribution system and prepare DPR for replacement of existing OH distribution system with underground cable network within the entire Visakhapatnam city area, after duly carrying out the load flow studies of existing OH system (at 2015 levels) and propose underground cable network for load condition of year 2022.

2.8 PROJECT IMPLEMENTING UNIT

The Government of Andhra Pradesh (GoAP) has designated APEPDCL as the Project Implementation Unit (PIU) for implementation of the REN/UG cable project within Visakhapatnam under APDRP.

Within Andhra Pradesh, APEPDCL is responsible for managing sub-transmission, distribution and bulk supply of power in the operation circles of Srikakulam, Visakhapatnam, and Vizianagaram, East and West Godavari districts and 20 Operation Divisions of Coastal Andhra Pradesh. APEPDCL supplies power to over 5.107 million consumers belonging to different categories through a network consisting of 656 Sub-stations of 33/11 KV level, 2704 feeders of 11 KV level and more than 151,447 distribution transformers of different levels and capacities.

2.9 RESILIENT ELECTRICAL NETWORK/ UG CABLE PROJECT (Package 2)

APEPDCL in accordance with the objectives of APDRP has drawn up an ambitious implementation schedule for REN/UG cable project within Visakhapatnam. The intended implementation schedule for REN/UG cable project is given in **Table 2.2**.

The Package 2 area of REN/UG cable project has seven substations at areas namely Indoor Dondaparty, Kailasametta, Maddilapalem, Pandurangapuram, RK Beach, TSR Complex and Vidyut Sakha and is spread over an area of 5.19 Sq.Km. The package 2 area

of REN/UG cable project is shown in **Figure 2.2**.

Administratively, Package 2 area covers GVMC municipal covers part wards number 8,10 and 13-18 of Zone 2, part wards number 19-21, 29-30 of Zone 3 and part wards number 31 and 44 of Zone 4. The GVMC municipal area is spread over 682 Sq. Km and has been demarcated into 72 wards, grouped into 6 zones for administrative purposes.

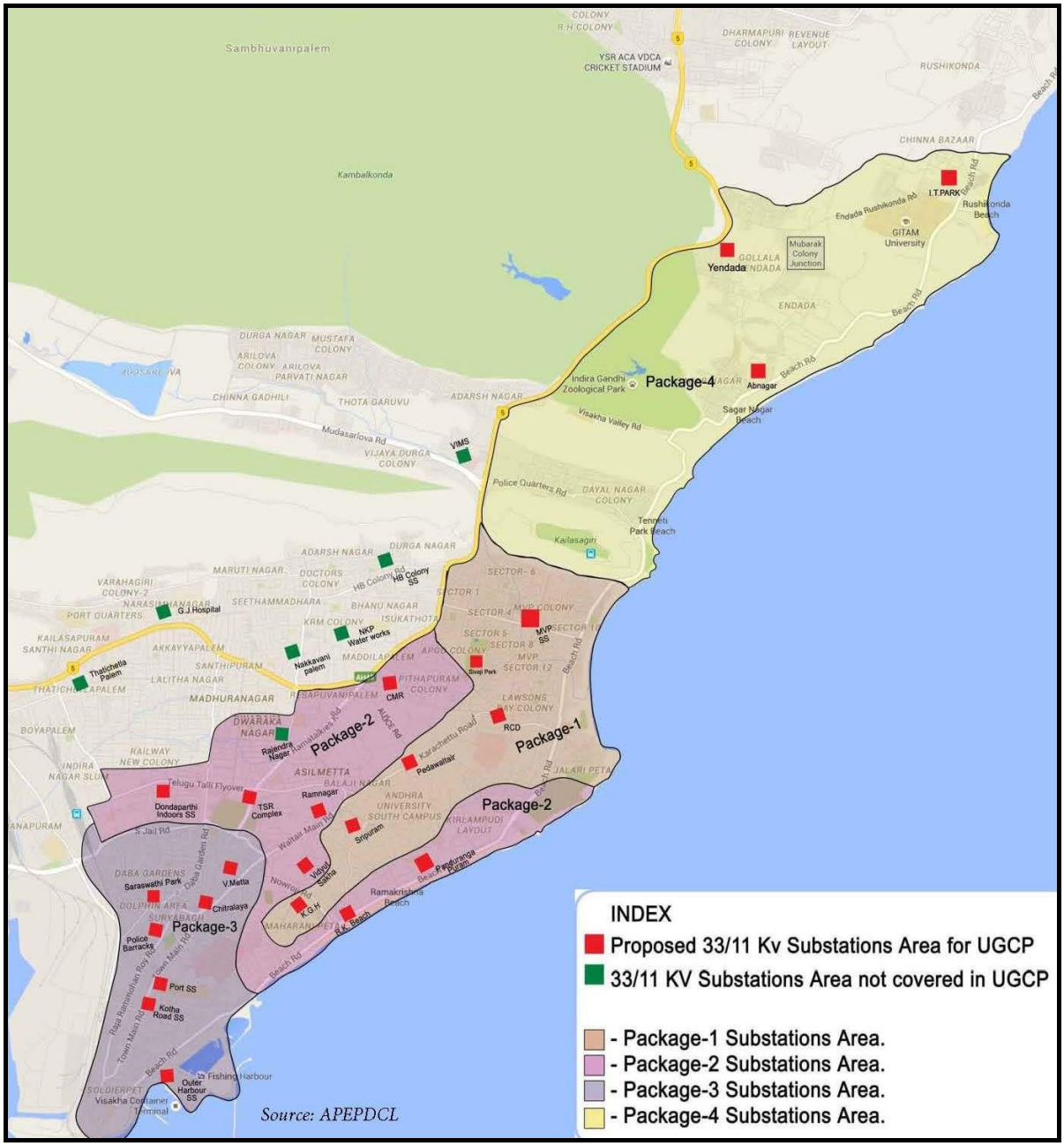


Figure 2.1: Package wise spread of REN/UG Cable Project within Visakhapatnam

Table - 2.2: REN/UG Cable Project Implementation Schedule			
S. No	**Package**	**Associated Substations**	**Schedule for Implementation**
1	Package 1	MVP Colony, Pedawaltair, KGH, RCD Hospital and Siripuram, Sivaji Park	Dec 2016 to May 2018
2	Package 2	Pandurangapuram, RK Beach, Ramnagar, Vidyut Sakha, TSR Complex, Dondaparty Indoor and Maddilapalem	Feb 2017 to July 2018
3	Package 3	Kotha Road, Port, Police Barracks, Outer Harbour, Venkateswarametta, Saraswathi Park and Chitralaya	Feb 2017 to July 2018
4	Package 4	Rushikonda, Adibhatlanagar, Yendada, Visalakshmi Nagar and Akkayyapalem, Thatichetlapalem, Nakkavanipalem, HB Colony, Rajendranagar and Seethammadhara Water works	March 2017 to Aug 2018
Source: APEPDCL			

2.10 REN/UG CABLE ROUTE ALIGNMENT - PACKAGE 2 AREA

The project preparation studies for REN/UG cable project has proposed to lay the underground cables alongside of footpath and along road edge in case where footpaths don't exist. The alignment of cable routes has been finalized after due consideration of several factors like most optimal length, analysis of alternatives, minimum obstacles among other influencing factors. Therefore, underground cable routes as proposed in the DPR drawings in all seven substation areas within Package 2 area are considered as final for assessment of the likely environmental and social impacts.

The substation area wise cable route alignments are given in **Figure 2.3** to **2.10**. Enlarged view of these cable route alignments with more details, substation area wise is provided in **Volume I - Environmental Screening Report**.

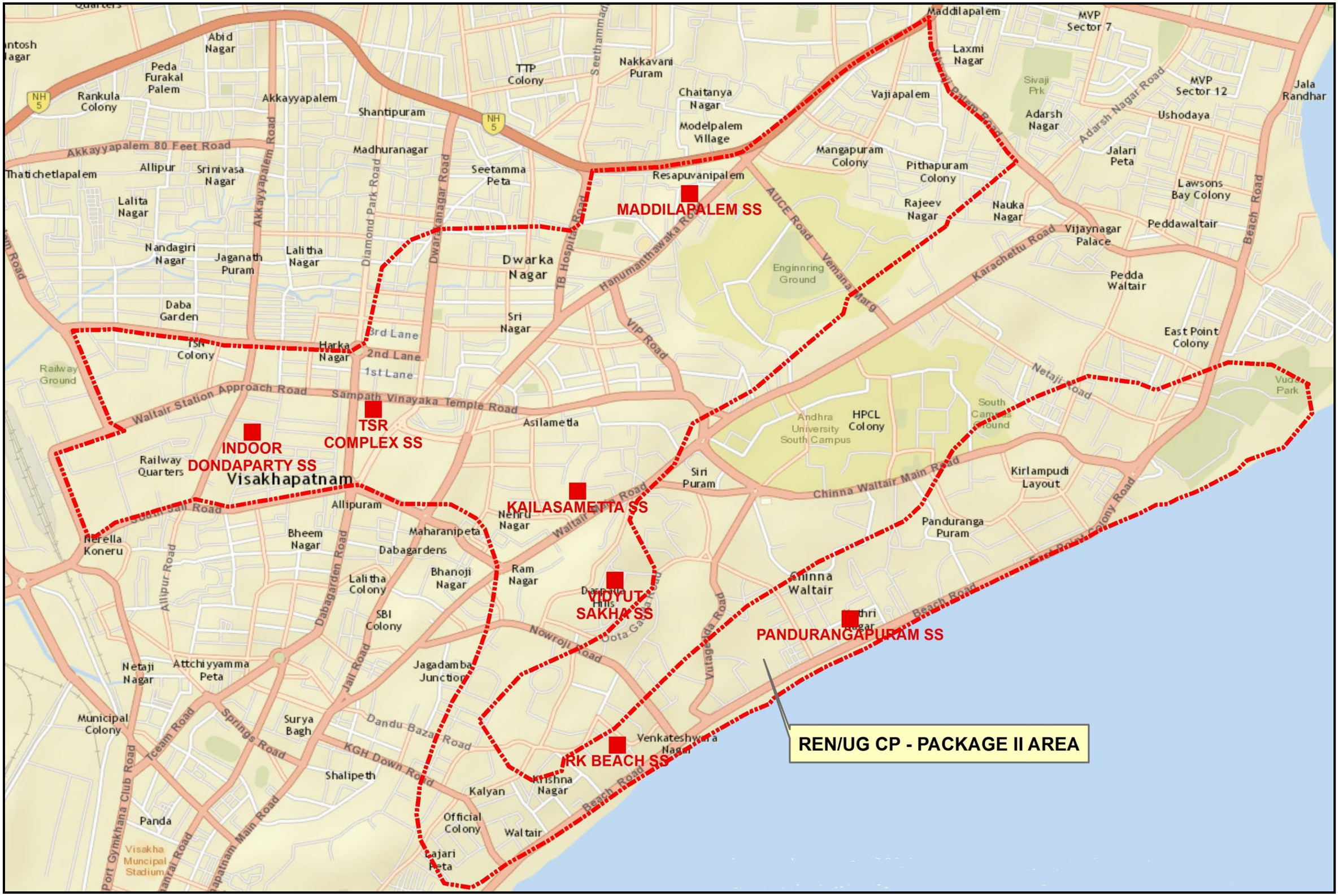


Figure 2.2: The package 2 area of REN/UG component

2.11 GENERAL ARRANGEMENT OF REN/UG CABLES

The project preparation for REN/UG cable project in Package 2 area has considered four types of cable trench configuration for laying of underground cables as shown in **Figure 2.11**. The cumulative length of cable trenches and RCC ducts under Package 2 is 92.15 km and the configuration wise break-up is given in **Table 2.3**. No provision of OFC and /or other communication cables have been included in the REN/UG cable project. This was warranted to minimize down time during restoration of faults in UG cables (in case), avoid multiplicity of required coordination during UG cable routine maintenance, particularly during cable fault repairs, to limit the width of the trench to bare minimum as trenches are along road and most importantly to maintain exclusivity as a safety requirement.

The REN/UG cable project also includes construction of 350 inspection chambers, at a spacing of 250 metres, all along the 87.61 km long underground cable route to facilitate maintenance and repairs of the damaged underground cable joints, if any during the operation phase. Inspection chambers are not warranted along RCC ducts.

Table 2.3: Substation Area wise Type and Length of cable Trenches under Package 2

S.No	Trench Configuration (Width X Depth in mm)	VIDYUT SAKHA	RK BEACH	KAILASAMETTA	TSR COMPLEX	DONDAPARTY	MADDILAPALEM	PANDURANGAPURAM	Total Length(km)
1	Type 1: 1000mm X 1250mm	5.5	0.81	1.63	3.8	0.6	5.82	0	**18.16**
2	Type 2: 600m X 1000mm	7.67	3.24	2.44	11.28	5.86	9.48	3	**42.97**
3	Type 3: 600mm X 1000mm	2.18	1.09	0.77	2.52	2.49	1.26	1.83	**12.14**
4	Type 4: 500 X 850mm	4.66	0.81	0.25	2.69	0.91	2	3.02	**14.34**
5	Total Trench Length	20.01	5.95	5.09	20.29	9.86	18.56	7.85	**87.61**
6	RCC Duct	1.37	0.2	0.41	0.95	0.15	1.46	0	**4.54**
7	**Total Length(km)**	**21.380**	**6.150**	**5.500**	**21.240**	**10.010**	**20.020**	**7.850**	**92.15**

Source: APEPDCL

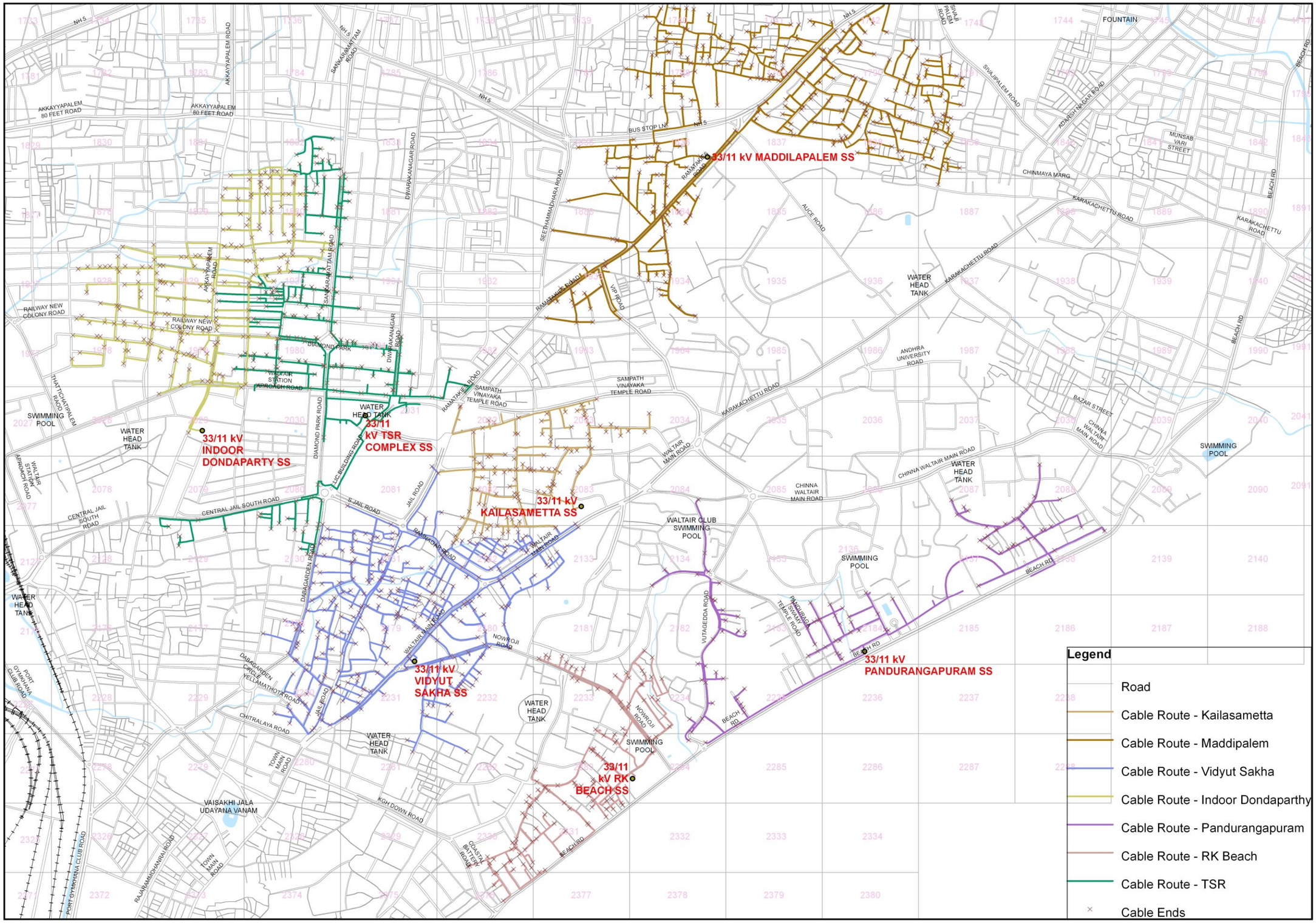


Figure 2.3: REN/UG Cable Route Alignment in all 7 Substation Areas within Package 2

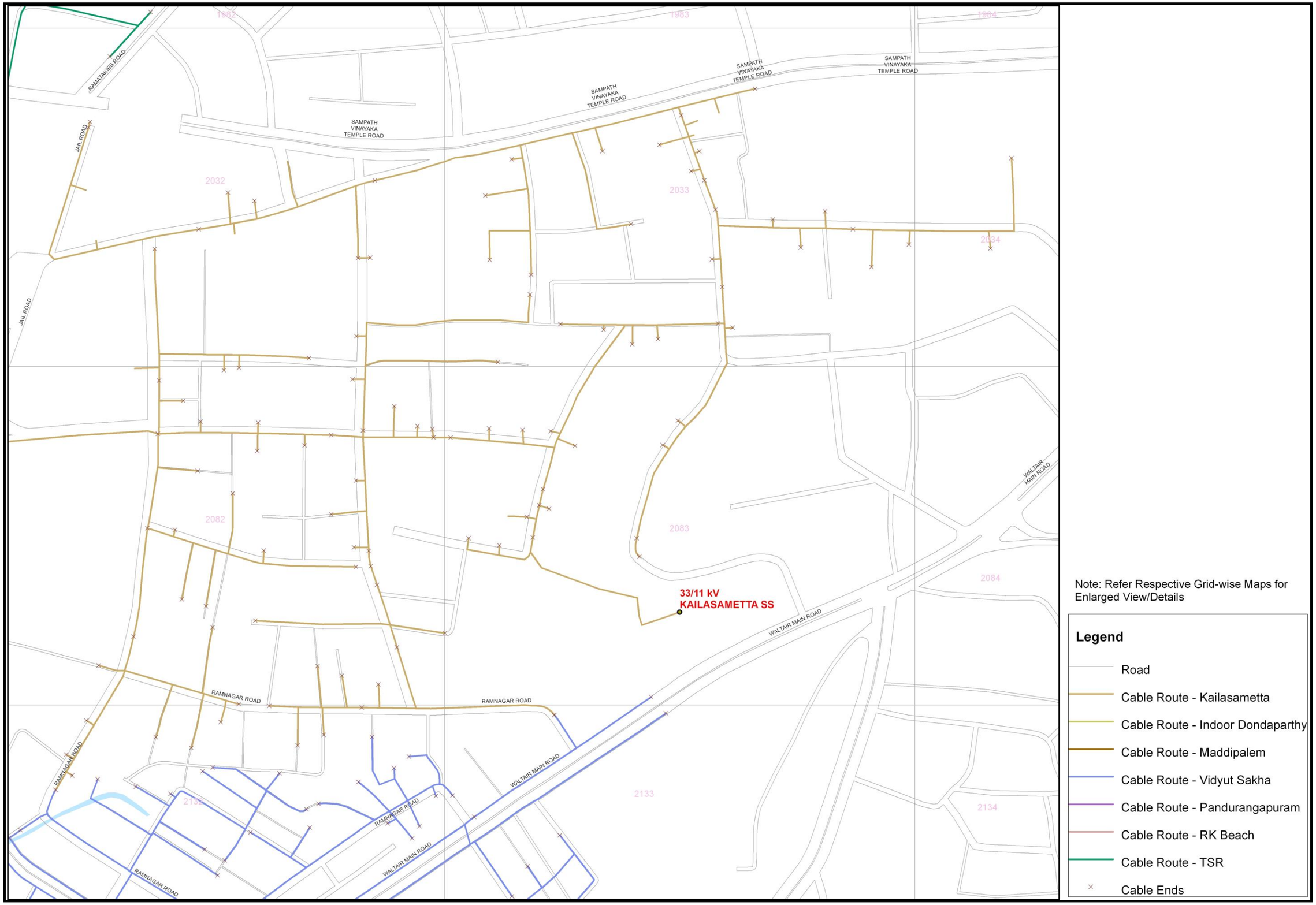


Figure 2.4: REN/UG Cable Route within Kailasametta Substation Area

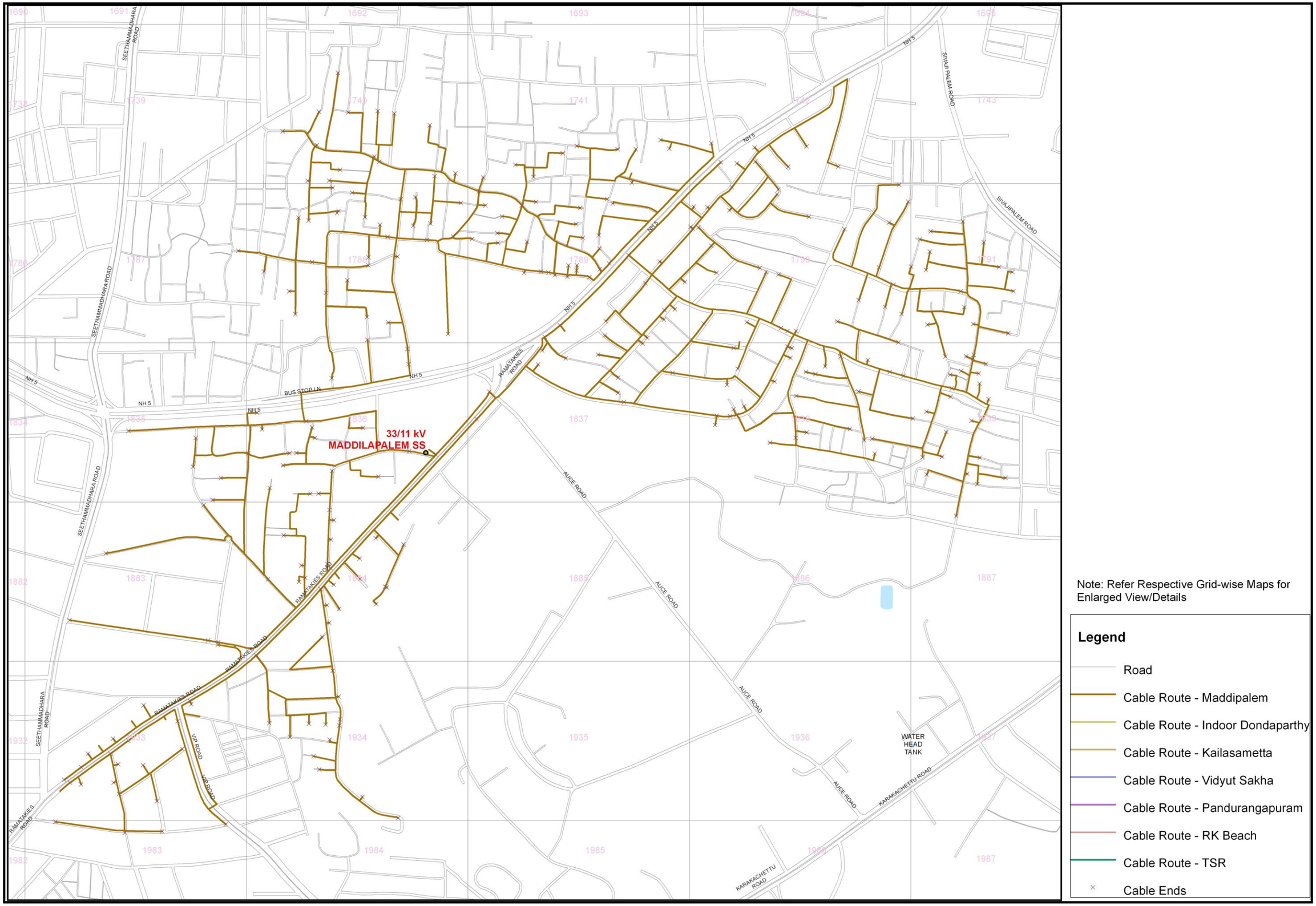


Figure 2.5: REN/UG Cable Route within Maddilapalem Substation Area

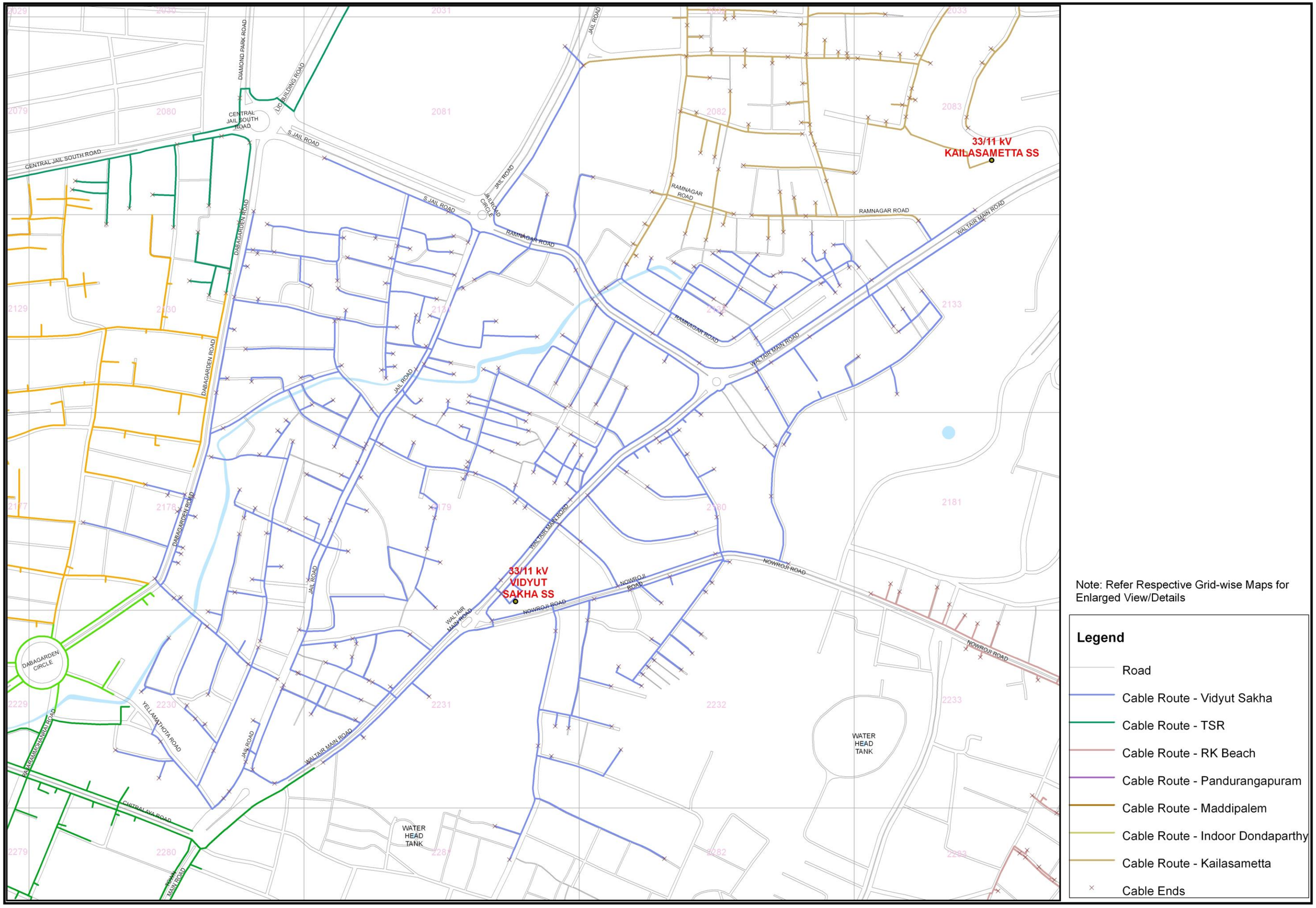


Figure 2.6: REN/UG Cable Route within Vidyut Sakha Substation Area

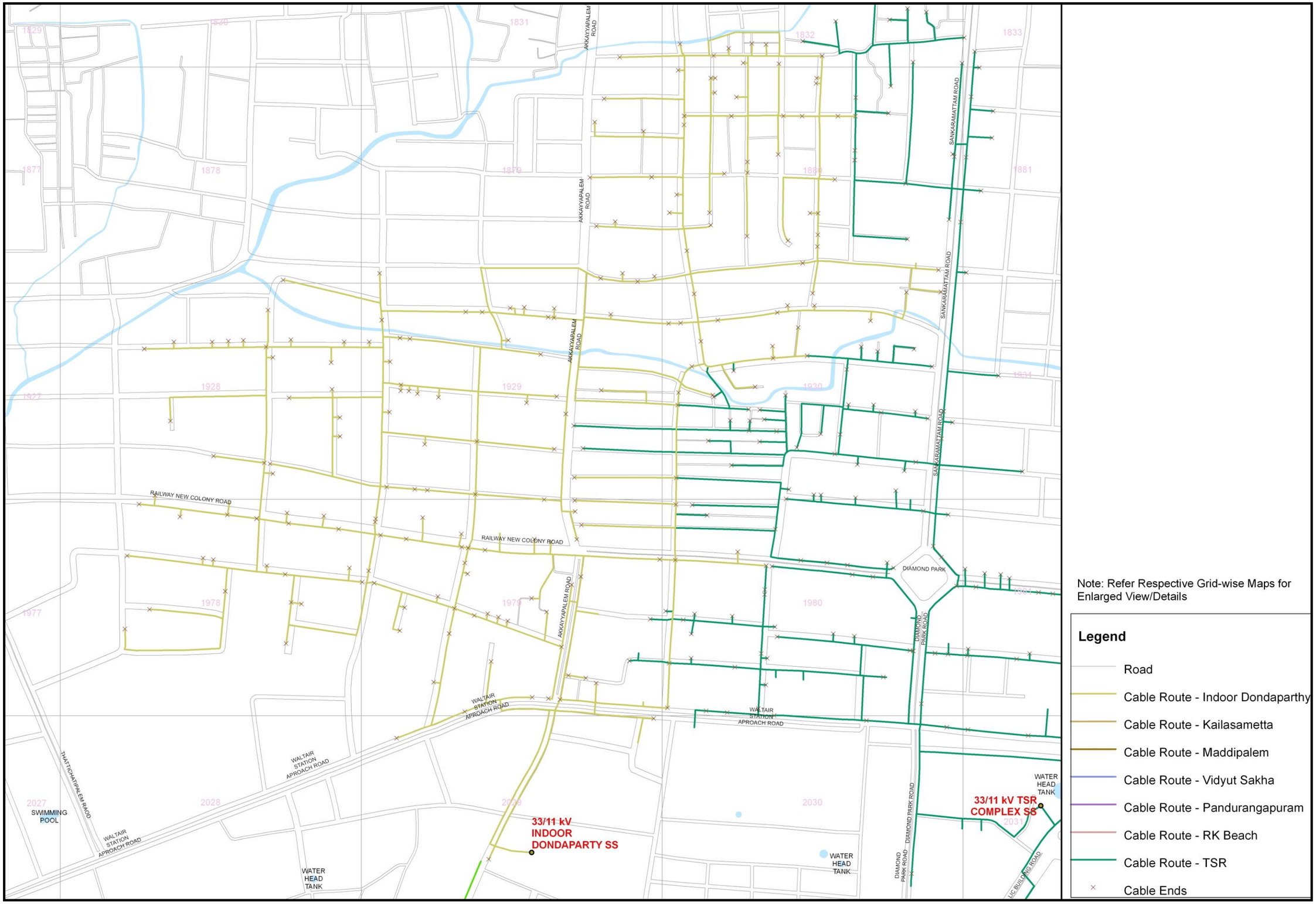


Figure 2.7: REN/UG Cable Route within Indoor Dondaparty Substation Area

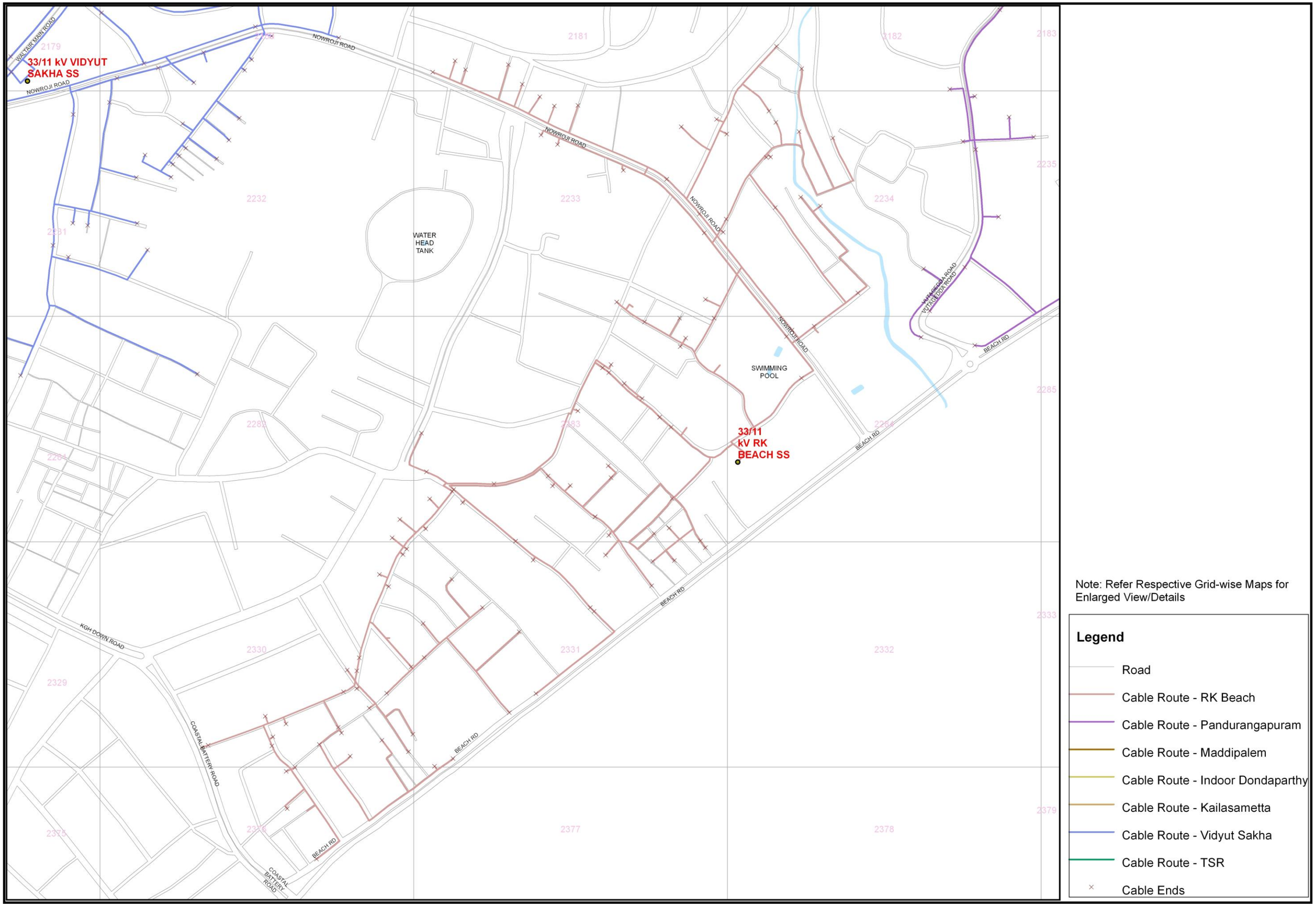
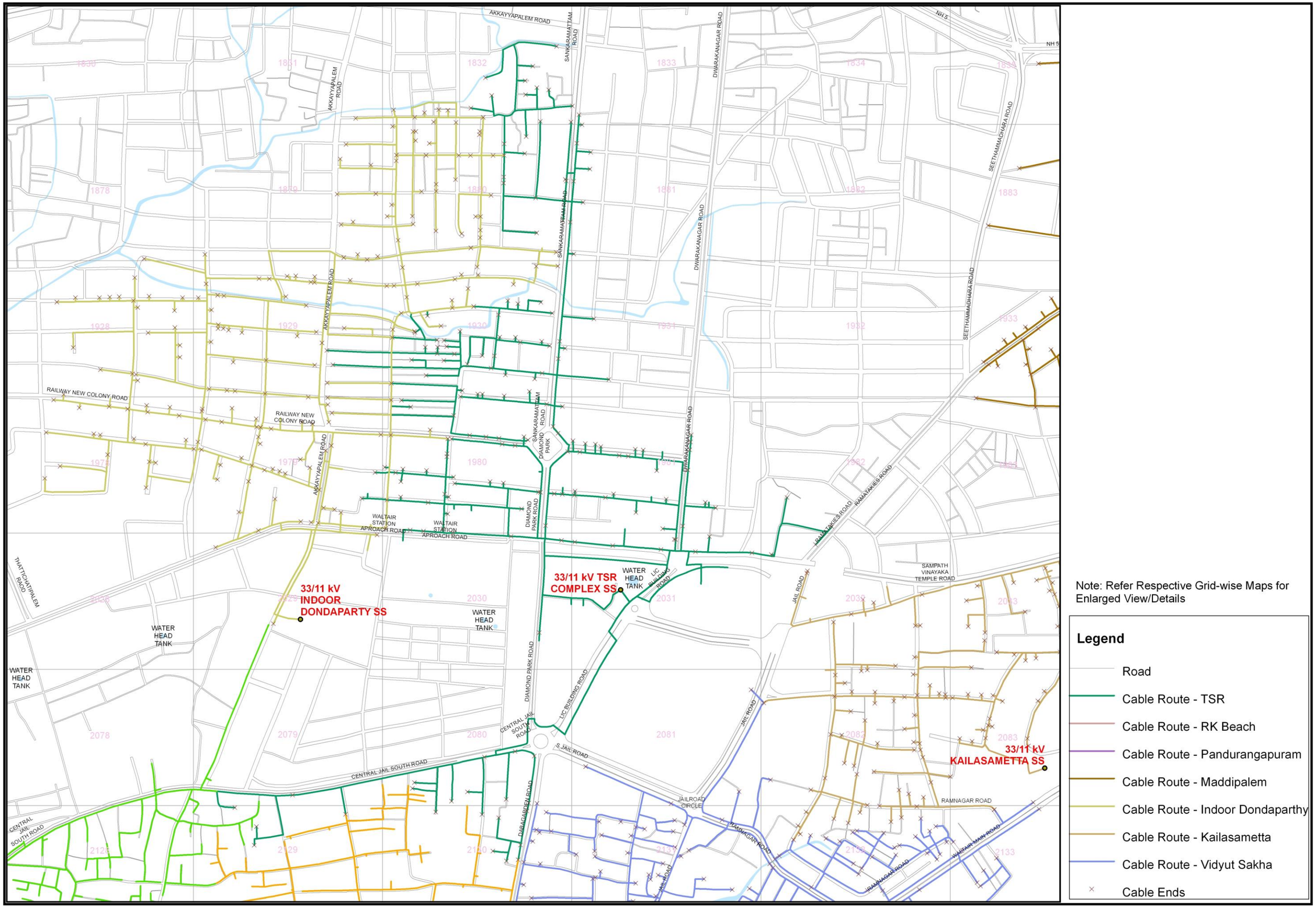


Figure 2.8: REN/UG Cable Route within RK Beach Substation Area



Note: Refer Respective Grid-wise Maps for Enlarged View/Details

Legend

- Road
- Cable Route - TSR
- Cable Route - RK Beach
- Cable Route - Pandurangapuram
- Cable Route - Maddipalem
- Cable Route - Indoor Dondaparthy
- Cable Route - Kailasametta
- Cable Route - Vidyut Sakha
- Cable Ends

Figure 2.9: REN/UG Cable Route within TSR Complex Substation Area

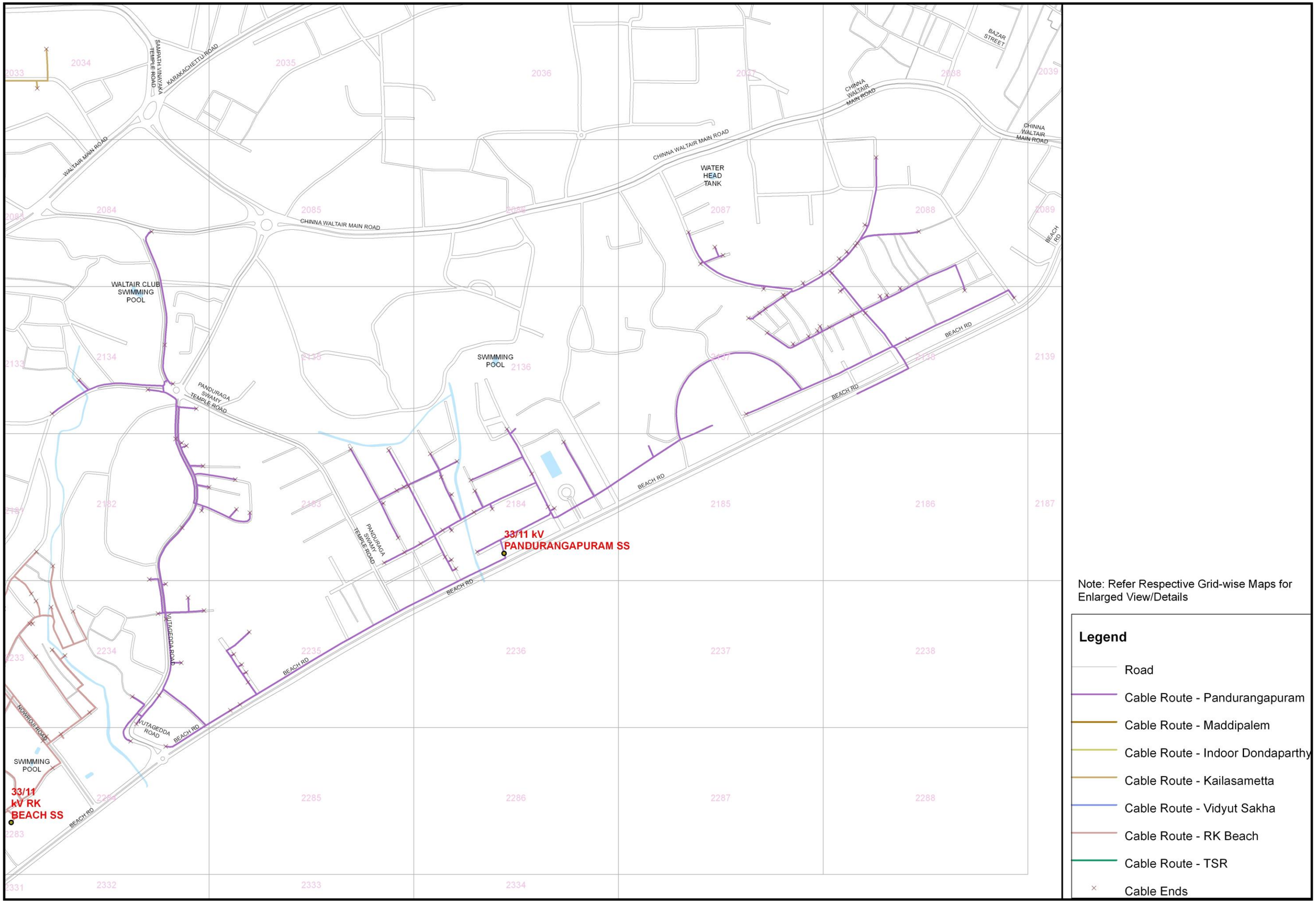
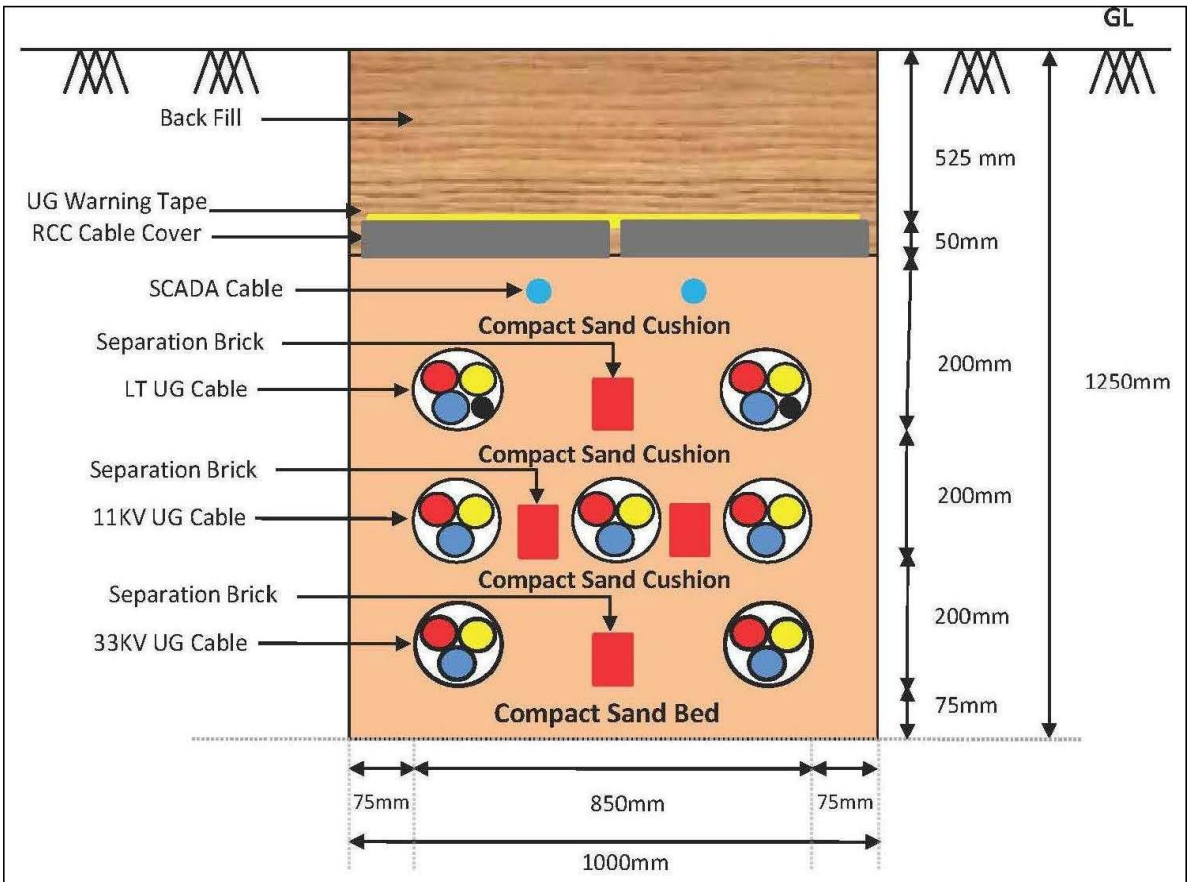
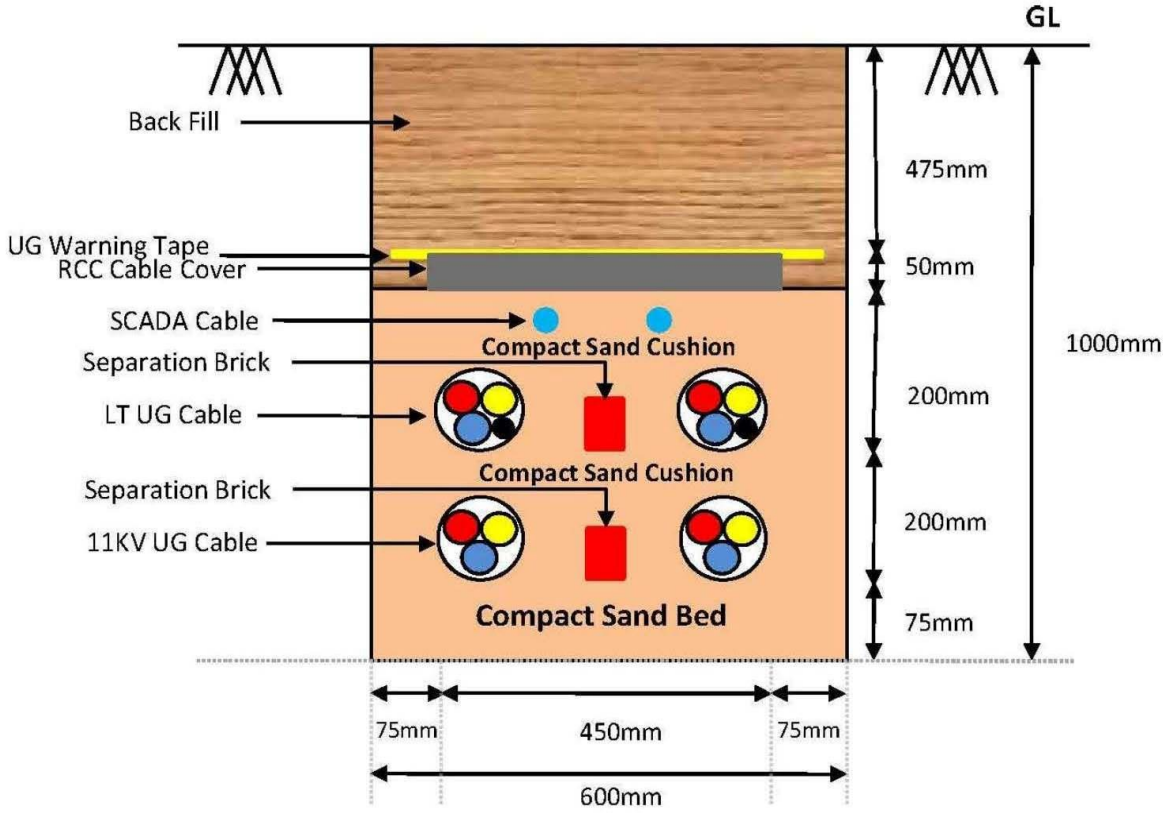


Figure 2.10: REN/UG Cable Route within Pandurangapuram Substation Area

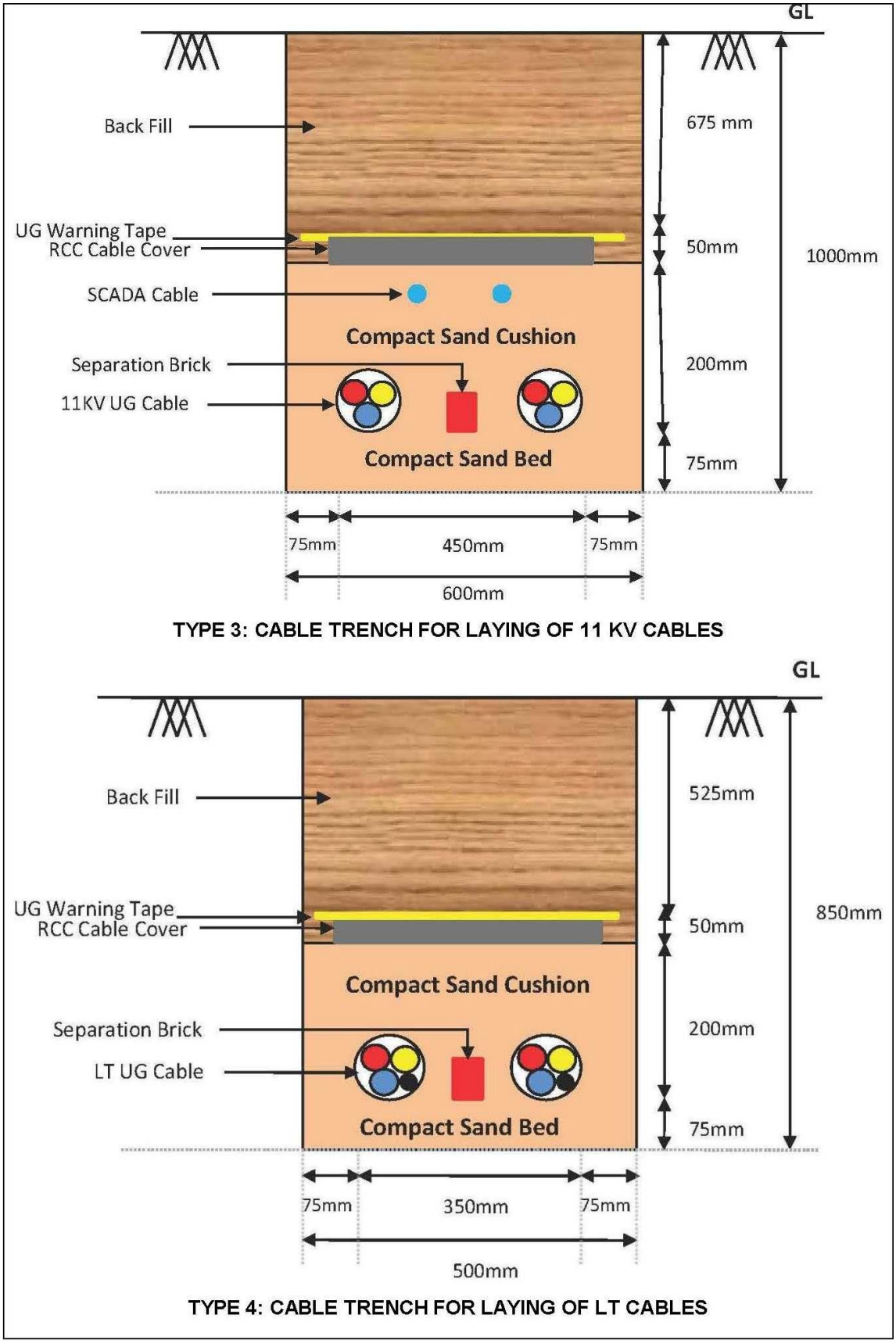


TYPE 1: CABLE TRENCH FOR LAYING OF 33 KV AND 11 KV UG CABLES



TYPE 2: CABLE TRENCH FOR LAYING OF 11 KV LT CABLES

Source: APEPDCL



Source: APEPDCL

Figure 2.11: Configuration of Cable Trenches under Package 2

2.12 ACCIDENTS/FATALITY RECORD OF APEPDCL'S OPERATIONS

APEPDCL has a built-in safety practices/standard operating procedures to prevent electrical accidents in all its operations as per Indian Electricity Regulations. Nevertheless, accidents (both fatal and non-fatal) do occur, which can be attributed to various reasons including human errors, natural calamities and un-authorized work on APEPDCL particularly on overhead conductors by third parties. APEPDCL has an established procedure to assess and compensate for the fatalities of all types through payment of ex-gratia. The accidents and compensation paid by APEPDCL between 2010 and 2016 (up to 31st March) is given in **Table 2.4**.

Table 2.4: Electrical Accidents/Fatality of APEPDCL's Operations

Sl.No.	Financial Year	No. of accidents occurred			No. of cases for which ex-gratia paid	
		Due to Dept. Faults (Snapping of conductor, defective appliances etc.,)	Not due to Dept. Faults (unauthorised work etc.,)	Total	No. of cases	Amount (in INR Lakhs)
1	2010-11	16	69	**85**	36	36
2	2011-12	35	78	**113**	80	68.1
3	2012-13	45	64	**109**	79	69.2
4	2013-14	49	104	**153**	27	26.7
5	2014-15	54	94	**148**	74	153.7
6	2015-16	49	102	**151**	66	131.5
Total		**248**	**511**	**759**	**362**	**485.20***

** Including previous years' sanction*

Source: APEPDCL,

2.13 DECOMMISSIONING OF EXISTING OH SYSTEM INFRASTRUCTURE

In addition, REN/UG cable project also envisage to decommission and dismantle all existing overhead infrastructure (includes overhead conductors, insulators, straight and V cross arms, guy wires, poles, power and distribution transformers along all associated accessories), after the commissioning of the newly laid underground cable network.

APEPDCL intends to redeploy usable(s) in its non-cyclone affected operational areas elsewhere and scarp the unusable materials through approved vendors. The existing overhead infrastructure under Package 2 area, which will be decommissioned and dismantled after commissioning of the REN/UG cable project is given in **Table 2.5**.

Table 2.5: Existing OH Infrastructure to be decommissioned under Package 2			
S.No.	**Particulars**	**Unit**	**Quantity**
1	Network Area of Package-2	Sq.km	5.19
2	33/11 KV Substation	No.	7
3	11 kV Feeders	No.	35
4	33 kV Line	Km	34.2
5	11 kV Line	Km	65.64
6	Power Transformer		
6a	Quantity	No.	12
6b	Total Capacity	MVA	78
7	Distribution Transformers		
7a	Quantity	No.	999
7b	Total Capacity	MVA	114.94
8	LT Line	Km	83.18
9	Consumers	No.	50,744
9a	HT Consumer	No.	110
9b	LT Consumer (Three Phase)	No.	12,827
9c	LT Consumer (Single Phase)	No.	37,807
Source: APEPDCL			

2.14 ACTIVITY FLOW CHART FOR UG CABLE LAYING OPERATIONS

The envisaged activity flowchart for laying of cables under REN/UG cable project – Package 2 area is given in **Figure 2.12.**

The 92.15 km long cable trench and RCC ducts under Package 2 is scheduled to be completed in about 18 months between Feb 2017 and July 2018.

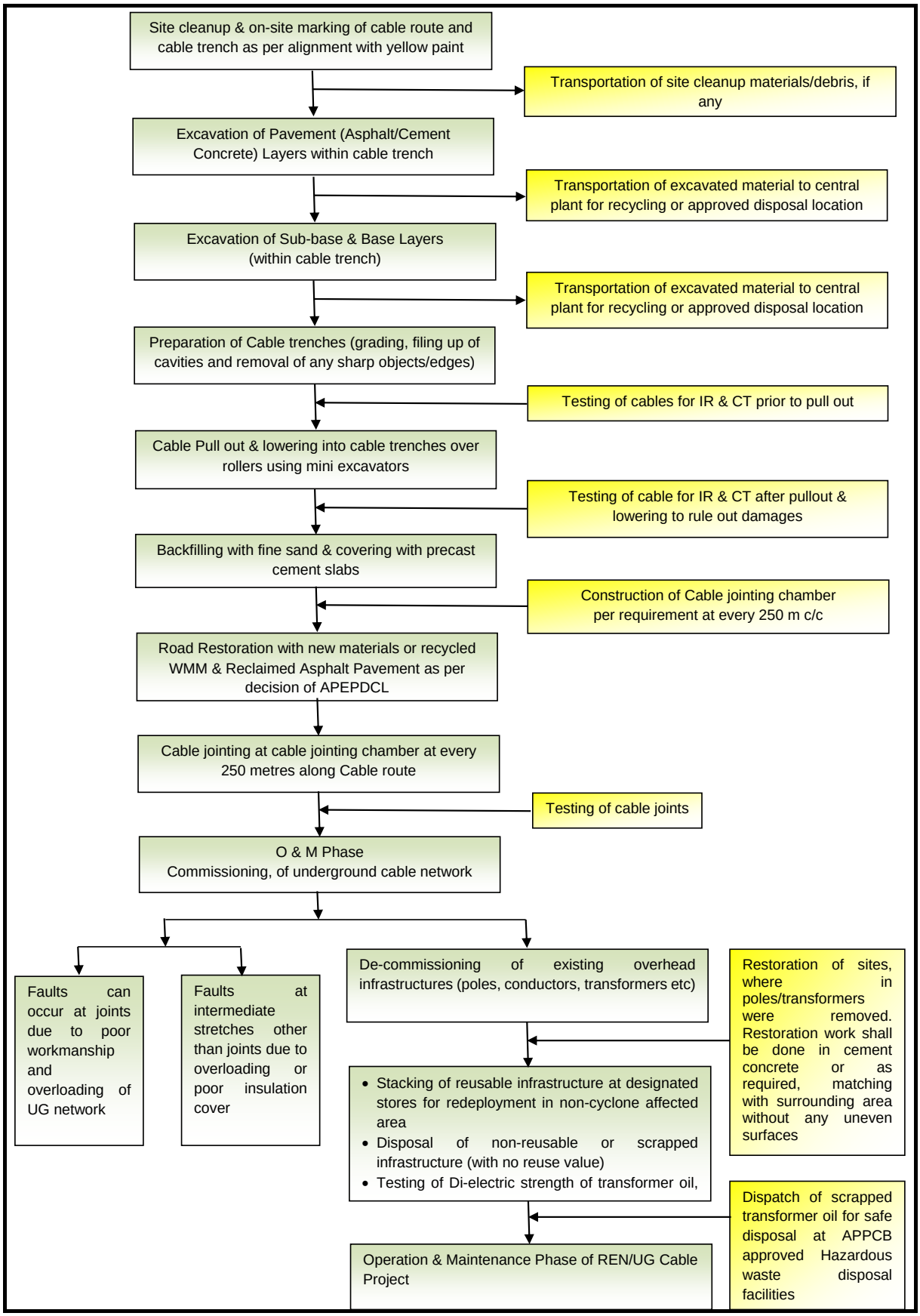


Figure 2.12: Activity Flowchart for Underground Cable Laying Operations – REN/UG Cable Project (Package 2 Area)

2.15 Maintenance of Underground Cable Network

The underground cables network is less maintenance intensive than one with overhead lines. However, it is necessary to have clear procedures for preventive, corrective and condition based maintenance in order to ensure a long trouble free operational life for the underground cables.

2.15.1 Preventive Maintenance

Preventive maintenance will need to be carried out annually comprises:

- Visual inspection of structures, fixtures, transformers, switchgear and cables for signs of deterioration/damage, cleanliness, physical condition & corrective action as necessary.
- Visual inspection of cable joints, splices and ground connections for integrity and condition and cleaning of termination joint outer surfaces of dust and contaminant deposits.
- Testing contact resistance of terminations for signs of deterioration.
- Insulation test between conductors, and resistance to ground using a Megger.
- Infra-red thermal scanning of all joints. If a poor electrical contact is detected through an increase in temperature, it should be cleaned, re-torqued and re-scanned.
- Repairs / replacement of faulty cable sections and re-jointing where necessary.

2.15.2 Corrective Maintenance

Corrective maintenance is required in response to a fault that could occur due to an internal failure (*e.g.* due to improper handling and installation, manufacturing defects, overloading etc.) or externally caused damage (e.g. due to digging). The objective is to identify the nature and location of fault and take remedial action in the quickest possible time. The recommended steps are:

- Visual and physical inspection of the cable route for signs of possible damage *e.g.* due to road works or digging.
- Insulation resistance tests between conductor and shield ground, shield ground and cable ground to identify the presence of a fault.
- Use of cable fault locator and sheath tester to determine the location of the fault.
- Repairs followed by testing and recommissioning.
- Root cause analysis and remedial measures to prevent / minimize future occurrence.

2.15.3 Condition Based Maintenance

Condition based maintenance is based on assessing the condition of cables and equipment that have already suffered partial damage and thereby predicting the need and timeline for future maintenance or replacement. Equipment such an Oscillating Wave Testing System (OWTS) can be used to identify, evaluate and detect partial discharge conditions in cables, joints and terminations. Depending on the magnitude of partial discharge conditions, a decision can be made to either replace the faulty cable section immediately or to test it again after an interval that can stretch from a week to 12 months.

During the maintenance of underground cable network, necessary Health, Safety & Environment (HSE) measures will be taken as described in EMP.

3.1 APPLICABLE ENVIRONMENTAL REGULATIONS

This chapter presents the national and state levels environmental policies, legislations and regulations and World Bank Policies relevant to the proposed REN/UG cable project. The various regulatory clearances required for the proposed REN/UG cable project are also included in this chapter.

3.1.1 Legal Framework

The Government of India has laid out various policy guidelines, acts and regulations pertaining to environment. The Environment (Protection) Act, 1986 provides umbrella legislation for the protection of environment. As per this Act, the responsibility to administer the legislation has been jointly entrusted to the Ministry of Environment, Forests and Climate Change (MoEF & CC) and the Central Pollution Control Board (CPCB) at National level, whereas Andhra Pradesh Pollution Control Board (APPCB) at State level in the present context to REN/UG cable project.

3.1.2 Environmental and Other Regulations Relevant to REN/UG Project

Table 3.1 presents the key environmental and other regulations relevant to REN/UG cable project.

Table 3.1: Environmental Regulations Relevant to REN/UG Cable Project

Sl. No	Environmental and Other Regulations	Relevance to REN/UG Cable Project	Regulatory Clearances Required, if any	Authority
1	EIA Notification, 14th Sept 2006 and subsequent amendments	This notification is NOT applicable as REN/UG cabling project is not listed in the Schedule of the notification and therefore out of the purview of notification	NONE	MoEF, GoI and SEIAA, GoAP
2	Coastal Regulation Zone(CRZ) Notification, 2011 and subsequent amendments	The Package 2 area of REN/UG cable project is within 500 metres from High Tide Line. The landward area of REN/UG cable project, which is within 500 metres from HTL is in municipal limits, fully developed and has been provided with drainage and approach roads. As per the notification, such areas are classified under CRZ-II areas. Laying of underground cables under REN/UG cable route will be confined to the existing city roads and will not ingress into beach areas (shoreline) along coastline.	CRZ clearance is NOT required for REN/UG cable project as it does not require water front and foreshore facilities. The UG cabling work will be confined on existing paved road	APCRZMA, Government of Andhra Pradesh and MoEF&CC, Government of India

Table 3.1: Environmental Regulations Relevant to REN/UG Cable Project				
Sl. No	**Environmental and Other Regulations**	**Relevance to REN/UG Cable Project**	**Regulatory Clearances Required, if any**	**Authority**
3	The Forest (Conservation) Act. 1980 with amendments made in 1988 and subsequent amendments thereof	This Act is NOT applicable as the alignment of cable routes under package 2 area of REN/UG cable project is along existing city roads, which are under jurisdiction of Greater Visakhapatnam Municipal Corporation and does not pass through forest areas or require diversion of forest land for laying of UG cables (non-forest purposes).	NONE	Principal Chief Conservator of Forests, Andhra Pradesh Forest Department, Government of Andhra Pradesh
4	Wild Life Protection Act 1972	This act is NOT applicable as the alignment of cable routes under REN/UG cable project is along existing city roads, which are under jurisdiction of Greater Visakhapatnam Municipal Corporation and does not pass through forest areas, national parks, sanctuaries or known wildlife crossing points.	NONE	Chief Wildlife Warden, Government of Andhra Pradesh
5	Air (Prevention and Control of Pollution) Act, 1981	This act is applicable for construction phase to manage ambient air quality at work camp sites with hot mix plants, macadam mix plants and concrete batch mix plants etc for road restoration work.	Consent for Establish (CFE) is to be obtained prior to establishing work camp sites. Consent for Operate (CFO) is to be obtained prior to commencement of operations at work camp sites	APPCB, Government of Andhra Pradesh
6	Water Prevention and Control of Pollution) Act,1974	This act is applicable for construction phase to manage to manage liquid waste discharges at work camp sites with hot mix plants, macadam mix plants and concrete batch mix plants etc.	Consent for Establish (CFE) is to be obtained prior to establishing work camp sites. Consent for Operate (CFO) is to be obtained prior to commencement of operations at work camp sites	APPCB, Government of Andhra Pradesh
7	Noise Pollution (Regulation and	This act will be applicable for all construction equipment/plant and	NONE but noise levels are to be regulated during	APPCB, Government of

Table 3.1: Environmental Regulations Relevant to REN/UG Cable Project				
Sl. No	**Environmental and Other Regulations**	**Relevance to REN/UG Cable Project**	**Regulatory Clearances Required, if any**	**Authority**
	Control Act),2000	machinery including vehicles deployed for implementation of REN/UG cable project-package 2 area for regulation of ambient noise levels	construction and maintenance of proposed REN/UG cable project in conformity with permissible standards	Andhra Pradesh
8	Construction & Demolition Waste Management Rules, 2016	This rule shall be applicable to waste resulting from excavation of trenches for cable laying operations such as excavated pavement materials, cement concrete roads, other construction debris and rubble etc	Construction waste management plan, prior to commencement of construction (cable laying operations)	Greater Visakhapatnam Municipal Corporation (GVMC)
9	e-waste (Management) Rules, 2015	This rule shall not be applicable as the Package 2 area of REN/UG cable project involves only decommissioning and/or shifting of electrical utilities from cyclone affected areas to non-cyclone affected areas and does not involve dismantling of electrical equipment into its components.	NONE	Andhra Pradesh Pollution Control Board
10	Ancient Monuments and Archaeological Sites and Remains (Amendment and Validation) Act, 2010	This act is not applicable as the Package 2 area of REN/UG cable project does not have any ancient monuments and archeological sites protected under the Act.	NONE	National Monument Authority, constituted under the Act
11	Public Liability and Insurance Act 1991	To protect damage to the public life and/or property as a result of negligence/accidents during implementation of REN/UG cable project (package 2 area)	NONE. However, Project operations are to be insured to cover damage to the public life and/or property due to accidents/negligence during implementation of REN/UG cable project (Package 2 area)	Insurance Regulatory and Development Authority of India
12	Central Motor Vehicle Act 1988 and Central Motor Vehicle Rules1989	This act will be applicable for all construction equipment/plant and machinery including vehicles deployed during implementation of REN/UG cable project (package 2 area)	NONE but vehicular emissions are to be regulated by project proponent in conformity with permissible levels/emission norms	State Transport Authority/ Motor Vehicles Department

Table 3.1: Environmental Regulations Relevant to REN/UG Cable Project				
Sl. No	**Environmental and Other Regulations**	**Relevance to REN/UG Cable Project**	**Regulatory Clearances Required, if any**	**Authority**
13	Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996	To ensure safety and welfare measures for workers employed at building and other construction sites. The REN/UG project is covered under Other construction category	NONE. Safety and welfare measures for work force employed at construction sites are to be regulated in conformity with the Act	Andhra Pradesh Building and Other Construction Workers' Welfare Board
14	Andhra Pradesh Water, Land and Trees Act, 2002 (APWALTA – 2002)	This act is not applicable to REN/UG cable project (Package 2 area). The cable routes will be aligned to bypass trees of all types and sizes. Therefore, no tree felling/cutting is required for implementation of REN/UG cable project within package 2 area. The water requirements of package 2 area, will be met from ground water sources, through existing tube wells and entire Visakhapatnam is under safe category for ground water extraction by CGWB.	NONE	Chief Conservator of Forests, Andhra Pradesh Forest Department, Government of Andhra Pradesh
15	Indian Electricity Rules, 1956 and amendments thereof and BIS 1255;1983 and amendments thereof	This stipulates all technical and safety requirements during cable laying, testing and operation of the REN/UG cable project.	NONE	Central Electricity Board and Govt. of Andhra Pradesh
16	Hazardous Waste (Management, Handling and Transboundary Movement) Rules,2008 and amendments thereof	The rules will be applicable to oils/lube wastes from construction equipments /machinery during construction phase (cable laying) and discarded/waste transformer oils during decommissioning phase of existing overhead infrastructure. The rule include storage, handling, transportation procedures and requirements for safe disposal of all hazardous wastes.	NONE	APPCB
17	Solid Waste Management Rules, 2016	This rules are applicable to all forms/types of solid waste generated at operational areas and work camp sites under REN/UG cable project	NONE	APPCB

3.1.3 World Bank Environmental Requirements

The safeguard policies of the World Bank relevant to proposed REN/UG cable project are given in **Table 3.2**.

Table 3.2: Relevant and Applicability of WB Safeguard Policies for REN/UG Project-Package 2

S.No	World Bank Safe Guard Policy	Policy Objective	Policy Applicability to REN/UG Project	Policy Triggered Or Not
1	Environmental Assessment (OP/BP 4.01)	Overall governing policy intended to ensure Bank-financed projects are environmentally sound and sustainable	All potential impacts due to REN/UG cable project are to be assessed and necessary mitigation measures are to be incorporated	Triggered
2	Natural Habitats (OP/BP 4.04)	Policy is intended to prohibit Bank financing of projects that degrade or convert critical habitats and supports projects that affect non-critical habitats only if no alternatives are available and if acceptable mitigation measures are in place.	REN/UG cable routes will be along existing city roads, which are under the jurisdiction of Greater Visakhapatnam Municipal Corporation and does not pass through forest areas/national parks/sanctuaries or known wildlife crossing points.	Not Triggered
3	Forests (OP/BP 4.36)	Policy is intended to support sustainable and conservation-oriented forest management, harness potential of forests to reduce poverty in a sustainable manner, integrate forests into sustainable economic development, and protect vital local and global environmental services and values of forests.	REN/UG cable routes will not pass through or involve in any activity in forests/plantation areas.	Not Triggered
4	Physical Cultural Resources (OP/BP 4.11)	Policy is intended to ensure that projects identify and inventory cultural resources that are potentially affected by the project. Projects should include mitigation measures, when there are adverse impacts on physical cultural resources.	The REN/UG cable routes will be along city roads and will be aligned to avoid/bypass all cultural property resources (CPR) and therefore does NOT warrant shifting or affect CPRs.	Triggered

4.1 GENERAL

This chapter defines the operational area required for laying of underground cables, which is also the corridor of impact as a consequence of cable laying operations under REN/UG cable project. The findings of environmental screening of the operational area or corridor of impact in particular, project influence area and beyond in general are summarized in this chapter. The baseline environmental profile of the Visakhapatnam city, which includes the Package 2 area of REN/UG cable project, is also described in this chapter.

4.2 OPERATIONAL AREA/CORRIDOR OF IMPACT

The underground cables under the REN/UG project are envisaged to be laid along side of the roads as per the alignment/routes finalised during project preparation. However, almost all roads under Package 2 area has pre-existing road side over ground infrastructure like electric/ telecom/street light poles, road side trees and underground OFC cables laid by multi telecom operators.

Most of the pre-existing roads side infrastructure/utilities are within a maximum of 0.45 metre from the foot path or road edge, towards the roadside. Therefore, trench for the REN/UG cable project has to be essentially at least 0.45 metre away from the footpath or road edge, towards roadside, in order to avoid fouling of cable trenches under REN/UG project with other pre-existing infrastructure/utilities and roadside trees. However, this strip of 0.45 metre can serve as space for requirements like stacking of material, etc and thus can be included within the operational area for REN/UG cable project. Field assessments have indicated that in smaller or narrower roads, this 0.45 metre can reduce to even 0.3 metre and can be included within operational area. Hence, it is considered to demarcate a 2.5 m wide strip as **operational area**, one side of strip being footpath or road edge, and other side of strip extending towards the other side of road or median, in case of dual carriageway (including 0.45 metre wide strip with pre-existing infrastructure).

This 2.5 metre wide strip is bare minimum space required as operational area to mechanically excavate required size of cable trenches, stacking and handling of all materials, cable pullout and lowering operations, backfilling of trenches, construction of inspection chambers and road restoration works.

During cable laying, this operational area is to be barricaded on both sides, with intermediate access provided to buildings, wherever required and all cable laying operations are to be limited to this barricaded operational area. Thus, the barricaded operational area will also be the direct **Corridor of Impact** (COI), as a consequence of cable laying operations. The entire road width (in case of single carriage way) or up to middle of road/median (in case of divided carriageway) along cable routes is considered as **Project Influence Area,** which will be subjected to some incidental construction phase impacts and inconveniences like increased dust, noise levels and traffic disruptions due to constricted carriageway due to barricading of operational area among others.

The barricaded operational area/corridor of impact for cable laying operations is shown in **Figure 4.1.**

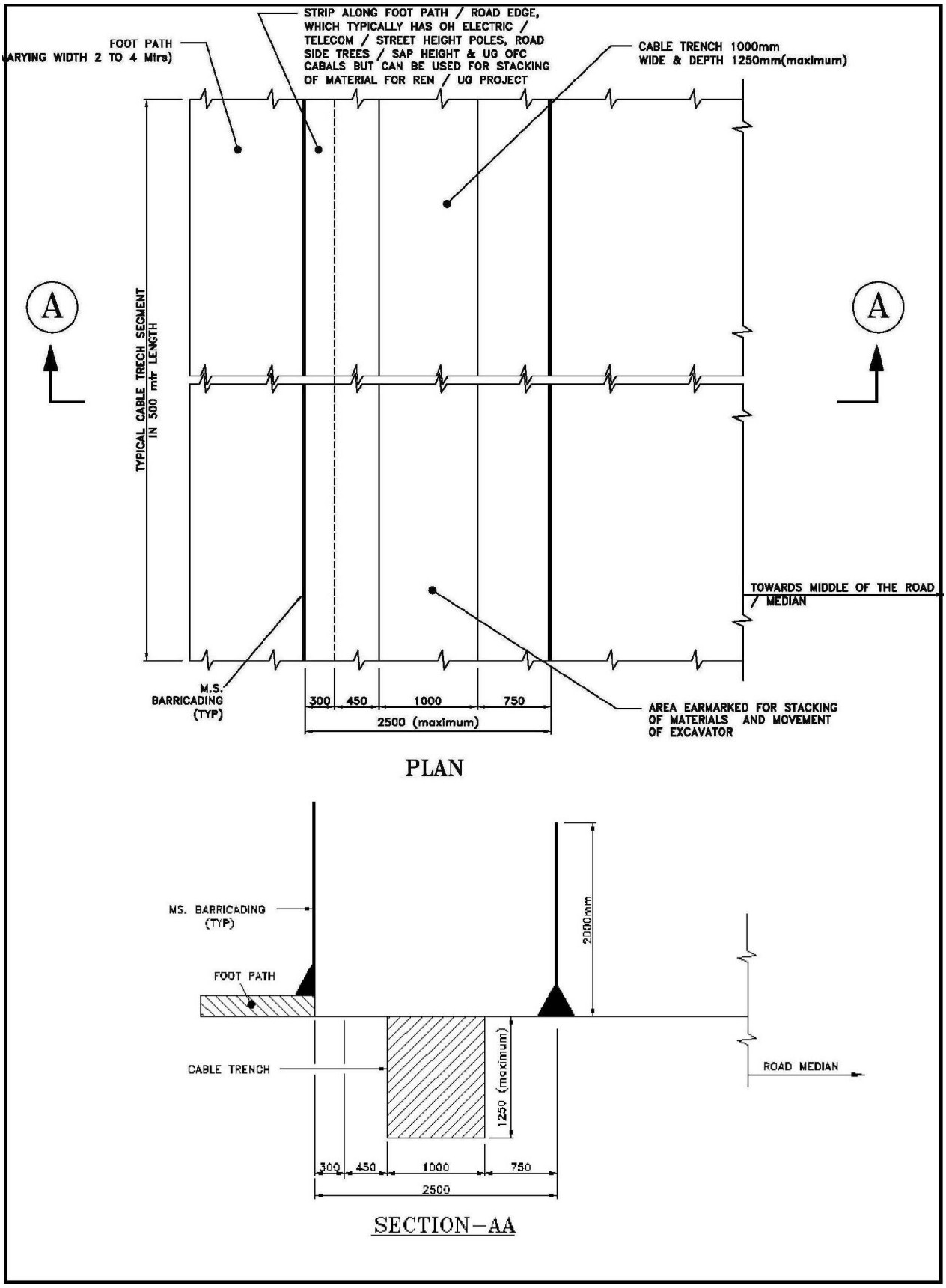


Figure 4.1: Barricaded operational area/COI for UG cable laying operations

4.3 ENVIRONMENTAL SCREENING OF REN/UG PROJECT- PACKAGE 2 AREA

As part of the baseline assessment, an environmental screening was carried out during February 1-20, 2016 comprising;

- Environmental screening within a 10 km radius of Package 2 area of REN/UG cable project. Screening formats as per ESMF under APDRP was used. The screening was carried based on latest secondary data base available in public domain, supplemented by field visits for ground truth verification, wherever required
- Environmental screening of corridor of impact and project influence area, in order to prepare an inventory of environmental features, sensitive receptors and physical cultural resources along the cable routes. The screening was carried out through transect walks and the features along cable routes were captured in specially prepared strip plans as well as formats for enumeration of sensitive receptors and physical cultural resources. A videography of the corridor of impact area was also carried out during this screening exercise.

4.3.1 Summary of Environmental screening within 10 km radius of Package 2 area

The findings of the environmental screening surrounding the Package 2 area, up to 10km radius are;

- There are no biosphere reserves, national parks, tiger/elephant reserves, coastal areas with coral reefs, wetlands, important bird areas and/or any other ecologically sensitive areas within a radius of 10km of the package 2 area of REN/UG cable project
- The Kambalakonda wild life sanctuary, Kambalakonda eco-tourism park and Indira Gandhi Zoological Park are at an aerial (as crow fly) distance of 3 km from outer edge of Package 2 area.
- The coastline along Visakhapatnam between R K beach and Bheemili is known to have sporadic nesting sites for Olive Ridley turtles (*Lepidochelys olivacea*), which are protected under Schedule I of Wildlife Protection Act and listed as vulnerable in IUCN list. However, the nesting site within the package 2 area is Yoga village, where VSPCA has an ex-situ hatchery facility, due to excessive beach front activities on like tourism, heavy lighting, pollution and predators such as crows, eagles, jackals and beach dogs. Cable routes under REN/UG project are along city roads through fully developed areas and do not extend into coastal sands (beach areas).
- The package 2 area of REN/UG cable project skirts within 500 metres from High Tide Line and thus will be under the purview of CRZ Notification. The landward area of REN/UG cable project, which is within 500 metres from HTL is in municipal limits, fully developed and has been provided with drainage and approach roads. As per the notification, such areas are classified under CRZ-II areas. Laying of underground cables under REN/UG cable project will be limited to existing roads, which are pre-existing to the date of CRZ notification and does not extend into sand and/or beach areas (shoreline) along coastline.

The filled in environmental screening formats as per ESMF under APDRP along with location maps of above mentioned sensitive areas with respect to Package 2 area are given in Annexure I of **Volume I - Environmental Screening report**.

4.3.2 Summary of Environmental Screening within COI/Project Influence area

The environmental screening of the operational area/corridor of impact and project influence area along cable route corridors has indicated that cables under the REN/UG project can be laid along the proposed routes without resorting to shifting of any of the pre-existing road side over ground infrastructure and/or felling of road side trees (all types and sizes). At all such locations, the cable routes can be re-aligned with minor deviations, to avoid any such requirements.

The underground cable routes do pass through existing roads, which have sensitive receptors like hospitals, schools / educational institutions and temples, however none of them will be affected as cable routes are away from them and neither require shifting of any physical cultural resources. The construction phase impacts and inconveniences in terms of dust, noise levels and traffic disruptions at all such stretches are to be managed through appropriate management measures.

The underground cable routes will intersect various underground utilities like sewer lines, water supply lines, telephone lines, etc. These underground utilities will be avoided, shifted and restored to its previous state by the contractors as part of cable laying operations through deployment of a dedicated crew, which will be provided with all resources. Before laying of underground cable, underground utilities will be shifted in consultation with GVMC and or respective building owners as may be required.

The REN/UG cable project is also likely to affect above ground utilities. The enumeration of such utilities have been carried out and presented in Volume I as Environmental Screening.

The REN/UG cable project will however require demolition of ramps/steps and part structure of shops/kiosks of street vendors, many of which are illegal and have been extended onto roads. During the screening survey, all such extensions within the corridor of impact, irrespective of whether they are legal or illegal have been enumerated.

The strip plans of cable routes showing sensitive receptors and other road side infrastructure, summary of enumeration surveys of physical structures, which are within the operational area/corridor of impact and are likely to be affected during cable laying operations is given in Annexure II of **Volume I - Environmental Screening report**.

4.4 ENVIRONMENTAL PROFILE OF REN/UG PROJECT- PACKAGE 2 AREA

The climate and weather conditions are significant in this project as it can influence the progress of work and implementation schedule of REN/UG cable project. The following sections describe the key elements of the climate, viz., temperature, wind, rainfall and relative humidity and evaporation recorded at meteorological observatory at Visakhapatnam established by the IMD (India Meteorology Department), Government of India. The other relevant environmental attributes like geology, soils, ground water, prevailing ambient air quality and ambient noise levels, ecologically sensitive areas, physical cultural resources are also described hereunder.

4.4.1 Climate

Climatologically, Vishakhapatnam experiences tropical sub-humid type of climate with moderate summer and good seasonal rainfall. The southwest monsoon sets in the second week of June and lasts till September end. October and November months receive rainfall from northeast monsoon. Winter seasons are generally cool and fine weather prevails from

December to February followed by summer season extending up to early or middle of June.

4.4.2 Temperature

The annual daily mean temperature within Visakhapatnam city ranges between 23.7°C and 32.5°C. May is the hottest month with a daily mean maximum at 36.2°C and January is the coldest month with the daily mean minimum at 18.0°C. The highest and lowest temperature ever recorded in Visakhapatnam is 45.3 °C in June and 13.6 °C in January months.

4.4.3 Wind Speed and Direction

The wind speed in Visakhapatnam ranging between 1-19 kmph occurs for about 250 days in a normal year. The wind speed ranging between 20-61 kmph occurs for about 50 days in a normal year and remaining are calm days/period.

Generally, during post-monsoon and winter season (November to February), wind blows from east or north-east directions. With the onset of summer, (March onwards), south westerlies and westerlies are dominant winds and continue during the rest of summer upto May end or early June. The south west monsoon season winds are mostly from directions between South-west and North West. The general dominant wind flow pattern is south westerly during monsoon, whereas the wind direction is easterly in the post-monsoon and winter seasons.

4.4.4 Cloud Cover

Visakhapatnam has nearly 270 days of clear sunshine in a year i.e., with low cloud cover between 0-2 Oktas. As per the data recorded by the India Meteorological Department, the region has a cloud cover of 8 Oktas (*i.e.,* 100% of sky is covered with clouds or complete overcast) over 57 days in a normal year and for the remaining 38 days, the cloud cover generally ranges between 2 and 7 Oktas in a year (*i.e.,* 25%-75% of sky is covered with clouds).

4.4.5 Rainfall

The mean annual rainfall in Vishakhapatnam is 968.8 mm, occurring over 52 days in a year. In a normal year, October is the wettest month with an average rainfall of 205 mm over 10 rainy days. Visakhapatnam receives lowest monthly rainfall of less than 10 mm per day in between December and March. The highest ever recorded rainfall in 24 hours is 293 mm (October, 1958) and highest ever recorded rainfall in a year is 1442 mm (Year 1910).

4.4.6 Humidity

Visakhapatnam experiences humid conditions ranging between 64% - 79% throughout the year. August being the most humid month with 79% and December is the lowest with 64% humidity. The mean humidity of Visakhapatnam is 72% both during morning and evening hours.

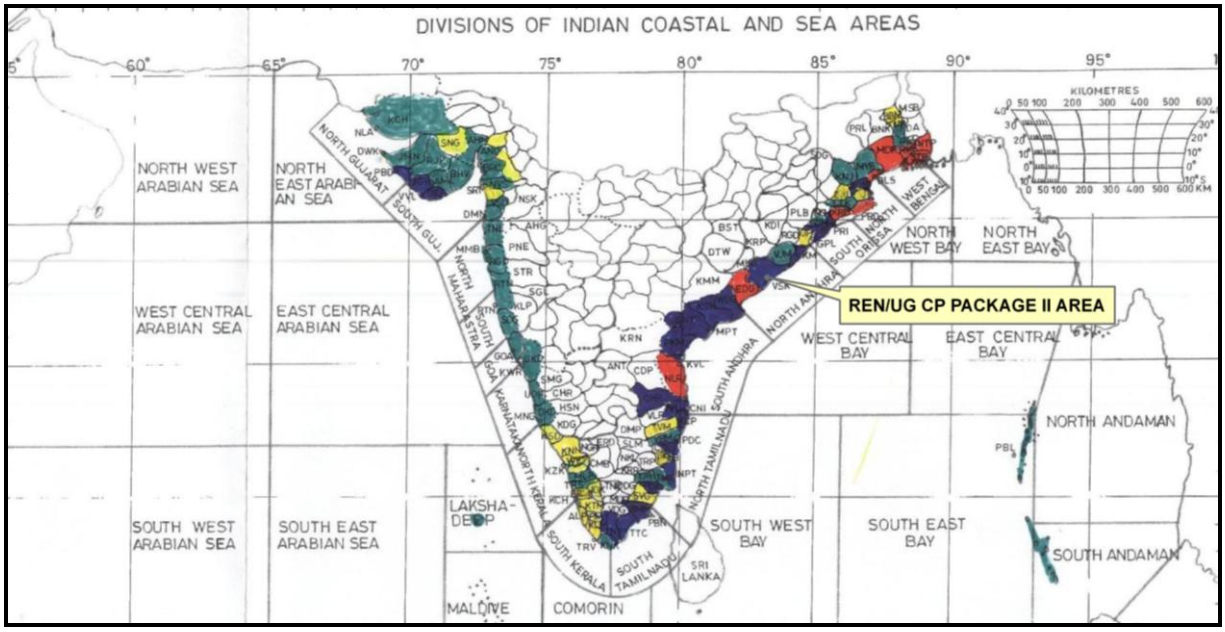
4.4.7 Thunder, Dust Storms and Visibility

As per the weather data recorded at meteorological observatory, Visakhapatnam, experiences thunders over 62 days in a year, squall over 10 days in a year but no dust storms have ever been recorded. Visakhapatnam has visibility of over 20 km for about 46 days in a year. The visibility reduces to a range of 4-20 km for about 311 days (evenly distributed throughout the year) and for about just 3 days in a year (in months of November, December and January), the visibility ranges between 1 km to 4 km.

4.4.8 Vulnerability of Visakhapatnam to Cyclones and Natural Disasters

Andhra Pradesh is endowed with 972 km of coastline, the second largest in the country after Gujarat. Because of its long coastline and geographical location, Andhra Pradesh has some of the most vulnerable coastal stretches to multiple natural disasters in India.

Visakhapatnam, located within the northern coastal stretch of the State is designated to be highly prone to cyclones by the National Disaster Management Authority (**Figure 4.2**).



Source: Proposed by expert Sub-Committee, NDMA

Figure 4.2: Vulnerability of Visakhapatnam Coast to Cyclones

The frequency of depressions, cyclonic storms and severe cyclonic storms along the Visakhapatnam along with other coastal districts of Andhra Pradesh based on the historic data is given in **Table 4.1 & 4.2.** The historical data indicates that September and October months are the most probable months for occurrence of depressions, cyclones and severe cyclonic storms in Visakhapatnam and other coastal districts of the State. The occurrence of major cyclones along Visakhapatnam and other the coastal districts of Andhra Pradesh between 1977 and 2014 are given in **Figure 4.3**.

Table 4.1: Frequency of Depressions, Cyclonic and Severe Cyclonic Storms along Visakhapatnam District

S.No.	District	Depressions	Cyclonic Storms	Severe Cyclonic Storms
1	Srikakulam	19	7	7
2	Vizianagram	6	3	2
3	**Visakhapatnam**	**32**	**8**	**5**
4	East Godavari	5	7	1
5	West Godavari	11	9	5
6	Krishna	24	17	8
7	Guntur	7	6	6
8	Prakasam	9	5	4
9	Nellore	14	11	13

Source: Data compiled from histograms depicted in ESMF, APDRP

Table 4.2: Month Wise Storms That Crossed Andhra Pradesh Coast (Between 1891 to April 2014)				
S.No.	**Month**	**Depressions**	**Cyclonic Storms**	**Severe Cyclonic Storms**
1	January	1	-	-
2	February	-	-	-
3	March	-	-	-
4	April	1	1	-
5	May	2	3	5
6	June	5	4	-
7	July	6	1	-
8	August	11	-	-
9	**September**	**36**	**4**	**3**
10	**October**	**35**	**23**	**6**
11	November	5	9	18
12	December	-	1	2
Source: Data compiled from histograms depicted in ESMF, APDRP				

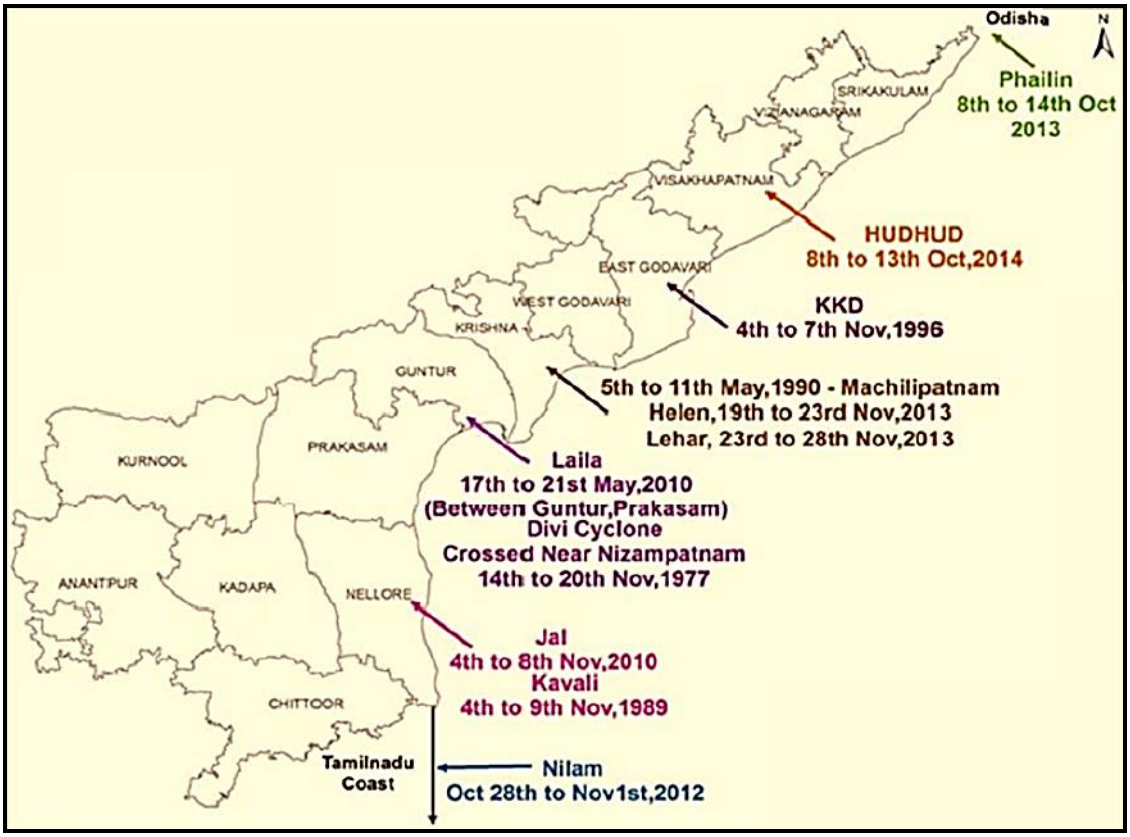


Figure 4.3: Major Cyclones along Coastlines of Andhra Pradesh in Recent Years

An expert sub-committee constituted by the National Disaster Management Authority, has proposed a **rating of P2 for Visakhapatnam coast based on the hazard criteria** (P4 being highest) (**Table 4.3**). Within Andhra Pradesh, Vizianagaram has been rated the highest at P3 and none of the coastal stretches within Andhra Pradesh has been rated under P4 category. The highest P4 rating has been proposed for certain coastal stretches of Kerala, Tamil Nadu, Odisha, Karnataka, Gujarat among others.

Table 4.3: Cyclone Prone Districts* of Andhra Pradesh

S.No.	Districts	Ratings Based on Hazard Criteria					
		No.of Severe Cyclones	Total No. of Cyclones	Wind Speed	PMSS	Mean Rating	Category of Proneness
1	Nellore	7	10	10	7	8.5	P1
2	East Godavari	5	10	10	7	8	P1
3	Srikakulam	5	7	10	5	6.7	P2
4	Guntur	3	3	10	10	6.5	P2
5	**Visakhapatnam**	**5**	**5**	**10**	**5**	**6.3**	**P2**
6	Krishna	3	5	10	7	6.3	P2
7	West Godavari	3	3	10	7	5.7	P2
8	Prakasam	3	3	10	7	5.7	P2
9	Chittor	7	7	10	0	6	P2
10	Vizianagram	0	3	10	5	4.5	P3

Source: extracted from Cyclone prone districts of India

* *Proposed by an Expert Sub-Committee Constituted by NDMA*

4.4.9 Vulnerability of Visakhapatnam based on Wind Speed

The wind and cyclone hazard map prepared by the Building Materials and Technology Promotion Council (BMTPC) has placed Visakhapatnam under Very High Damage Risk Zone with wind speeds ranging between 50-55 metres/sec (180 kmph to 200 kmph), the highest along the east coast of India.

BMTPC has been mandated (among other objectives) by GoI to advise on vulnerability and risk assessment and on formulation of relief, reconstruction and rehabilitation programs for disaster mitigation and assist in capacity building for disaster preparedness. Thus, Visakhapatnam coast is vulnerable to both cyclone and wind speed hazards (Refer **Figure 4.4)**.

4.4.10 Seismic Hazard Risk and Vulnerability:

Vishakhapatnam falls under the stable zone II of seismic zoning classification as notified by the Seismic Zoning Committee, Government of India. Seismic Zone II is the most stable and Zone V is considered to be least stable. The seismic Zones I and II were merged during reorganization of seismic zones in year 2000.

The entire REN/UG cable project is within the most stable seismic zone II and therefore not susceptible to any seismic risks.

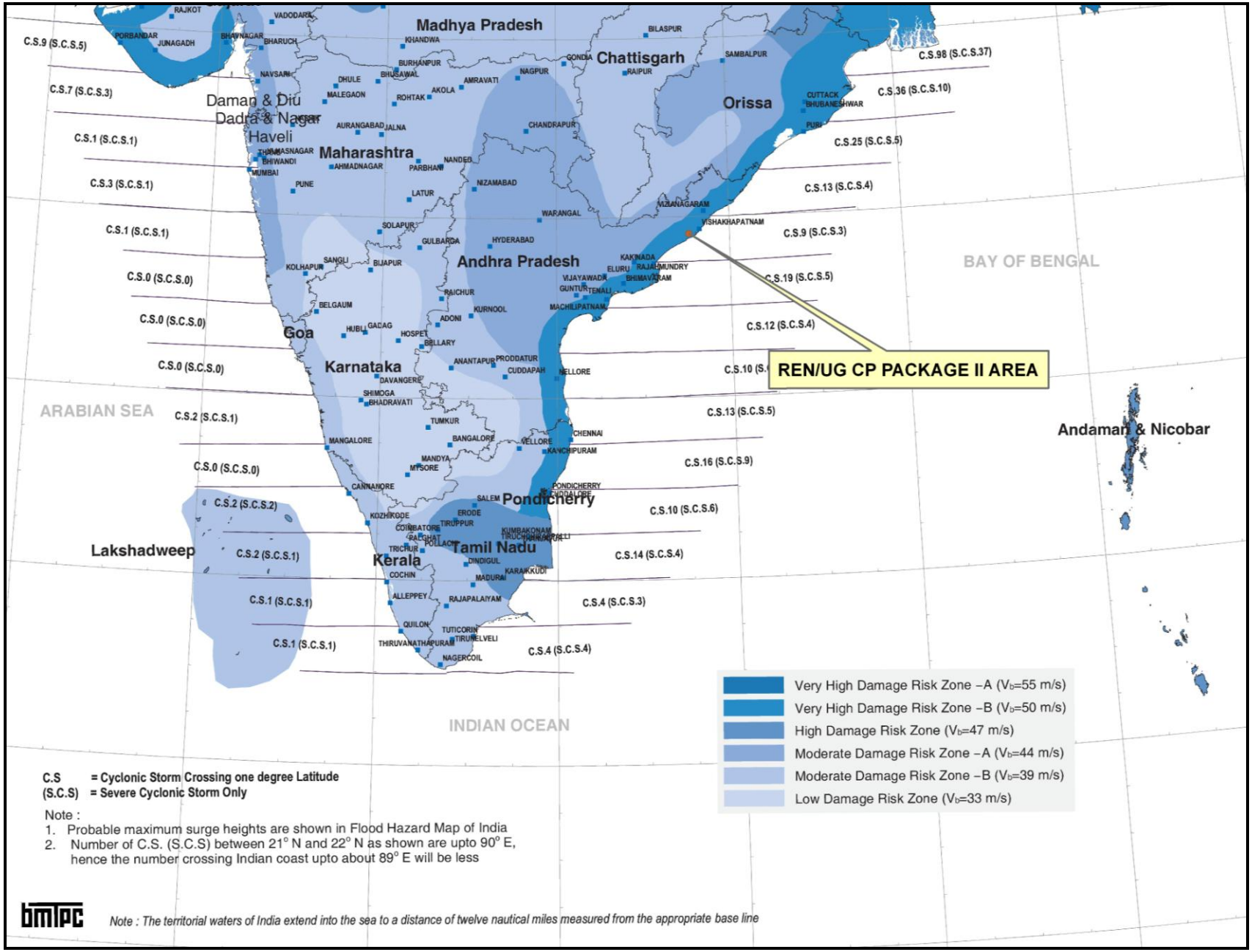


Figure 4.4: Wind & Cyclone Hazard Map Relevant to Package 2 Area

4.4.11 Geology and Soil

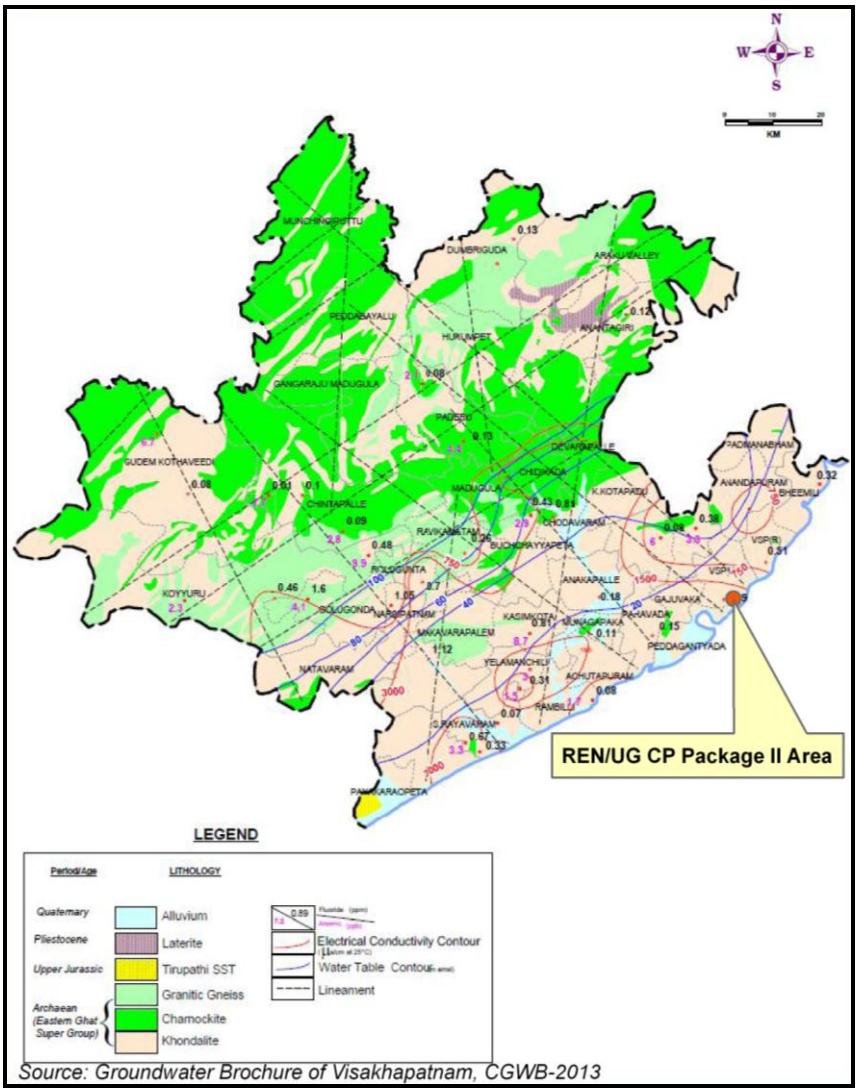
Geologically, Visakhapatnam district can be divided into three regions, *viz.,* and northern hilly terrain with valleys, middle pediplains and alluvial coastal plains. The entire REN/UG cable routes under Package 2 fall under the middle pediplains and coastal plains.

The soil of Visakhapatnam district as a whole including the Visakhapatnam city area is predominantly covered by red loamy soils (nearly 70% of the area), whereas sandy loamy soils are the next dominant soils, followed by sandy soils and black cotton soils. The coastal stretches of the district including certain parts of Visakhapatnam city is dominant with sandy loamy soils. Generally, the soil are poor textured, easily drained with low fertility index (low Nitrogen, Phosphorus and Potassium values).

4.4.12 Ground Water

4.4.12.1 Hydrogeology

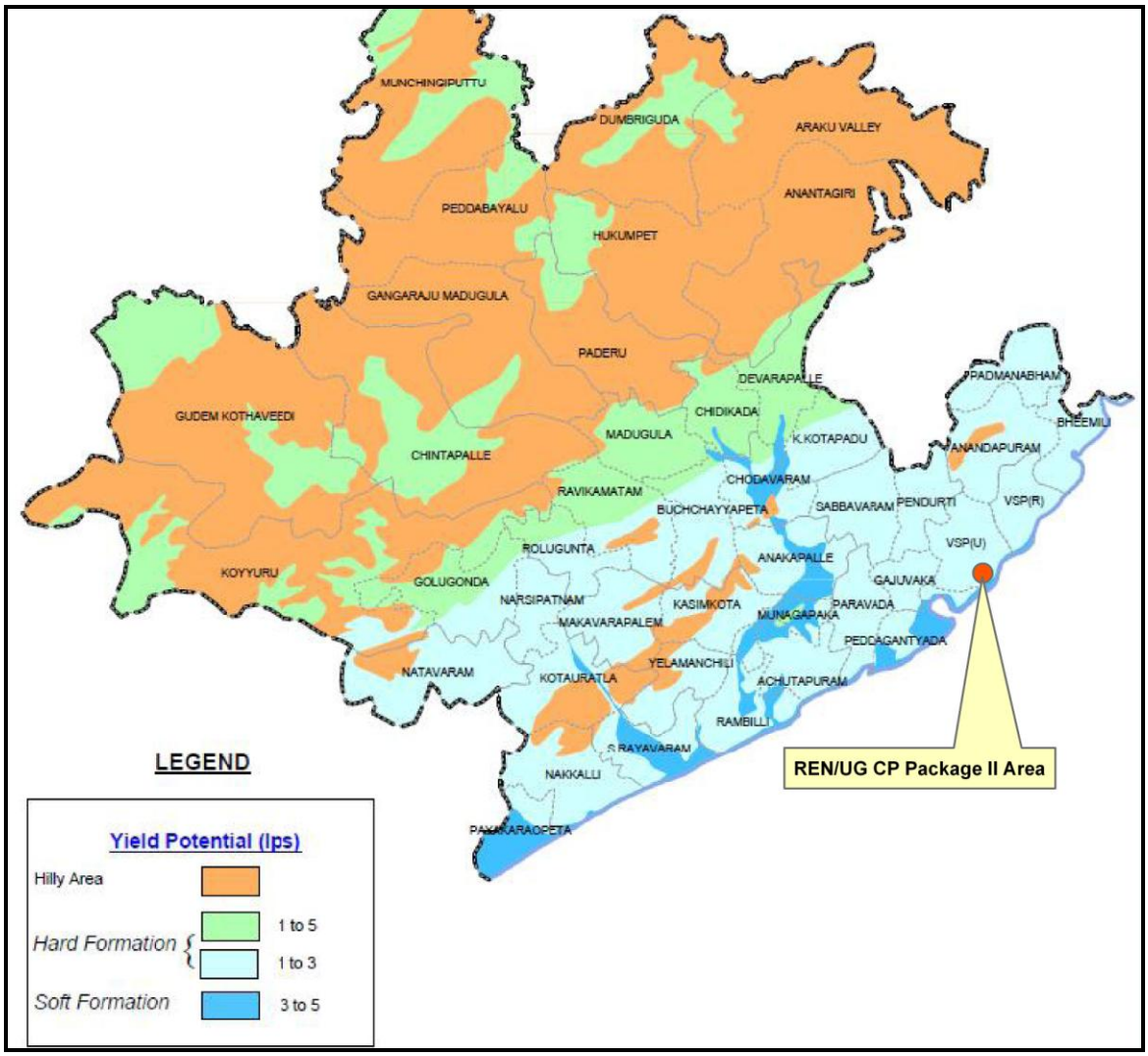
The Visakhapatnam (both Urban & Rural) district is underlain by variety of geological formations from the oldest Archaeans to Recent Alluvium. The Archaean group of rocks includes Khondalites and Charnockites of Eastern Ghat super group and Granitic gneisses of Migmatite group. The Gondwana rocks which are represented by sandstones are in very limited aerial extent. The recent alluvium is prevalent along the rivers (**Figure 4.5**).



Source: Groundwater Brochure of Visakhapatnam, CGWB-2013

Figure 4.5: Hydrogeology of Visakhapatnam District

Ground water occurs in almost all geological formations. From the ground water point of view, the aquifers in Visakhapatnam can be broadly classified into hard formations (Khondalites, Charnockites, Granitic, Gneisses etc.) and soft formations (Sand stones and Alluvium). Ground water occurs under unconfined to semi-confined conditions in the hard formations, while it occurs under unconfined to confined conditions in soft formations. The groundwater yield potential in Visakhapatnam district is given in **Figure 4.6.** Based on the yield potential of the aquifers, the district is classified as low (1 to 3 lps), low to moderate (1 to 5 lps) and moderate (3 to 5 lps) yield potential areas.



Source: Groundwater Brochure of Visakhapatnam, CGWB 2013

Figure 4.6: Ground Water Yield Potential – Visakhapatnam District

4.4.12.2 Water Level Scenario

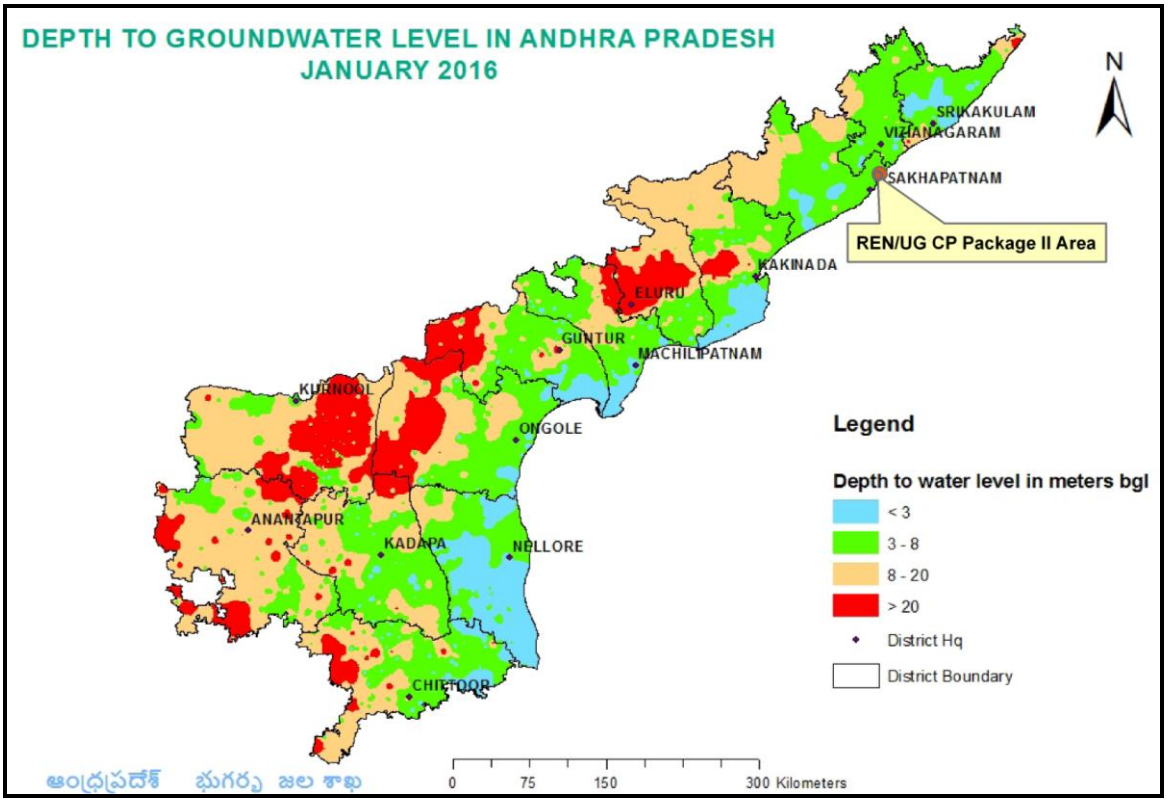
The depth to ground water level within Visakhapatnam, including the REN/UG project area (Package 2) as of January 2016 varies between 3-8 m bgl (below ground level), assessed by Ground Water Department, Govt. of Andhra Pradesh. The seasonal fluctuation of ground water levels between May 2015 to January 2016 (pre-monsoon and post monsoon) within Visakhapatnam indicates rise between 2-4 meters, indicating a good level replenishing of ground water resources (**Figures 4.7 & 4.8**) within the district.

A comparison of average depth to ground water levels vis-à-vis rainfall between January 2015 and January 2016 is given in **Table 4.4**.

Table 4.4: Comparison of Average Depth to Ground Water Levels & Rainfall of January 2015 to 2016, Visakhapatnam, Andhra Pradesh

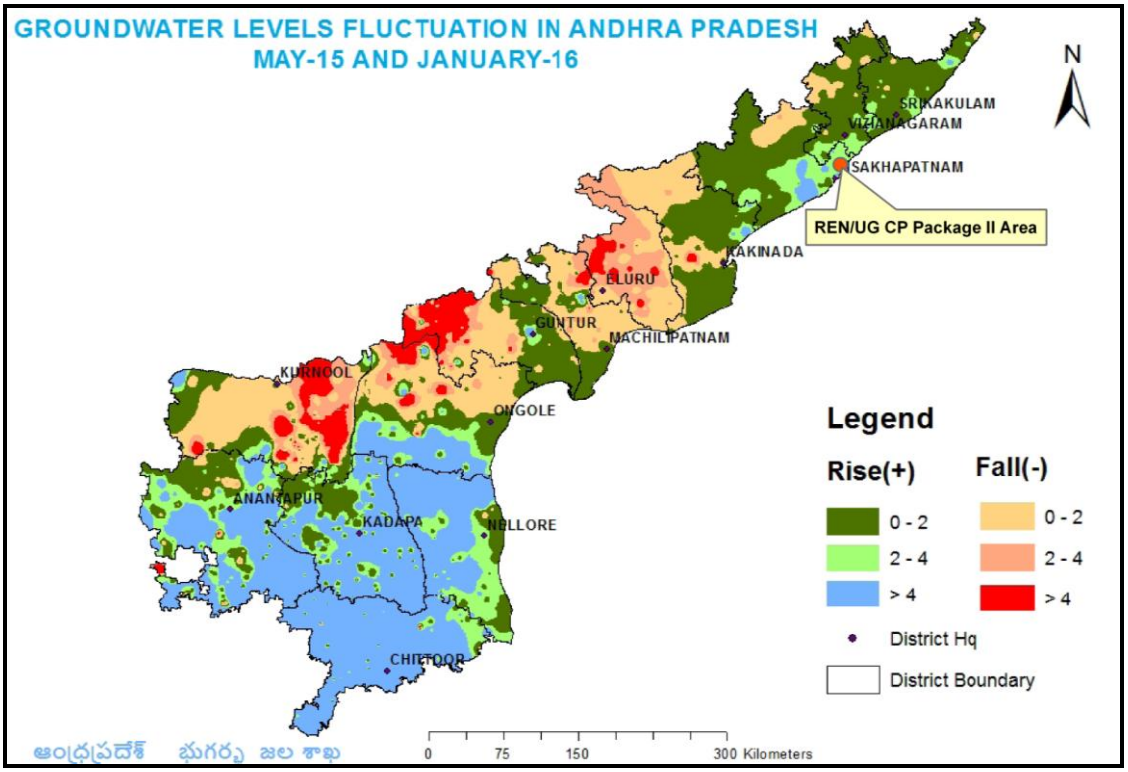
District	Rainfall in mm			Average Depth to ground water levels in m.bgl.				Rainfall Deviation with Normal in % upto		Fluctuation in water level between May-2015 and January-2016 (m)		
	Normal for Water Year (up to Jan)	Actual (2014-15 water year) (up to Jan)	Actual (2015-16 Water Year) up to Jan	Jan-15	May-15	Dec-15	Jan-16	Jan-15	Jan-16	May-15	Dec-15	Jan-16
Visakhapatnam	1020	818	1042	5.25	7.86	5.87	5.74	-20	2	2.12	-0.37	-0.49
Andhra Pradesh (state as a whole)	860	551	814	10.9	14	8.99	9.74	-36	-5	4.24	-0.76	1.1

Source: Groundwater Level Scenario in Andhra Pradesh, January 2016



Source: Groundwater Level Scenario in Andhra Pradesh, Ground Water Department, GoAP

Figure 4.7: Depth to Groundwater Level in Andhra Pradesh



Source: Groundwater Level Scenario in Andhra Pradesh, Ground Water Department, GoAP

Figure 4.8: Groundwater Levels Fluctuation in Andhra Pradesh

4.4.12.3 Status of Groundwater Development

The present level of groundwater development in Visakhapatnam urban district is just 28% of the annual replenishable resource as compared to 23% in Visakhapatnam rural District and 32% in Visakhapatnam district as a whole. The Visakhapatnam is placed under safe category (**Table 4.5)** as per the Ground Water Profile published by CGWB. Thus, the district presents scope for harnessing groundwater for developmental needs.

Table 4.5: Status of Groundwater Development in Visakhapatnam

S.No.	Administrative unit/District	Net Annual ground water availability (ham)	Existing ground water draft for all uses (ham)	Ground water balance (ham)	Stage of ground water development %	Category
1	Visakhapatnam Rural	1386	323	1063	23	Safe
2	Visakhapatnam Urban	1699	480	1219	28	Safe
3	Visakhapatnam District as a whole	71689	23100	48589	32	Safe
Source:	*Ground Water Brochure of Visakhapatnam, CGWB 2013*					

4.4.13 Ambient Air Quality:

Ambient air quality within Visakhapatnam city is being monitored at 8 locations by CPCB under the National Ambient Air Quality Monitoring Program (NAAQMP). APPCB is monitoring ambient air quality at 1 location under the State Ambient Air Quality Program. In addition, APPCB is also monitoring ambient air quality at 2 locations within Visakhapatnam

on a continuous basis with the funding assistance of CPCB. The ambient air quality data (annual averages) of all these 11 locations for year 2014-15 are given in **Table 4.6**.

Table 4.6: Ambient Air Quality Monitoring Data (Annual Averages) of Visakhapatnam (2014-15)

S.No.	Station Name & Code	Type/ Category	PM_{10}	$PM_{2.5}$	SO_2	NO_2	NH_3	CO	O_3
A	**Ambient Air Quality Monitoring Data of Stations under NAMP at Visakhapatnam**								
1	Mindi – 234	Residential	61	-	11.2	17.2	74	1.1	-
2	Marripalem - 233	Industrial	58	-	10.6	17.1	87	1.1	-
3	Pedagantyada – 584	Industrial	56	-	10	15	100	3.2	-
4	Police Barracks – 371	Residential	99	-	17.3	32.1	72	1	-
5	Gnanapuram - 467	Residential	81	-	15.5	29.1	77	1.1	-
6	Ramky - 585	Industrial	49	-	10.2	13.4	100	1.9	-
7	ESI – 387	Sensitive	58	-	11.3	18.2	79	1.6	-
8	Seetammadhara - 388	Residential	50	-	12.3	16.6	88	1.1	-
B	**Ambient Air Quality Monitoring Data of State Ambient Air Quality Monitoring Stations**								
9	Madhavadhara	Res/Com	53	-	13.6	18.4	-	-	-
C	**Ambient Air Quality Monitoring Data of Continuous Ambient Air Quality Monitoring Stations**								
10	APIIC (104, area)*	Industrial	107	47	16.6	34.6	11.26	3.33	7.41
11	GVMC Building	Commercial	106	54	12.69	44.52	12.43	0.77	41.06
D	**National Ambient Air Quality Standards, CPCB, 2009**								
i	Time weighted average - Annual (except for CO & O_{3-8} hours)		60	40	50	40	100	2	100
ii	Time weighted average - 24 hours (except for CO & O_3 – 1 hour)		100	60	80	80	400	4	180
Note:	*All values are expressed in µg/m^3 except CO which is expressed in mg/m3* *'-' indicates data not available/not monitored* **Monitoring location within Package 2 Area*								
Source:	*Annual Report - 2014-15, APPCB*								

The annual average PM_{10} levels in **Table 4.6** indicate that out of the 11 locations, the levels exceed NAAQ standards in 5 locations, whereas it is within limits in 6 locations. Out of these 5 locations, where PM_{10} levels exceed NAAQS, 3 are residential, 1 is commercial and 1 is industrial category. The 6 locations, where the PM_{10} levels are within NAAQS include 3 are industrial, 1 sensitive and 2 are under residential category.

The annual average levels for PM $_{2.5}$ are available only for two locations and the levels exceed the NAAQS for PM $_{2.5}$ at both these locations, one being commercial and the other is industrial category. The SO_2, O_3 and NH_3 levels at all 11 monitored locations are within the NAAQS for respective parameters irrespective of their type/category of the sampling

location. The NO_2 levels is exceeding in only one location, which is under commercial category, out of the 11 locations monitored. The CO levels are exceeding in 2 out of 10 locations, for which data is available and both of these locations are under industrial category.

4.4.13.1 Ambient Air Quality in Package 2 area

Out of 11 ambient air quality monitoring stations being monitored by CPCB and APPCB, only one location (ie APIIC (104, area), which is an industrial area) is within the Package 2 area of REN/UG cable project. Therefore, assessment of the ambient air quality monitoring in and around package 2 area was carried out at 9 locations during March to July 2016. The monitoring covered 2 commercial areas, 1 commercial cum/residential area, 4 sensitive areas, and 2 residential areas. The selected locations for ambient air quality monitoring along with the most nearby monitoring stations of CPCB & APPCB are shown in **Figure 4.9**.

The ambient air quality monitoring within Package 2 area during March 2016 was carried out by through independent environmental monitoring laboratories namely Bhagavathi Ana Labs Private Limited, a Bureau Veritas Group Company and Team Labs, both are accredited by NABL and MoEF & CC. Bi-weekly samples were collected from each location, based on 24 hour duration per sample. The test reports furnished by these accredited agencies along with their credentials are given in **Annexure 1**. The summary of the ambient air quality monitoring results is given in **Table 4.7**.

Table 4.7: Ambient Air Quality Monitoring Data within Package 2 Area, March-July 2016

S.No.	Station Name & Code	Type/ Category	PM_{10}		$PM_{2.5}$		SO_2		NO_2		CO	
			I	II	I	II	I	II	I	II	I	II
1	Dwarkanagar*	Commercial	110	105	38	32	7.8	8.8	27.6	28.9	1.4	1.5
2	Dabagardens	Sensitive	127	132	40	45	15.5	12.8	19.9	15.8	1.2	1.1
3	Maddilapalem*	Residential	102	105	27	32	7	6.5	12.2	12.8	1.1	1.1
4	Velampeta	Commercial	102	98	33	31	14	12.2	18.6	17.4	1.1	1.2
5	Old Post Office	Sensitive	140	125	55	47	19.8	17.9	18.2	19.4	1.3	1.2
6	Siripuram	Res/Comm	115	120	41	40	25.4	23.4	31.3	35.4	0.81	0.93
7	Sivaji Palem	Residential	122	117	44	38	27.1	24.3	34.5	35.6	0.85	0.89
8	Pedawaltair	Commercial	130	122	35	41	26.9	27.4	37.3	36.9	0.86	0.82
9	MVP Sector 7	Sensitive & Commercial	110	114	32	38	25.6	23.9	33.5	34.8	0.84	0.84
	National Ambient Air Quality Standards, CPCB, 2009											
10	Time weighted average - Annual (except for CO & O_{3-8} hours)		60		40		50		40		2	
11	Time weighted average - 24 hours (except for CO & O_3 - 1 hour)		100		60		80		80		4	

Source: Environmental Monitoring During EIA Studies, March-July 2016,
Note: All values are in µg/m^3 except CO which is in mg/m3 & I & II indicate biweekly samples
**Monitoring Locations within Package 2 area*

Figure 4.9: Ambient Air & Noise Monitoring Stations within Package 2 Area

The ambient air quality in and around Package 2 area monitored during March-July, 2016 indicate that PM_{10} levels exceed the NAAQS at all nine locations. The $PM_{2.5}$ levels and other

monitored parameters like SO_2, NO_2, CO during the same period are within the respective permissible limits as prescribed in National Ambient Air Quality Standards.

4.4.14 Ambient Noise Levels in Visakhapatnam

Andhra Pradesh Pollution Control Board has established Real Time Noise Monitoring Stations (RTNMS) at 2 locations in Visakhapatnam. Details of the ambient noise levels for year 2014-15 (annual averages) recorded at these locations are given in **Table 4.8**.

Table 4.8: Annual Average Values of Ambient Noise Levels at Visakhapatnam & Suburbs (2014-15)

S.No.	Stations	Category	Day Time	Night Time
1	Zoo Park	Sensitive	68	65
2	Andhra University, Siripuram*	Residential	75	67
Ambient Air Quality Standards for Noise, CPCB				
1	Industrial		75	70
2	Commercial		65	55
3	Residential		55	45
4	Sensitive		50	40

Note: Values are expressed in dB (A). Day time: 6.00 am to 10.00 pm. Night Time: 10.00 pm to 06.00 am.
**Monitoring Location within Package 2 Area*
Source: Annual Report - 2014-15, APPCB

As per the available ambient noise level data for year 2014-15, the annual average ambient noise levels at both monitored locations exceed during day time as well as night time, one of these locations being the zoo, which is quite away from the urban settings.

As per other secondary data available in the public domain and noise level monitoring carried out by independent scholars/researchers within Visakhapatnam city indicate, generally noise levels exceed the permissible limits for both day and night times at all monitored locations barring a very few. The monitored locations include sensitive receptors like hospital (RCD hospital), residential area (Lawson's Bay Colony), city roads with vehicular traffic (Jagadamba junction, Andhra Pradesh State Road Transport Corporation Complex junction and Seethammadhara junctions), sea side and coastal stretch (Santhi Ashram) and industrial zone (sea port area).

The ambient noise level monitored at RCD hospital was more than 10 dBA above the permissible limits at any time. The ambient noise level at Santhi Ashram was 3 dBA less at night time and 2 dBA less at day time, when compared to ambient air quality noise standards for silent zone. The ambient noise levels at busy roads and junctions were in the range of between 80+dBA, among which 75% values were found in the range of 110 +dBA, clearly beyond permissible ambient noise levels.

In summary, ambient noise levels across Visakhapatnam city, particularly the commercial areas, roads and junctions well as industrial zones exceed the permissible levels, compared to coastal stretches, which still have relatively low ambient noise levels due to large expanse and quick dissipation.

4.4.14.1 Ambient Noise Level in Package 2 area

Out of the two real time noise monitoring stations of APPCB, only one station (Andhra University) lies within the boundary of the Package 2 area. Hence, an ambient noise level monitoring in and around Package 2 area was carried out through accredited agencies at 9 locations during March-July 2016. The locations ambient noise level monitoring stations are shown in **Figure 4.9** under the previous ambient air quality sub section. The summary of the ambient noise levels at these 9 monitored locations in and around Package 2 area is given in **Table 4.9**.

The test reports furnished by accredited monitoring agencies along with their credentials are given in **Annexure 1.**

Table 4.9: Ambient Noise Levels Monitoring Data within Package 2 Area, March-July 2016

S.No.	Stations	Category	Day Time	Night Time
1	Dwarkanagar*	Commercial	66.8	56.8
2	Dabagardens	Sensitive	67.4	55.1
3	Maddilapalem*	Residential	64.1	54.3
4	Velampeta	Commercial	63.1	53.7
5	Old Post Office	Sensitive	69.7	56
6	Siripuram	Res/Commercial	62.5	49.8
7	Sivaji Palem	Residential	58.2	47.6
8	Pedawaltair	Commercial	66.5	46.5
9	MVP Sector 7	Sensitive & Commercial	60.2	44.8
Ambient Air Quality Standards for Noise, CPCB				
1	Industrial		75	70
2	Commercial		65	55
3	Residential		55	45
4	Sensitive		50	40
Note:	*Values are expressed in Leq dB (A). Day time: 6.00 am to 10.00 pm. Night Time: 10.00 pm to 06.00 am.* **Monitoring Locations within Package 2 Area*			
Source:	*Environmental Monitoring During EIA Studies, March 2016*			

The day time ambient noise levels at 2 (one commercial and one residential cum commercial area) out of 9 locations exceed the permissible limits. Whereas the night time ambient noise levels exceed the limits at 4 (2 commercial, 1 residential/commercial area and 1 sensitive/commercial area) out of 9 locations.

4.4.15 National Parks, Wild Life Sanctuaries and Important Bird Areas

Andhra Pradesh has 6 national parks and 21 wildlife sanctuaries, out of which only one *i.e.* Kambalakonda Wildlife Sanctuary is in Vishakhapatnam.

Kambalakonda Wildlife Sanctuary (KWS) is on the northern side of Visakhapatnam city along NH-5, geographically spread over an area of 70.70 sqkm between northern region of Visakhapatnam and southern region of Vizianagaram districts in Andhra Pradesh. The KWS is dry evergreen forest mixed with scrub and meadows and the terrain is hilly with steep slopes. The KWS has a high floral diversity and includes *Tectona grandis, Catunaregam spinosa, Grewiatili aefolia* and *Abruspre catorius* among others.

The Forest Department, Government of Andhra Pradesh has carved out an area of 0.8 sq km for community based eco-tourism activities within the sanctuary and it is popularly known as Kambalakonda Eco Tourism Park. Across NH-5 and opposite to eco-tourism park is the Indira Gandhi Zoological Park, another most popular and tourist attraction place within Visakhapatnam. The zoo has enclosures for nearly 80 species of primates, carnivores, lesser carnivores, small mammals, reptiles and birds aviaries.

The KWS, Kambalakonda Ecotourism Park and Indira Gandhi Zoological Park, are all located at an aerial distance of 3 km away from the outer edge of Package 2 area of REN/UG cable project. (**Figure 4.10**).

Visakhapatnam including its suburbs is not known to have designated Important Bird Areas, although Andhra Pradesh has 13 such designated Important Bird Areas.

4.4.16 Olive Ridley Turtle Nesting Sites

The beach areas along the coastline of Visakhapatnam between RK Beach and Bheemili Beach is known to have sporadic nesting sites for Olive Ridley Turtles (*Lephidochelys olivacea*), which are protected species in Schedule-I of Wildlife Protection Act, 1972 and listed as Vulnerable in IUCN red list). However, the nesting site within the Package 2 area is Yoga village, where VSPCA has an ex-situ hatchery facility, due to excessive beach front activities on like tourism, heavy lighting, pollution and predators such as crows, eagles, jackals and beach dogs. Whereas, cable routes under REN/UG project are along city roads through fully developed areas and do not extend into coastal sands (beach areas). The Package 2 area under REN/ UG cable project and the known turtle nesting sites along Visakhapatnam coastline is shown in **Figure 4.11**.

Visakha Society for the Protection and Care of Animals (VSPCA), an animal welfare organization based in Visakhapatnam has deployed a beach surveillance team, designated as Sea Turtle Protection Force (STPF) for protection of mother turtles and their eggs during nesting activities, spread between January and March month (breeding season). The turtle conservation efforts of VSPCA during the year 2014-15 are given in **Table 4.10**.

Table 4.10: Turtle Nesting and Conservation along Vishakhapatnam Coastline- 2015						
S.No.	**Location of Nesting sites**	**Area along coastline**	**Eggs received**	**Undeveloped Eggs**	**Dead Hatchlings**	**Hatchlings Released**
1	R.K.Beach Area covered – Coastal Battery to VUDA Park	123	15,016	1,101	730	13,105
2	Jodigullupalem Area covered – VUDA Park to Rushikond upto Bheemli	197	23,777	2,113	1,274	20,390
	Total	**320**	**38,793**	**3,294**	**2,004**	**33,495**
Source: VSPCA Sea Turtle Report, 2014-15. Complete report can be accessed at www.vspca.org						

Figure 4.10: Kambalakonda Wild Life Sanctuary, Ecotourism Park & Zoological Park in Visakhapatnam

Figure 4.11: Location of Turtle Nesting Sites along coastline of Visakhapatnam

As per the information available in the public domain, VSPCA's STPF is an eleven-member team, comprising trained local fishermen and volunteers who are tasked to comb the beaches night and day on patrol, to protect the turtle rookeries from predators, poachers and generally careless beachgoers. The STPF protects not only the turtle eggs and the hatchlings, but also the mother turtles that come to nest.

The entire coastline between Visakhapatnam to Bheemili, has been assigned with STPF members (two per every 4 Km stretch), who mark the eggs and monitor their progress on a regular basis. Further, the team also involved in rescue and facilitate safe release of the turtles as soon as they are hatched, guiding the weaker ones to the ocean; knowing well that we are ensuring that the females among these hatchlings would return 15 years later by virtue of their inherent "nesting site fidelity" which means that adult turtles always, go back to nest where they were hatched. The Package 2 area of UG cable project has one known turtle nesting site, which is in Yoga village, where VSPCA has an ex-situ hatchery facility, due to excessive beach front activities on like tourism, heavy lighting, pollution and predators such as crows, eagles, jackals and beach dogs.

VSPCA has an ex-situ facility at other locations like RK beach and Jodugullapalem also and an *in-situ* facility at other locations like Rushikonda and Bheemili, as these areas are not yet exposed to excessive beach front activities like Visakhapatnam.

4.4.17 Archaeological Monuments and Excavation Sites

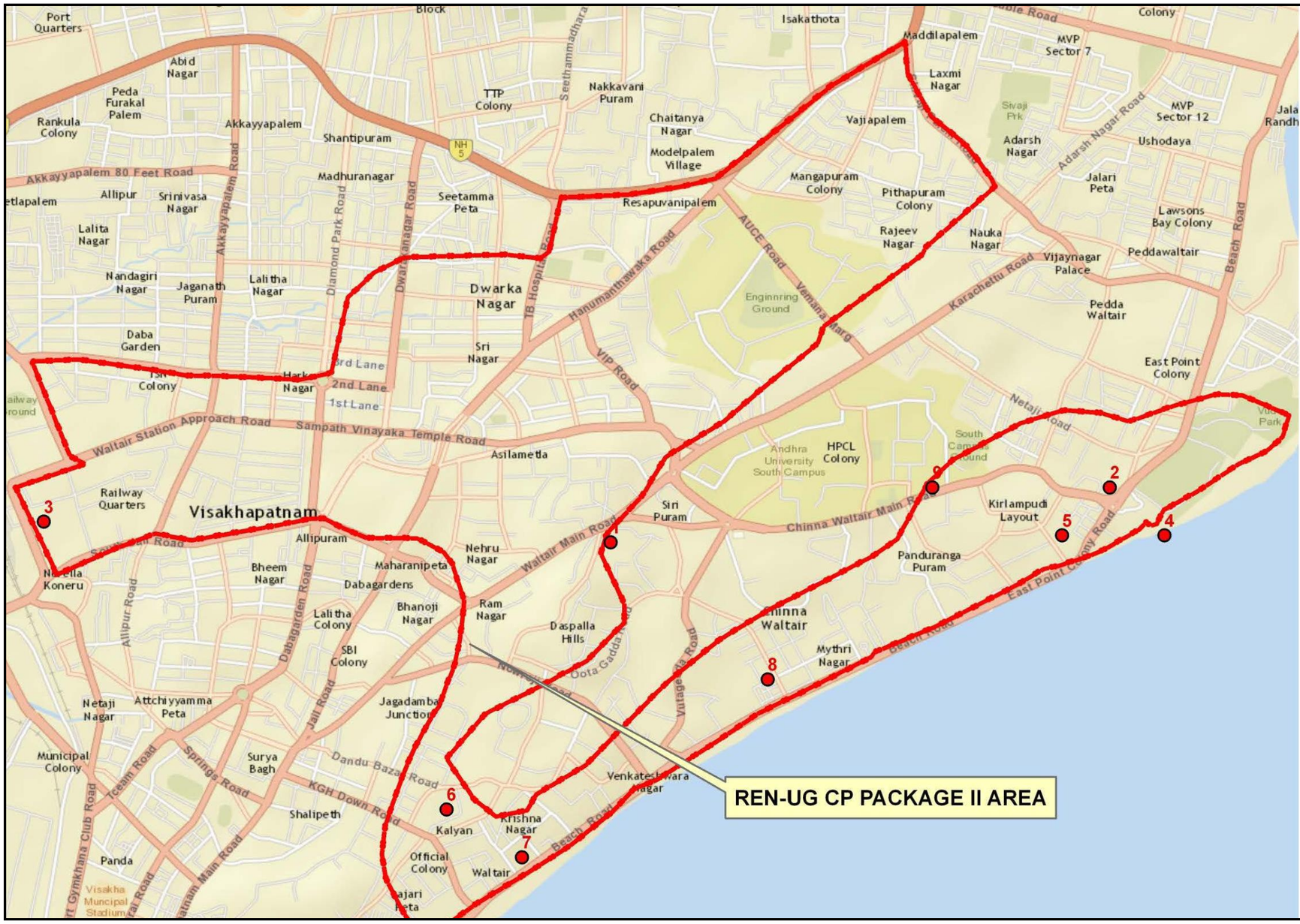
The Package 2 area of the REN/UG cable project does not have any ancient monuments and/or archaeological site(s), protected under the Ancient Monuments and Archaeological Sites and Remains (Amendment and Validation) Act, 2010 or by the Department of Archaeology and Museums, Government of Andhra Pradesh.

4.4.18 Heritage Resources

The Package 2 area has 9 heritage structures and none of them are protected either at State or National level as given in **Table 4.11**. These structures are guarded and well encased within their property boundaries, away from roadside as well as cable routes. The Heritage Sites in Package 2 Area are shown in **Figures 4.12 & 4.13**.

Table 4.11: Heritage Sites in Package 2 Area

S.No	Name of Heritage Site	Substation Area
1	St Paul's Church	Pandurangapuram
2	Railway Guest House	Pandurangapuram
3	Railway Bungalows	TSR Complex
4	Light House	Pandurangapuram
5	Visakha Museum	Pandurangapuram
6	District Collector's Office	RK Beach
7	Hawa Mahal	RK Beach
8	Pandu Ranga Swamy Temple	Pandurangapuram
9	Tikkaravarapu Laxmi Narayana Reddy Sabha	Pandurangapuram



Heritage Sites in Package 2 Area		
S.No	Name of Heritage Site	Substation Area
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2	Railway Guest House	Pandurangapuram
3	Railway Bungalows	TSR Complex
4	Light House	Pandurangapuram
5	Visakha Museum	Pandurangapuram
6	District Collector's Office	RK Beach
7	Hawa Mahal	RK Beach
8	Pandu Ranga Swamy Temple	Pandurangapuram
9	Tikkaravarapu Laxmi Narayana Reddy Sabha	Pandurangapuram

Figure 4.12: Locations of Heritage Resources within Package 2 Area

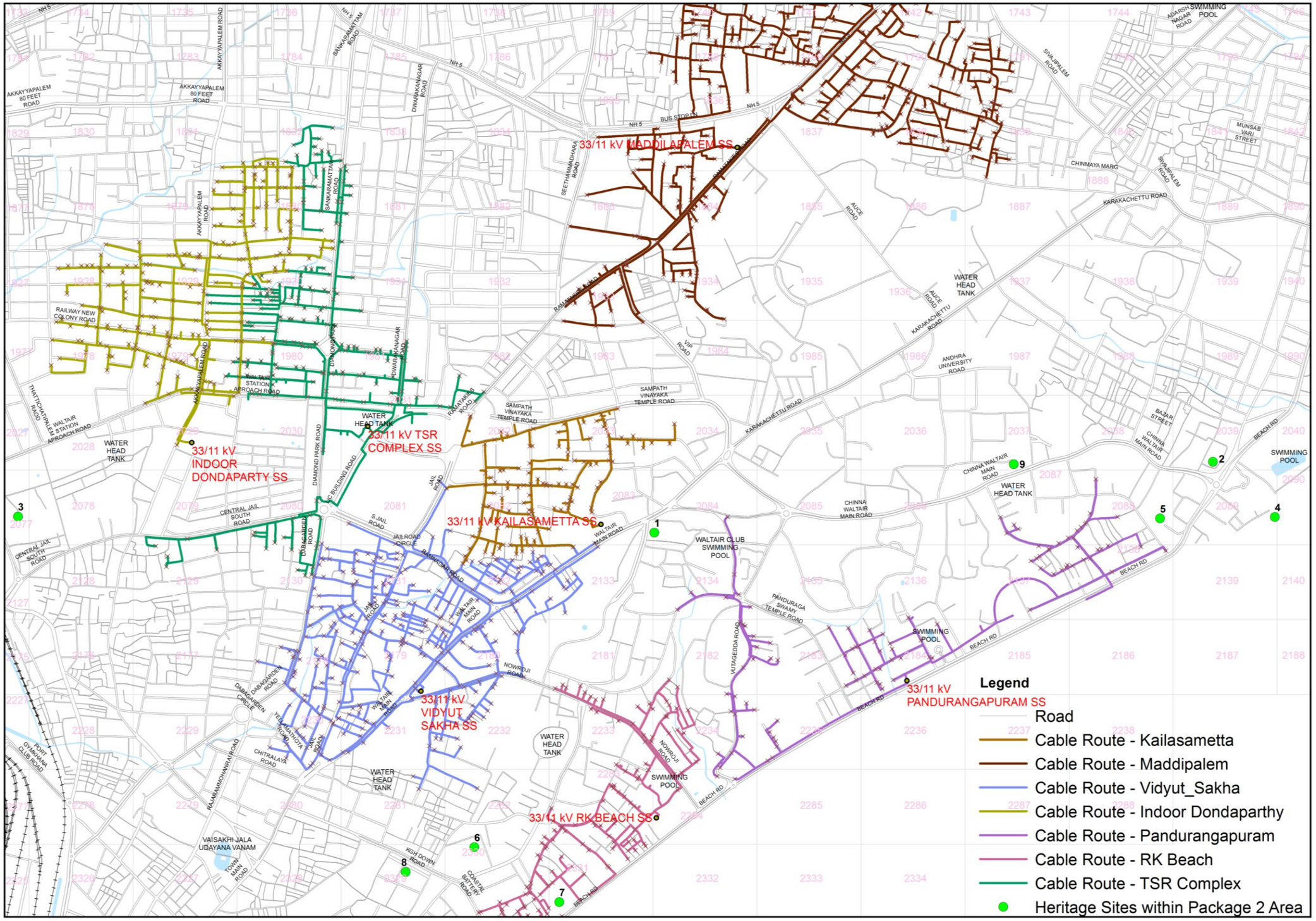

Figure 4.13: Locations of Heritage Resources within Package 2 Area (shown along with cable route)

4.4.19 Flora & Fauna

The environmental screening of the operational area across all 7 substations areas in Package 2 area has indicated the trees and other road side infrastructure/utilities are generally within 0.45 metre from the foot path/road edge. Therefore, cable routes will be aligned beyond this 0.45 m from footpath/road edge to avoid trees (irrespective of size) and no tree will be felled for this project.

Although, underground cables will be aligned to avoid trees (of all types and sizes), an enumeration of trees, within the 2.5m wide operational area has indicated that there are 208 trees. The substation area wise tree enumeration data is given in **Table 4.12**.

Table 4.12: Enumeration of Trees within 2.5 m wide Operational Area of Package 2 Area

S.No.	Sub Station Area	DBH <0.3m	DBH: 0.03m - 0.45m	DBH > 0.45m	Total
1	Kailasametta & Vidyut Sakha	3	13	8	**23**
2	R K Beach & Pandurangapuram	15	15	52	**82**
3	Maddilapalem	4	11	6	**21**
4	Indoor Dondaparty	20	11	18	**49**
5	TSR Complex	12	12	8	**32**
	Total	**54**	**62**	**92**	**208**

Source: Field enumeration survey, Feb 1-20, 2016; DBH: Diameter at Breast Height

As the underground cables will be laid along existing city roads and does not traverse through forest/plantation areas or stretches with green cover, collection of information on fauna was not considered warranted.

4.4.20 Sensitive Receptors

The 92.15 km long underground cables, spread across 7 substations areas in Package 2 area has several sensitive receptors along the cable routes. Some receptors are on the same side of the road along which cable routes are aligned while some are on the other or opposite side of the road. The sensitive receptors include educational institutions, hospitals, religious places, function halls among others.

During the environmental screening and baseline surveys, an enumeration of all such sensitive receptors was carried out. The Package 2 area sensitive receptors as given in **Table 4.13** and all of these are well encased within their respective property boundaries and away from cable routes. During cable laying operations, some of these might get exposed to inconvenience in terms of constricted traffic movement, dust and noise levels, if not managed.

Table 4.13: List of Sensitive Receptors & Other Structures along Cable Route Corridor									
S.No	Category of Receptors	Hospitals*		Educational Institutions		Public Utility Buildings**		Substation wise Total	
		On same road side of cable route	On opposite road side of cable route	On same road side of cable route	On opposite road side of cable route	On same road side of cable route	On opposite road side of cable route	On same road side of cable route	On opposite road side of cable route
1	Indoor Dondaparty	8	0	7	2	7	2	22	4
2	Kailasametta	1	1	4	2	1	2	6	5
3	Maddilapalem	5	2	6	14	7	2	18	18
4	TSR Complex	1	2	8	6	4	1	13	9
5	Pandurangapuram	1	0	4	4	3	3	8	7
6	RK Beach	7	7	7	3	4	2	18	12
7	Vidyut Sakha	16	6	12	8	5	4	33	18
	Total	**39**	**18**	**48**	**39**	**41**	**16**	**118**	**73**

**includes Govt. hospitals, private hospitals, clinics/diagnostic centres/pathologies/blood banks etc*
***includes parks, function hall, clubs etc*

Source: Environmental Screening Survey, Feb 1 – 20, 2016

4.4.21 Over Ground Pre-Existing Infrastructure within Operational Area

The 2.5 metre wide operational area/corridor of impact within package 2 area has pre-existing over ground infrastructure like telecom poles, electricity distribution poles, street light poles among others. **Table 4.14** present the summary of all such over ground pre-existing infrastructure enumerated during screening surveys. The corridor of impact/operational areas and cable routes will be aligned so as to avoid any such over ground pre-existing utility infrastructure (Ref sub section 4.2).

Table 4.14: Enumeration of Poles along Cable Route Corridor under Package 2 Area		
S.No.	Sub Station Area	Poles (All Types & Sizes)
1	Kailasametta & Vidyut Sakha	81
2	R K Beach & Pandurangapuram	116
3	Maddilapalem	57
4	Indoor Dondaparty	70
5	TSR Complex	105
	Total	**429**

Source: Environmental Screening Survey, Feb 1 – 20, 2016

4.4.22 Underground Pre-Existing Infrastructure within Operational Area

The pre-existing underground infrastructure along the roads, in which cable routes have been aligned, were considered (manhole chambers as an indicator) during environmental screening surveys and are shown in strip plans of respective substation wise maps in Annexure II of Environmental Screening Report (Volume I). This apart, information about any other underground infrastructure like water supply pipes, sanitary and drainage pipes laid across the corridor of impact /operational area could not be captured since, no physical evidence or marking is available/visible at road surface level. Interactions with GVMC officials at respective ward levels indicated it is nearly impossible for them to provide street /road wise information on such existing underground utilities, particularly relating to water, sanitary/drainage connections to individual buildings either in commercial or in residential areas.

4.4.23 Ramps/Steps/Other Structures within Operational Area

The underground cable routes under Package 2 area can be aligned to avoid pre-existing over ground structures like poles & trees (of all types & sizes). However, cable trench excavation within the operational area will require part dismantling/demolition of ramps, steps and other minor extensions of shops/kiosks of street vendors. Most of these are illegal and have been extended on to roads over the years. Enumeration of all such structures, which are likely to be damaged during cable trench excavation, is given in **Table 4.15**. As part of the REN/UG cable project, these structures will be restored to its previous state, after completion of cable laying and prior to road restoration works.

Table 4.15: Details of Structures likely to impacted under Project-Package 2

S No.	Substation Area	Type of Structures					
		Ramp		Steps		Others*	
		No.s	Area (Sq.mt.)	No.s	Area (Sq.mt.)	No.	Area (Sq.mt.)
1	TSR Complex	173	2041	97	138.78	111	2887.82
2	Dondaparty Indoor	312	3244	66	141.75	129	3326.7
3	CMR Maddilapalem	367	3508	25	39.96	94	1872.78
4	Vidyut Sakha	104	1206	7	18	34	1409.46
5	RK Beach	77	794	6	11.79	54	155.54
6	Pandurangapuram	185	2022	49	109.71	177	7387.2
7	Kailasametta	79	831	8	17.64	60	970.5
8	**Total**	**1297**	**13646**	**258**	**477.63**	**422**	**18010**

Source: Socio-Economic Survey, Feb 1-20, 2016

*Note: * Indicate other structures like base of hand pump, water tank, part of small walls of extended shops, signboards, boundary walls of public utilities etc.*

5.1. GENERAL

This section summarizes the impacts and mitigation measures due to implementation of the REN/UG cable project within package 2 area.

5.2. IMPACTS AND MITIGATION MEASURES DUE TO PROJECT LOCATION

5.2.1. Impacts on Land use

The Package 2 of REN/UG cable project, with a cumulative length of 92.15 kms (87.61 kms of cable trench and 4.54 kms of RCC duct) will be laid along the existing roads within the municipal limits of Visakhapatnam city. The city roads are largely bitumen paved and cement concrete roads particularly in narrow lanes and by-lanes and sporadic stretches of even kutcha roads at some locations. The Package 2 of REN/UG cable project is scheduled for completion between Feb 2017 and July 2018. Once the cable laying operations are completed, the roads will be restored to its previous condition. The work camp sites, store yards and hot mix plant areas will also be restored to its previous state after demobilisation. The REN/UG cable project does not involve any land acquisition or diversion of land for permanent change in land use. Thus, there will not be any long term impact or change in the land use as a consequence of this project.

5.2.2. Impacts on Surface Water Resources

The REN/UG cable project (Package 2) will require water during initial site preparation and cable trench excavation apart from consolidation/compaction of soil during back filling operations of cable trenches, apart from dust suppression measures at different stages of the project implementation. Provision of onsite sanitation facility through mobile toilets for workforce will also require water.

No fresh surface water sources will be used for meeting the water requirements of the project. Thus, there will be no impact on surface water resources of the area as a consequence of this project implementation.

5.2.3. Impacts on Ground Water Resources

The water requirements of the REN/UG cable project (Package 2) is intended to be met through ground water resources (existing tube wells). Visakhapatnam urban area is categorized under safe category for ground water extraction as per assessment carried out by CGWB (ref Chapter 4.4.12- Baseline Environment Profile).

The total water requirement of REN/UG cable project for Package 2 area is estimated at 6.82 kld, which includes both operational and onsite sanitation requirements. This is an insignificant quantity (equals daily water requirement of 10 households with 5 persons per household as per national standards) and very minimal as compared to the presently available ground water resources within Visakhapatnam. The total water requirement of the entire package as well as water requirement for every 500 metres long cable laying segment is given in **Tables 5.1** and **5.2**.

Table 5.1 Total Water Requirement for REN/UG Cable Project-Package 2					
S. No.	**Sub-Station Area/Zone**	**Total Trench Length (in Kms)**	**Total Duration for Cable Laying (in working days)**	**Total Water Required @ 6000 litre/500m length Cable Trench**	**Average Water required/Day**
1	Vidyut Sakha	20.01	400	240120	600
2	RK Beach	5.95	300	71400	238
3	Kailasametta	5.09	300	61080	204
4	TSR Complex	20.29	400	243480	609
5	Indoor Dondaparty	9.86	350	118320	338
6	Maddilapalem	18.56	400	222720	557
7	Pandurangapuram	7.85	300	94200	314
6	**SUB TOTAL**	**87.61**		**1051320**	**2859**
7	**RCC Ducts**	**4.54**	**300**	**54480**	**182**
8			**Total**	**1105800**	**3041**
			Add Contingency 10%	**110580**	**304**
			Total Water Requirement for Cable Laying operations under Package 2 Area	**1216380**	**3345**
			Water Requirements for onsite sanitation and drinking water facility at 7 operational area @ 15 litres/person/day for 210 workforces		**3150**
			Total Water Requirements for Operations, Onsite sanitation and drinking water facility with 5% contingencies		**6820**
Note : This water requirement is for total project period of 18 months					

Table 5.2: Water Requirements for Laying 500m Length of Under Ground Cable			
S.No.	**Activities**	**Water Requirement**	**Total Quantity (in litres)**
1	Initial Site Clean up	0.5 litre/sqm X 2.5m wide operational area X 500m	625
2	Trench Excavation (asphalt layer)	1 litre/sqm X 1.0m trench width X 500m X 2 times	1000
3	Trench Excavation (WBM/Soil Layer)	1 litre/sqm X 1.0m trench width X 500m X 3 times	1500
4	Consolidated & Backfilling Operations including Road Restoration	1.5 litre/sqm X 1.0m trench width X 500m X 2 times	1500
5	Wetting of Net Cloth Covered over Tipper Trucks	10 litre/truck X 100 trucks/Segment	1000
6	Site Cleanup Operations	0.3 litre/sqm X 2.5 wide operation area X 500m X 1 time	375
	Total Water Requirement for Laying 500m Segment of UG Cable		**6000**

The REN/UG cable project does not involve any operations, which lead to generation of effluents/emissions that may directly or indirectly impact either surface and/or ground water resources. All other off-site operational areas under REN/UG cable project like store yards, work camp sites, which are likely to have potential for pollution, if any will be provided with provisions to avoid soil, surface water and/or and ground water contamination. Thus, REN/UG cable project will not impact ground water sources.

5.2.4. Impacts on Soil and Geology

The underground cables under this project will be laid along the existing bitumen and/or cement concrete roads, within the municipal limits of Visakhapatnam city. The maximum depth of cable trenches will be 1.25 metres from existing road level. The roads will be restored to its previous state after cable laying operations. No top soil will be disturbed or any virgin areas will be opened up for cable laying operations. The work campsites and other off site areas also will be restored to its previous state. Debris generated during laying under ground cables will be collected and disposed in environmental sound manner. Therefore, the REN/UG cable project will not cause any impacts on soil and/or geology of the area.

5.2.5. Impacts on Flora and Fauna

The operational area, within which underground cables will be laid under this project, will be limited to a 2.5 metres wide corridor along the footpath and/or road edge (Chapter 4.1 for details on operational area/corridor of impact). The environmental screening has indicated most of the pre-existing road side infrastructure/utilities including road side trees are within maximum of 0.45 metre from the foot path or road edge. Therefore, cable routes within the operational area will be aligned beyond this 0.45 m from footpath/road edge to avoid trees (irrespective of size) and no tree will be felled for this project.

The tree enumeration survey during environmental screening has indicated that 92.15 km long cable route corridor under Package 2 area has 208 trees of different sizes (ref Chapter 4.4.19 - Baseline Environment Profile). At stretches, where fully grown trees exist, mechanical excavation will be avoided and trenches will be excavated through manual means. Even lopping of trees to facilitate movement of mechanical excavators along cable trenches will be avoided and manual excavation will be resorted at such specific stretches/locations. During trench excavation, utmost care will be taken to avoid damage to the root zone of trees, irrespective of its size. Thus, REN/UG cable project will have no impact on flora of the region.

As the REN/UG project is limited to existing city roads and does not traverse through forest/plantation areas or stretches with green cover, impacts on fauna is not anticipated.

5.2.6. Impacts on Weather and Climate

The REN/UG cable project will not cause any impact on weather and climate. Also, the project does not involve large scale construction activities like area development or industrial or other infrastructure development projects, which can induce some impacts on the local climate.

5.2.7. Impacts on Ancient Monuments/Archaeological Sites

The Package 2 area of the REN/UG cable project does not have any ancient monuments and/or archaeological site(s), protected under the Ancient Monuments and Archaeological

Sites and Remains (Amendment and Validation) Act, 2010 or by the Department of Archaeology and Museums, Government of Andhra Pradesh.

Thus, there will no impacts on ancient monuments and archaeological sites due to the REN/UG cable project.

5.2.8. Impacts on Heritage Structures

The Package 2 area has 9 heritage structures and none of them are protected either at State or National level (ref Chapter 4.4.18 – Baseline Environment Profile). These structures are guarded and well encased within their defined property boundaries, away from roadside. Therefore, cable laying along the road will not impact these heritage structures. Specific requirement/suggestions of the concerned authorities with these structures, if any, with regard to cable route alignment will be duly adhered during cable laying works at such locations.

5.2.9. Impacts on Ecologically Sensitive Areas

There is no ecologically-sensitive, wetland, protected areas and important bird areas (IBA), within Package 2 area of the REN/UG cable project. The Kambalakonda wildlife sanctuary and Indira Gandhi Zoological Park are at an aerial distance of 3 km from Package 2 cable laying area. The coastline between Visakhapatnam and Bheemili has sporadic nesting sites of Olive Ridley turtles (Lepidochelys olivacea), which are along sandy areas of coastline (along beach areas), which include the Yoga village, where VSPCA has an ex-situ hatchery facility, due to excessive beach front activities on like tourism, heavy lighting, pollution and predators such as crows, eagles, jackals and beach dogs. Cable routes under REN/UG project are limited to already existing city roads through fully developed areas and do not extend into coastal sands (beach areas) and therefore, underground cable laying works under this project will not cause any impacts on any of these areas.

5.3. Hazard Risk and Vulnerability

The REN/UG cable project is spread across Visakhapatnam city, which is under a low risk seismic zone (Zone II). Further, project in itself does not involve any super structures, which warrant earthquake resistant designs.

Historical data indicates September and October months are the most probable months for occurrence of depressions, cyclones and severe cyclonic storms in Visakhapatnam (Ref Chapter 4.4.8 Baseline Environment Profile for details). Therefore, cable laying operations could get stalled for brief periods, in the event of any occurrence of cyclones/inclement weather conditions during the implementation phase.

On the contrary, the REN/UG cable project is being implemented in order to have a resilient underground electrical network, to counter damages, during and after cyclones and other such natural calamities along coastline of Visakhapatnam.

5.4. Beneficial Impacts of REN/UG Cable Project

The most notable and anticipated benefits of REN/UG cable project to Visakhapatnam City and its residents are hereunder

- REN/UG cable network is safer to public lives and property, particularly of people belonging to lower economic strata of society during calamities/disasters/thunders /lightening instances

- Areas covered under Package 2 of REN/UG cable project is expected to practically remain unaffected in future from power disruptions and associated implications during or after cyclone/high winds or natural calamities/inclement weather conditions, hence resilient to natural disasters, the main project development objective of REN/UG cable project component under APDRP
- Resilient underground electrical cable network will help to retain/restore water, sewerage and sanitation services across city during or after calamities/cyclones
- Resilient underground electrical cable network will help state administration to restore other damaged infrastructure during natural calamities with least down time.
- Conserve state's resources in re-construction of damaged electrical network during every calamity. During Hudhud, 2014, the state government had incurred nearly INR 500 Crores for restoration of damaged power distribution system in Visakhapatnam alone.
- Visakhapatnam being the largest city and financial hub or commercial capital in the newly formed Andhra Pradesh, stands vulnerable to natural calamities, will essentially need such resilient electrical distribution network, thus aid in State's economic growth and enable to become attractive and destination to investors
- Will help in improving aesthetics of the city through conversion of all over ground power distribution network into resilient underground infrastructure. All overhead power distribution infrastructure will be dismantled, after commissioning of the REN/UG cable project.
- Visakhapatnam has already been selected for developing as one of the SMART cities by Government of India (GoI) under its SMART CITIES MISSION. The REN/UG cable project is another step forward in developing Visakhapatnam into a definite SMART CITY, an ambitious program of both GoAP as well as GoI.
- The present REN/UG cable project will concurrently enable to up-rate distribution network to future demands by at least 10 years by installing the XLPE cables, which are far superior than the conventional overhead conductors, thus will avoid upgrading/up-rating of existing OH network
- Trefoil configuration of underground cables in REN/UG cable project will enable to improve current distribution, reduce sheath losses, minimize magnetic field around conductor and reduce heat-up of cables, all of which will further improve efficiency of underground cable network
- Underground cables do not require any dedicated corridor to be kept permanently clear as in case of an overhead line for safety, maintenance and repair
- Underground cables will vacate space over ground, which improves aesthetics, higher public acceptance, convey environmental benefits and as well spurt an increase in property values. Thus, underground cables have a potential to induce knock-on effect" - that all other local communities might want "their" network put underground.
- Underground cables do not create obstacles over ground like in case of over head lines. Also, underground cables pose no hazard to avifauna and low flying aircraft
- Underground cables are not affected by momentary interruptions, occurring from

lightning, crow faults and falling of tree branches on overhead lines, which de-energize and then re-energize the circuit moment later, a most common feature in over head lines

- Typically, outrages in underground cable network are about half of their equivalent overhead networks. Also, operating and maintenance costs are estimated to be around one tenth of the cost of overhead network. Thus, advantage of underground network is of fewer interruptions and lower maintenance costs.
- Underground cables will have no pilferage, whereas overhead cables have scope for pilferage/power thefts, which can lead to safety hazards and accidents at times

5.5. IMPACTS AND MITIGATION MEASURES DURING CONSTRUCTION STAGE

The cable laying activities under Package 2 of REN/UG project comprise sequential activities like initial site preparation, onsite cable route demarcation, trench excavation, cable pullout and lowering, cable jointing, backfilling of trenches, construction of cable joint inspection chambers, road restoration works and finally site cleanup operations. Each of these activities will be normally completed within 2-3 days and therefore the impacts for very limited duration and transitory. A typical work completion time for laying of underground cable in a 500 metres long segment is given in **Table 5.3**.

Table 5.3: Work Completion Time UG Cable Laying in a 500 metre long Segment

S.No.	Activities	No. of Days Required for Work Completion		Relevant Construction/Machinery
		Cable Trench (Type 1 & 2)	Cable Trench (Type 3 & 4)	
1	Site Preparation & Excavation of Road/Pavement	4	3	• Tipper trucks for transportation of all site cleanup materials/debris • Cold milling machines or mini excavators fitted with attachments for road/pavement cutting/breaking • Excavators, for loading the excavated materials on to tipper trucks to transport it to central work campsite or to disposal location per requirement
2	Excavation of Earth & WBM Layers	3	3	
3	Cable Laying (Pullout & Lowering)	4	3	• Mini excavator fitted with attachments for cable pull out, as required
4	Refilling of Sand & Laying of Concrete Slabs	2	2	• Rotating transit mixers fitted with hoses for delivery of fine sand into cable trench • Cement Concrete slabs are laid manually in cable trench but brought to site by trucks and unloaded & stacked manually

Table 5.3: Work Completion Time UG Cable Laying in a 500 metre long Segment				
S.No.	Activities	No. of Days Required for Work Completion		Relevant Construction/Machinery
		Cable Trench (Type 1 & 2)	Cable Trench (Type 3 & 4)	
				alongside of cable trench
5	Backfilling of Trenches	3	2	• Rotating transit mixers fitted with hoses for delivery of WMM into cable trenches in un-segregated form • Vibratory compactors cum rollers, suitable for working in cable trenches (1.0 m wide)
6	Road Restoration works & Site Clean up	5	3	• Tipper trucks for transportation of asphalt materials to operational area and also removal of all debris/waste materials • Pavers for laying of Bituminous Concrete • Rollers for compacting the Bituminous concrete layers
7	Total Time Required for Cable Laying (500m segment)	21	16	• Tipper trucks for transportation of all debris & waste materials to approved disposal location or stacking area, prior to disposal
8	Time Required for Construction of Cable Joint Inspection Chamber, concurrent to UG cable laying operations	21	21	• Rotating transit mixers for pouring ready mix concrete for casting of RCC. joint inspection chambers

Moreover, all these activities will be confined to 2.5 metres wide barricaded operational area, which would keep shifting ahead in 500 metres long segments as the work progress. As per the project implementation schedule, only one such operational areas of 500 metres long segment will be opened up per substation area at any given point of time. All works, except laying of bituminous layers to allow for natural compaction is to be **MANDATORILY** completed in the previous segment, prior to opening up of next operational area segment. The laying of the bituminous layer is to be subsequently taken up immediately after the natural compaction, expected to take place within 3-4 weeks or as determined based on site conditions. The entire 92.15 km length of cable laying in Package 2 area of REN/UG cable project is scheduled to be completed in 18 months of time (February 2017 and July 2018).

Other than this, REN/UG cable project will require store yards at 3 locations across city, to

cater for all 7 substation areas, which is primarily intended to store cable coils and other inventory required for cable laying operations. Such store yards will enable to avoid on-site storage along cable routes (to extent possible) and thereby avoid inconvenience/disruptions to pedestrian as well as vehicular traffic. The project will also require one work camp site for establishing macadam mix plant and bitumen mix plant for road restoration works. The impacts and mitigation measures, for each of the sequential cable laying activities are given hereunder.

5.5.1 Site Clearance and Preparation

The site clearance and preparation activities along each of the 500 metres long operational area segment will comprise the following:

- Onsite marking of the cable routes as per cable alignment plan in the respective substation area
- Erect barricades on either side of the 2.5 metres wide operational area
- Clearing of barricaded area, for any unwarranted/waste materials, to ensure entire barricaded operational area is available for cable laying operations
- Provision of intermediate access, wherever required access across barricaded area for adjacent building occupants as per requirements

5.5.1.1 Impacts

The impacts of site clearance and preparation of operational area will be as hereunder:

- Site clearance operations may cause a marginal increase in dust levels, although for a very limited time in and around barricaded operations area
- Access to buildings across barricaded operational area will be constricted
- Pedestrian traffic across and along barricaded area will get constricted
- Road side parking (both authorised and unauthorised) will get constricted as a result of barricading of operational areas in 500 metres long segments
- Vehicular traffic along the road will also get constricted as a result of reduced width of carriageway due to barricading
- Road side storm water drainage along 500 metres long segment might get slightly affected, since some drainage chutes might get blocked under barricaded operational area
- Seepage and water logging of cable trenches may occur affecting the cable laying operations

5.5.1.2 Mitigation Measures

The mitigation measures required during the site clearance and preparation are:

- Cable route, cable trench of 1.0 metre width as well as 2.5 metres wide operational area is to be preferably demarcated on ground with yellow paint (7.5 cm wide minimum). The location of cable joint inspection chambers (size 2.0x2.5x2.0 metres deep or as per requirement) at every 250 metres interval along cable route, also to be marked on

ground with yellow paint,

- While, demarcating the cable route and cable trench, shall mandatorily avoid removal /shifting of any of over ground road side infrastructure like poles (all types and sizes) and trees (all types and sizes), with exception of ramps, steps which are extending onto road,
- Ensure, centreline of 1.0 metres wide cable trench coincide with centreline of 2.5 metres wide operational area, with 750 mm wide working space availability on both sides of cable trench (Refer Figure 4.1 under chapter 4.0 – Baseline Environment Profile),
- The cable routes and strip plans for entire Package 2 area is provided in Volume I - Environmental Screening Report. The cable route plans are also provided in bid/contract documents of REN/UG cable project
- In case, cable routes are along commercial and busy roads, requisite approvals from traffic police shall be obtained at least 7 days in advance prior to start of site clearance operations in such stretches. The strip plans provided in Volume I can be used in planning of any traffic diversions, if required and /or for seeking approvals from traffic police
- The environmental screening has identified 191 sensitive receptors along 92.15 km of roads in which cable routes are aligned, the receptors include like hospitals, schools/educational institutions/ function halls etc along cable routes in all six substations areas. The locations of all such receptors are provided in strip plans in Volume I. Details of information about cable laying operations, scheduled work completion time in such specific stretches shall be shared with all such institutions/occupants of buildings at least 7 days in advance, prior to commencement of works. Their requirements with respect to access or traffic diversions or any other concerns shall be considered in operations planning and scheduling of work and adhered to without any lapses on any account
- The occupants of other buildings/establishments along operational areas to be barricaded shall be informed 7 days in advance about cable laying operations, scheduled work completion time, restriction in access for limited time and their specific requirements, if any with respect to temporary access and arrangements shall be discussed and finalised prior to barricading and commencement of trench excavation
- Prior to commencement of excavation works, carry out minor repairs to foot paths (including making good all uneven surfaces along 500 metres cable route segment) adjacent to barricaded area (wherever applicable) to ensure pedestrian safety as a result of reduced walkway due to barricading on the road side
- All operations shall be restricted to only day hours in residential areas. Only in case of commercial areas, which are most unlikely to disturb residential pockets, the operations, can be carried out at night hours with adequate floodlit arrangements and ensure operations are not a hazard to night traffic
- At any given point of time, only 500 metre length operational area shall be opened up for cable laying operations at a particular location and a maximum 1 such operational area per substation zone. Prior to moving to next 500 metre segment, all works in the previous segment shall be completed in all respects, except laying of bituminous layers, which shall be taken up after achieving a natural compaction within 3-4 weeks. The

worksite shall be completely cleared, prior to opening to traffic

- Prior to commencement of excavation operations, permission for road cutting from GVMC and approvals from traffic police, wherever required shall be obtained in advance. The telecom department shall be informed about the cable laying operations
- Once required permissions from GVMC and traffic police are in place, barricade(s) shall be placed on either side of the 2.5 metre demarcated operational area. A suggested typical design for barricade, suitable for city roads is given in **Figure 5.1.** The barricade will not only help to significantly limit impacts of cable laying to the operational area but will also act as a noise barrier. Therefore, the specifications indicated for the barricade shall be strictly adhered to (ref Chapter 5.8 for noise attenuation effect of barriers)
- Sand/earth filled polypropylene bags (used cement bags) are to be placed along inner side of both barricades, to prevent seepage and water logging of cable trenches during rainy days. Seepage and water logging will not only prolong cable laying operations but will also prolong inconvenience to public and vehicular traffic as a result of barricaded operational area for extended period
- The barricades shall be provided with energy efficient LED strip lighting system (only towards roadside) as a hazard safety for traffic moving at nights and late nights. The LED lighting system shall be switched on between sunset and sunrise hours mandatorily, for the entire duration of cable laying operations in any segment
- All work force deployed for cable laying operations shall be provided induction training, which shall include awareness about safety practices at work places, safe distances to maintain around moving equipment like excavators etc, health and safety issues with particular emphasis on public safety and on-site sanitation practices at worksite during cable laying operations
- Every 500 metres segmental operation area shall be stationed with one mobile water tanker of 6000 litres capacity to meet all operational water requirements. The water tanker shall be fitted with a pressurized fine spray system and a hose reel of 600 metres length. Typically, water is required for dust suppression during site preparation, excavation, consolidation of backfilling layers and wetting of net cloth covered over tipper trucks, prior to their dispatch from operations site and site clean up after completion of cable laying
- All workforce deployed at site irrespective of level, shall mandatorily wear personnel protective equipment (PPE) like safety helmets, face masks, ear plugs, protective gear with reflective jackets and safety shoes
- Use of well-maintained and less than 5-year old earth excavators/moving equipment will enable to limit the noise levels to a large extent
- At some locations like busy roads with commercial complexes and particularly near or ahead of junctions, location specific traffic diversion plans are to be planned and implemented to ensure smooth passage of traffic and avoid congestion. Same may be finalised in consultation/approval of traffic police, well in advance of at least 7 days.

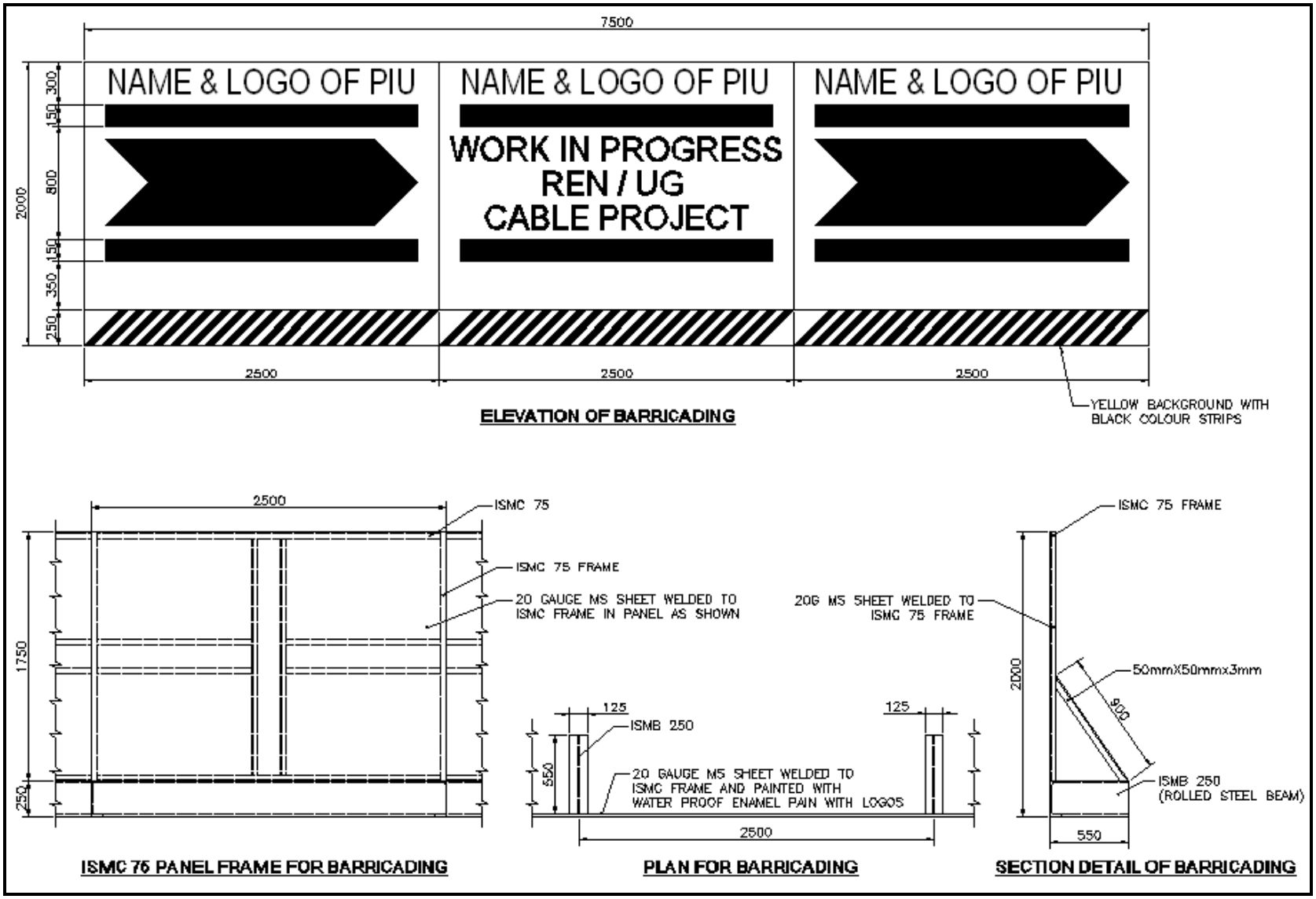

Figure 5.1: Typical Design for Barricade for Operational Area

- Diversion notice boards, or caution notice boards for both pedestrian as well as vehicular traffic at all appropriate required locations, both on upstream and downstream both sides of the barricaded area shall be installed, so that approaching traffic can move with caution. All boards shall be as per code of practice for road signs IRC: 67-2012
- Trained traffic wardens with reflective hand held batons and jackets, helmets and safety shoes are to be deployed at places, wherever barricaded operation areas are near to road junctions/intersections in order to ensure smooth movement of traffic.
- An on-site crew group, comprising mason, plumber, carpenter/sheet metal fabricator, with mobile van (MUV type) and all required tools/equipment/materials shall be provided on full time basis and common to all operational areas to rectify the damages to underground utilities like water supply pipelines, sewer lines, drainage and/or sanitary connections or provide temporary access during excavation. The crew shall be provided with all resources by contractor to restore damaged utilities with least down time. The same crew group shall be deployed to restore the damaged steps, ramps during trench excavation works to ensure proper drainage alongside barricaded operational area during and after rains.
- Every 500 metres segment operation area shall be stationed with one mobile toilet (1 seat for men and 1 seat for women with separate entrances) and parked at a suitable place within a maximum distance of 100 metres from the operational area. The mobile toilet shall have at least 1000 litres capacity overhead water tank and replenished regularly. The toilet shall be well maintained and in usable condition at all times. The bottom tanks shall be emptied on a regular basis.
- The workforce shall be instructed to use the mobile toilets, specially provided under the project and not to use any other public/open places or public toilets.
- Each operational area shall have at least two waste collection bins (25 litres capacity each) installed at entry and exit points for use by workforce. The bins shall be regularly emptied and kept in clean conditions at all times
- Every 500 metres operational area shall be stationed with one drinking water kiosk with minimum 300 litres capacity, replenished regularly. The kiosk shall be placed at a suitable place within 100 metres from operational area
- The operational area shall display/maintain list of nearby hospitals for attending to any injury/ fatalities either to workforce and/or to public as a result of cable laying activities. The site shall also have a first aid kit and field level supervisory staff shall have undergone first aid training/orientation.
- Since the work is being carried out along roads in commercial as well as residential areas, utmost attention shall be exercised to swiftly complete all operations including road restoration, prior to opening up the barricaded area for public use with shortest possible time.

5.5.1. Excavation of Pavement/Asphalt Layers

After the site preparation, first activity at operational area will be excavation of pavement (asphalt) layers, which can be done either by using cold milling machines and /or the specially designed accessory fitted to mini-excavators or backhoes of excavators itself, suited for 2.5m wide operational areas.

Cold milling machines will have a milling drum with tungsten carbide teeth, which effectively bite into asphalt pavement to desired pre-determined depth and also ensure the cut as per cross slope of existing road. The milled materials, passing through 40mm sieve can be directly loaded onto the tipper trucks prior to transporting it to the central asphalt plant, if recycling of the materials needs to be carried out for road restoration or transport to a safe disposal point, if re-cycling of excavated asphalt materials is not desired.

The cold milling machines will leave a clean road cut edge, which is an essential requirement for the subsequent road restoration stage. Cold milling machines, which can do the milling operations within limited widths between 1 to 1.5 m and pavement thickness up to 330 mm, are available in India either for outright purchase or on hire basis.

Alternatively, pavement (asphalt) can be cut using specially designed accessory for road cut (pavement breaker) fitted onto the mini excavators or even with the back hoe of the excavators itself. Both of these will generate chunks of pavement material with irregular sizes, which are to be transported to a central plant for further crushing so that at least 95% of the materials pass through 40mm sieve, if the material is to be recycled back for road restoration or transported as it is for safe disposal, if re-cycling is not desired.

5.5.2.1 Impacts

Irrespective of methods deployed, excavation of pavement will generate 12218 cum of asphalt materials and 1268 cum of cement concrete road cut materials from all 7 substations areas spread across Package 2 area. The summary of excavated asphalt and cement concrete pavement cut materials is given in **Table 5.4.**

Table 5.4: Pavement (Asphalt & Cement Concrete) Cut Materials for Package 2 - REN/ UG Cable Project

S.no	Trench Configuration (Width X Depth in mm)	Excavated Quantities of Bitumen & Cement Concrete along cable Routes (in cu.m)	
		Bituminous Roads	Cement Concrete Roads
1	Type 1: 1000mm X 1250mm	3542	Not Applicable
2	Type 2: 600m X 1000mm	4017	628
3	Type 3: 600mm X 1000mm	987	347
4	Type 4: 500 X 850mm	852	Not Applicable
5	**Total (in cu.m)**	**9399**	975
6	**Total Quantity (Add 30% for Voids Volume)**	**12218**	**1268**

*Note: * Pavement cut materials are estimated based on 150mm thickness for bituminous roads and 200mm thickness for cement concrete roads for the respective trench lengths and width substation area wise*

The pavement cut materials estimated in **Table 5.4**, will need to be either recycled/reused to the extent possible for road restoration works or safely disposed off to avoid adverse impacts on environment.

Other than this, pavement excavation operations will contribute to dust and noise levels, which are to be managed. Since the pavement excavation will largely be restricted to barricaded operational area, disruptions to local traffic will not be significant, except during loading of pavement cut materials to tipper trucks.

5.5.2.2 Mitigation Measures

a) Management of excavated pavement materials:

The pavement excavated materials, particularly asphalt contain significant quantities of bitumen (up to 4%) and stone aggregates (up to 96%), which can be re-deployed (as recycled asphalt pavement) during the road restoration works under REN/UG cable project. The recycling/reuse of construction waste materials is now mandatory with the newly notified Construction and Demolition Waste Management Rules, 2016

The recycled asphalt pavement have the following advantages:

- Avoid utilization of newer resources of bitumen and stone aggregates, through recycle and reuse of excavated pavement/road cut materials, which adequately contains required bitumen and stone aggregates
- Will avoid or minimise the quantities of asphalt materials for transport as well as, safe disposal apart from associated costs, involved thereof.
- Will avoid or minimise movement of tipper trucks in and out of city as well as avoid carriage cost for transportation of excavated asphalt materials. The 12218 cum of excavated asphalt materials will involve in totality about 2036 tipper trucks (@ 6 cum per tipper truck) for entire Package 2 and an average 10-12 tipper truck trips/day for every 500 metres segment of operational area. The GVMC approved disposal locations for waste disposal are at Kapulauppda/Tangudubilli/Giddijala are located between 25 and 40 km north of Visakhapatnam. On the other hand, if the material is to sent for recycling, central plants (modified bitumen hot mix plants) for processing of excavated asphalt materials will be located within city limits at less than 10 km.

Although, there are four principal recycling methods, central plant cold recycling (CPCR) is best suited for REN/UG cable project, since this facilitate recycling of maximum quantity of excavated asphalt materials. Details of CPCR along with other recycling methods are given in **Annexure 2**.

Deploying CPCR will enable to completely utilize all excavated asphalt pavement materials for road restoration. Also, deploying CPCR will not warrant either transportation over long distances or safe disposal of excavated asphalt materials. Therefore, recycling of asphalt materials through CPCR has been considered for road restoration under Package 2 of the REN/UG cable project (ref **Table 5.4** for excavated pavement materials and **Table 5.9** in subsequent sections for estimated requirement of recycled asphalt pavement for road restoration works).

The pavement cut materials of cement concrete roads, cannot be economically recycled/reused for pavement reconstruction. It can be used for filling low-lying areas or disposed as construction debris.

Consultations with GVMC officials indicate that all three disposal locations require large quantities of construction debris/soil either for closure of existing dumpsites at Kaupaluppda or construction of approach road and other infrastructure at the two other locations at

Tangudubilli/Giddijala, where GVMC is developing new waste disposal sites. In any case, GVMC shall have to establish facility to receive and process all such waste as per recently notified Construction and Demolition Waste Management Rules, 2016,

b) Other mitigation measures during pavement excavation operations

- The dust levels during pavement cut operations shall be controlled by through periodical sprinkling of water through 6000 litres capacity mobile water tankers stationed at operational areas tankers stationed at work site and fitted with pressurized fine spray with hose reel arrangement. Pressurized water spray will enable to conserve water and avoid excess use of water for sprinkling at work sites/operational areas.
- The tipper trucks, which carry the excavated asphalt materials to a central plant for processing shall be covered with net cloth and wetted with sprinkling of water, prior to dispatch of every trip, to prevent en-route spills as well as airborne dust during transit. Tipper trucks shall not be overloaded beyond designated capacities, to avoid en-route spills.
- The noise levels during pavement cut operations can be limited/reduced through deployment of well-maintained and relatively newer (less than 5-year old vehicles) and all excavation operations are conducted at normal work pace. Moreover, barricades provided for the operational area itself will act as noise barriers as per the noise modelling results. Noise modeling assessments conducted indicate that noise levels attenuate upto 12 dB A as a consequence of using the proposed barricades for operational requirements. (refer 5.8.1 for details on noise model and attenuation effect of noise barriers)
- All work force involved in pavement excavation operations will be provided with PPEs like safety shoes, helmets, face masks, ear plugs, reflective jackets mandatorily. All personnel exposed to noise levels for prolonged duration shall be provided with one additional break in the pre and post lunch sessions, to limit their exposures.
- The road/pavement excavation at some specific locations may warrant partial removal of unauthorized ramps/steps along cable routes, but all such ramps, steps and other infrastructure shall be restored to its previous state and temporary access across barricaded area is to be provided as an interim measure to avoid/minimize inconvenience to occupants of the buildings along REN/UG cable route corridor.
- A dedicated crew group comprising mason, plumber and carpenter/sheet metal fabricator with all resources including a mobile van (SUV type) is to be stationed (common for all operational areas across the package) to restore any damaged underground utilities like water/sewer/sanitary lines as a consequence of excavation works. In case of any un-foreseen utilities get damaged, the same shall be restored as per the time line provision made in the grievance redress mechanism (ref Chapter 9 for details). Normally, pavement excavation operations (upto maximum depth of 150mm in present case) is unlikely to damage to any pre-existing underground utilities.

5.5.3 Excavation of sub-base and base layers

The sub base and base layers, which are beneath asphalt/cement concrete pavement layers are also to be excavated as per the trench type configuration. The estimated quantity of sub base and base layers, which is to be excavated as per project design is estimated at 87592 cum as given in **Table 5.5.**

Table 5.5: Excavated Quantities of Base & Sub-Base Layers under Package 2 - REN UG Cable Project						
S.no	Excavated Quantities of Sub Base & Base Layers along Cable Routes*					
	Pavement Type along cable trench	Volume (in cu.m)				
		Type 1	Type 2	Type 3	Type 4	Total (in cu.m)
1	Bituminous Roads	25977	22764	5594	3976.145	58312
2	Cement Concrete Roads	Not Applicable	2511	1390	Not Applicable	3900
3	Kacha Roads	Not Applicable	6500	2008	Not Applicable	8508
4	Footpaths (CC Roads)	2274				2274
5	**Total (in cu.m)**					72994
6	**Total Quantity (Add 20% for Voids Volume)**					87592
*Note: * Materials are estimated based respective trench dimensions excluding the top pavement layers*						

The excavated base and sub-base layers, may largely contain natural sandy soils, prevalent in Visakhapatnam region, interspersed with water bound macadam layers (graded stone aggregates mixed with coarse soil). Much of this materials can be re-used, depending upon its gradation and composition, which is to be determined during the excavation operations.

If the excavated materials found to be useful for reusing as wet mixed macadam (WMM), then it can be transported to a central WMM mix plant, to make it suitable for reuse as WMM with additional material as per required gradation in accordance with IRC guidelines or MoRTH (Ministry of Road Transport and Highways).

The estimated quantity that can be used as recycled WMM during road restoration under Package 2 of REN/UG cable project is given in **Table 5.9** under chapter 5.5.7. Even if the material is determined to be reusable after carrying out required gradation adjustments, only some 30% of the materials can be reused and balance 70%(61,314 cum), would still needs to be disposed off as construction waste materials/debris or reused elsewhere.

5.5.3.1 Impacts

The surplus base and sub-base layers (after re-using to extent possible 30%) will need to be disposed off as construction waste and/or debris. Given that this excavated material is almost akin to natural soil, will not cause any adverse impacts and can be beneficially used in embankment construction or filling low lying areas and/ or can be sourced to other area development projects, commanding commercial value.

5.5.3.2 Mitigation Measures

- The surplus base and sub-base layers (after re-using to the possible 30%) is to be disposed off as construction wastes/debris at approved disposal locations unless any taker is found within Visakhapatnam. The approved disposal locations are at Kapulauppda/Tangudubilli/Giddijala, situated between 25-40 Km north of

Visakhapatnam.

- Consultations with GVMC officials indicate that all three disposal locations require large quantities of construction debris/soil either for closure of existing dumpsites at Kaupaluppda or construction of approach road and other infrastructure at the two other locations at Tangudubilli/Giddijala, where GVMC is developing new waste disposal sites. In any case, as per the Construction and Demolition Waste Management Rules, 2016, GVMC shall have to establish facility to receive and process the waste.
- Considering that only 70% of materials needs to be disposed off, which translates to average 20 tipper truck trips (@10 cu.m capacity trucks) per day spread over project implementation phase of entire Package 2 of REN/UG cable project. All tipper trucks, carrying excavated materials shall be covered with net cloth and wetted prior to dispatch of every trip, to prevent en-route spills as well as airborne dust during transit. Tipper trucks shall not be overloaded beyond designated capacities, to avoid en-route spills.
- The dust levels during excavation of sub-base and base layers shall be controlled through periodical sprinkling of water through 6000 litres capacity mobile water tankers stationed at operational areas and fitted with pressurized fine spray with hose reels. Pressurized water spray will conserve water and avoid unwarranted use of water for sprinkling at work sites/operational areas.
- The noise levels during excavation can be reduced through deployment of well-maintained and relatively newer (less than 5-year old vehicles) and all excavation operations are conducted at normal work pace. Moreover, barricades provided for the operational area itself will act as noise barriers as per the noise modelling results. (refer Chapter 5.8.1 for details on noise model and attenuation effect of barricades).
- All work force involved in excavation operations are to be sensitised to keep safe distances from moving equipment and provided with PPEs like safety helmets, safety shoes, face masks, ear plugs, and protective gear with reflective jackets mandatorily. All personnel exposed to noise levels for prolonged duration will be provided with one additional break in pre and post lunch session breaks, so as to limit their exposures.
- The excavation at some specific locations along operational area may warrant partial removal of unauthorized ramps/steps along cable routes, but all such ramps, steps and other infrastructure are to be restored to its previous state and temporary access across barricaded area are to be provided as an interim measure to avoid/minimize inconvenience to occupants of the buildings along REN/UG cable route corridor.
- Further, the excavation of sub-base and base layers at some locations may foul with some of the underground utilities like water supply, sewerage connections across barricaded operational area. Damage to pre-existing underground utilities are to be avoided through resorting to manual excavation at all such locations.
- In case of any damage to utilities like water/sewer/sanitary lines as a consequence of excavation works, same is to be restored through dedicated crew group comprising mason, plumber and carpenter/sheet metal fabricator stationed at operational area with all resources at earliest time line but not later than provision made in the grievance redress mechanism (ref Chapter 9 for details).

5.5.4 Cable Pull-out, Lowering and Jointing

Once the trench excavation is completed to required dimensions and checked for grading, cavities and sharp objects/edges, cables (as per required sizes and configuration) are transported and pre-tested at work site specific operational area for IR (insulation resistance) and CT (continuity test) as per BIS 7098 Part I and II, prior to lowering in cable trenches.

The tested cables are mounted on cradles and pulled out from coils over rollers (of required type and size) using mini excavator as a prime mover. Once the cables are pulled out and directly lowered into trenches as per required configuration, cables are tested once again for IR and CT to rule out damages to cable during pull out and lowering operations. During cable pull-out and lowering, the intact and safety of cable end caps are to be ensured. In case of damages, if any, same shall be made good with insulation tape, to avoid water/moisture getting into the core parts of cables, through damaged cable end caps. In case of cessation of works (for whatever reason), the cable trenches are to be covered with water proof tarpaulins, to avoid seepage or water getting into cable trenches, in case of rains.

Visakhapatnam has with 52 rainy days in a normal year and October being wettest month has more than 10 rainy days and lowest monthly rainfall for about half a day per month between December and March.

5.5.4.1 Impacts

The impacts of cable pullout and lowering operations are very limited and do not contribute to increase in ambient noise levels as excavator is just being deployed as a prime mover to pull out cables from coils and lower them into trenches.

Since the cable lowering operations are limited to barricaded operational areas, disruptions to both pedestrians and vehicular traffic are unlikely. The cable pullout and lowering over 500 metres long segment can be completed in 2-3 days, depending upon trench configuration and therefore any inconveniences are only for a limited period.

5.5.4.2 Mitigation Measures

- All cable laying operations shall be in conformance with safety precautions laid down in Indian Electricity Regulations,1956 (with latest amendments) and BIS1255;1983(with latest amendments)
- Prior to cable pull-out, the excavated cable trenches are to be checked for any cavities on sides and same are to be filled up with rich cement concrete, to avoid entry of any rodents into trench at a later date. Also, cable trenches are to be properly graded to have an even surface all through and devoid of any sharp objects/metal pieces/protruding stores at trench bottom/sides, to rule out damages to cables at a later date.
- During cable pull out and lowering operations, the work site shall have water proof transparent tarpaulins, as a contingency measure to cover cable trenches in case of rains (seasonal or unseasonal). Any slippages on this account may lead to water logging of cable trenches, which will delay cable laying operations, and as a consequence will further prolong the work completion time, thereby inconvenience to both public and vehicular movement gets extended.
- The transparent tarpaulins can be hung across 2.5 metre wide barricaded operational

area (in small lengths), which will facilitate work even during rainy/cloudy days.

- The work sites during cable lowering and backfilling shall be completely access controlled to prevent theft and vandalisation of cables. The barricaded operational areas are to be mandatorily access controlled and barred for entry by un-authorized persons from public safety point of view as well.
- The cable pull out, lowering operations can pose safety concerns and therefore all work force deployed in operations are to be properly trained to keep safe distances and provided with all required PPEs like safety helmets, face masks, ear plugs, protective gear with reflective jackets and safety shoes mandatorily.
- All cables in the lower tier (11 and 33KV cables in Trench Type 1 and 2) shall be drawn through cable conduits (of any suitable type and material); having a minimum of 40% extra space and conduit ends are embedded in the walls of the inspection chambers on either side. This will facilitate attending to cable fault at places other than joints, without resorting to opening up entire cable stretch and gain easy access to cables in lower tier.
- In case of any faults in such lower tier cables, which are in conduits, cables can be pulled out for repairs outside and pushed back into conduits and joints can be redone at both ends, all of which require least effort.

5.5.5 Backfilling of Cable Trenches with Fine Sand

Once the cable lowering as per project design is completed and tested for IR and CT, the trenches are to be backfilled with fine sand followed by fixing/laying of concrete slabs in layers as per project design (Ref Chapter 3.11 for details of trench and cable configurations).

The total sand requirement for backfilling of cable trenches is 42000 cum for the entire 87.61 km length of cable trenches (all types and configurations excluding RCC ducts) as given in **Table 5.6**.

A 500 metres length of cable trench will require on an average 240 cum of sand, depending upon the trench type and cable configuration, which translates to 40 truckloads/day (6 cum per load) and sand back filling operations can be completed in a maximum of 2 days.

5.5.5.1 Impacts

The trench backfilling operations do not cause any on site impacts, except for marginal increase in dust levels due to handling of fine sand. However, there could be some offsite impacts, if the sand is sourced from unauthorized sources and locations.

5.5.5.2 Mitigation Measures

- In order to limit off-site impacts, sand is to be mandatorily sourced from sand mining operators, licensed and approved by the Department of Mines, GoAP.
- The sand backfilling operation, brought to site in tipper trucks is normally carried out through manual means; which is time consuming and will involve double handling of materials at site with additional space requirement.
- In order to avoid on-site space requirements and pace up operations, back filling is to be carried out using transit mixers, normally used to transport and pour ready mix concrete. Use of transit mixers fitted with flexible hoses for delivery of sand directly into cable

trenches will enable to swiftly complete sand back filling operations, with minimal manual labour.

Table 5.6: Sand Requirements for Backfilling of Cable Trenches for Package 2										
S.No	**Sand filling Trench Configuration wise**	**Vidyut Sakha**	**RK Beach**	**Kailasa metta**	**TSR Complex**	**Indoor Dondaparty**	**Maddila palem**	**Panduranga puram**	**Total (in cu.m)**
1	Type - 1: 1000mm X 675mm	3713	547	1100	2565	405	3929	Not Applicable	**12258**
2	Type - 2: 600mm X 475mm	3643	1539	1159	5358	2784	4503	1425	**20411**
3	Type - 3: 600mm X 275mm	600	300	212	693	685	347	503	**3339**
4	Type - 4: 500mm X 275mm	1282	223	69	740	250	550	831	**3944**
	Total	**9237**	**2608**	**2540**	**9356**	**4124**	**9328**	**2759**	**39951**
	Requirement of Fine Sand with 5% contingencies and rounded off to								**42000**

- The marginal increase in dust levels due to fine sand can be contained through use of pressurized fine spray of water. All work sites will be stationed with one water tanker (6000 litres cap.) fitted with arrangements for pressurized fine spray with 600 metres of hose reel.

5.5.6 Laying of Cement Concrete Slabs

Once the back filling of sand is completed, pre-cast M 20 grade cement concrete slabs are to be placed over the sand as per project design for cable trenches. The estimated requirement of pre-cast slabs is given in **Table 5.7**. (Ref Chapter 3.11 for details of trench and cable configurations).

Table 5.7 Requirement of Cement Concrete Slabs for Laying in Cable Trenches										
S.No	**Trench Type**	**Sizes of CC Slabs as per design**	**Substation Area**							**Total (in cu.m)**
			VIDYUT SAKHA	**RK BEACH**	**KAILASAMETTA**	**TSR COMPLEX**	**DONDAPARTY**	**MADDILAPALEM**	**PANDURANGAPURAM**	
1	Type - 1	0.9m X 0.05m	248	36	73	171	27	262	Not Applicable	**555**
2	Type - 2	0.450m X 0.05m	173	73	55	254	132	213	68	**686**
3	Type - 3	0.450m X 0.05m	49	25	17	57	56	28	41	**204**
4	Type - 4	0.450m X 0.05m	105	18	6	61	20	45	68	**210**
	Total		**574**	**152**	**151**	**542**	**235**	**549**	**177**	**1655**
	Volume of CC Slabs with 5% contingency for damages during transport & laying									**1737**

The pre-cast slabs will act as a protective layer for cables and prevent damage to cables due to accidental excavation at a later stage. The M 20 grade cement concrete slabs can be cast at work camp sites material yards under REN/UG cable project and /or can be procured from pre-cast material suppliers as a customized requirement.

5.5.6.1 Impacts

The laying of pre-cast concrete slabs do not cause any on site impact and involves just laying of slabs in place manually as per project design. There could be off-site impacts, if the pre-cast slabs are not sourced from well-established and licensed/approved sources.

5.5.6.2 Mitigation Measures

- The pre-cast slabs can be stored along side of trenches within the barricaded operational area and therefore no additional space beyond operational area (at work site) is required.
- The off-site impacts can be limited by sourcing the pre-cast slabs from well established and approved/licensed sources.
- Damaged and/or broken pre-cast slabs, if any during laying of pre-cast slabs is to be stored aside and transported back to work camp sites for disposal as construction debris, eventually.

5.5.7 Road Restoration Works

After the completion of the trench backfilling with sand and laying of pre-cast slabs, the roads are to be restored to its previous state (after allowing for natural compaction with an anticipated time frame of 3-4 weeks or as per site conditions) and to evenly match newly laid surface with existing old surfaces along the excavated cable trench.

The pavement excavated materials, particularly asphalt contain significant quantities of bitumen (up to 4%) and stone aggregates (up to 96%), which can be re-deployed (recycled asphalt pavement) during the road restoration works under REN/UG cable project (ref Table 5.4 under 5.5.2 for excavated quantities of asphalt materials in previous sub-sections).

Although, there are four principal recycling methods, central plant cold recycling (CPCR) is best suited for REN/UG cable project, since this facilitate maximum recycling of excavated asphalt materials. Details of CPCR along with other recycling methods are given in Annexure 2**.**

Deploying CPCR will enable to completely utilize excavated asphalt materials for road restoration, which is nearly equivalent to required quantity of pavement materials. Also, deploying CPCR will not warrant either transportation of excavated materials over long distances or safe disposal of excavated asphalt materials. Therefore, recycling of excavated asphalt materials through CPCR may preferably be considered for road restoration under Package 2 of the REN/UG cable project. The road restoration using the redeploying excavated asphalt materials will involve laying of fine sand, wet mixed macadam, recycled asphalt mix followed by hot recycled bituminous concrete (BC) mix in different layers. However, the decision to use either recycled materials or new materials for road restoration shall rest with APEPDCL.

Alternatively, if decided not to opt for recycled asphalt pavement and use only newer materials, then the trench will have to be filled with available excavated soil followed by

WMM and bituminous concrete mix in different layers using all new materials/resources. The pavement composition and estimated pavement quantities for road restoration under both options is given in **Table 5.8 & 5.9**.

Based on environmental requirements and the mandatory requirement of the newly notified Construction and Demolition Waste Management Rules, 2016, use of recycled WMM, cold recycled asphalt mix and hot recycled bituminous concrete mix as per option 1 shall be adopted for Package 2 area. However, the decision to use either recycled materials or new materials for road restoration shall rest with APEPDCL.

Although, this method is being widely practiced for more than 30 years in developed countries like U.S., it is not yet fully /widely used in India but required technical know how as well as plant and equipment is available in India.

Table 5.8: Pavement Types & Options for Road Restoration under REN/UG Cable Project (Package 2)

S.No.	Pavement Type	Pavement Composition	Pavement Thickness in mm (Trench Type wise)			
			Type - 1	Type - 2	Type - 3	Type - 4
	Option 1					
1	Road Restoration with Recycled WMM & Reclaimed Asphalt Pavement	Sand	Not Applicable	Not Applicable	125mm	Not Applicable
		Recycled WMM	225mm	175mm	250mm	225mm
		Cold Recycled Asphalt mix	260mm	260 mm	260mm	260 mm
		Hot Recycled Bituminous concrete	40 mm	40 mm	40 mm	40 mm
	Option 2					
2	Road Restoration with new WMM & Bituminous Concrete	Backfilling with Natural/Excavated Soil	290 mm	175mm	315mm	225mm
		WMM (new material)	145mm	250 mm	270 mm	250 mm
		Bituminous Concrete in 2 layers (45 mm) - new material	90 mm	50 mm	90 mm	50 mm

Table 5.9: Estimated Quantities of Pavement -Layer wise for Road Restoration under REN/UG Cable Project (Package 2)							
S.No.	Pavement Layers for Road Restoration	Estimated Pavement Quantities - Layer wise in CU.M (Trench Type wise)					Remarks/Notes
		Type - 1	Type – 2	Type - 3	Type - 4	Total	
OPTION 1 - Road Restoration with Recycled WMM & Reclaimed Asphalt Pavement							
1	Sand	Not Applicable	Not Applicable	911	Not Applicable	911	New Material/Fresh Requirement
2	Recycled WMM	4086	4512	1821	1613	12032	Material requirement can be obtained through processing of excavated base and sub-base layers with additional material supplement (stone aggregates) if any required
3	Cold Recycled Asphalt mix	4722	6703	1894	1864	15183	Can be obtained through processing 100% of excavated asphalt material through CPCR methods and reused as recycled asphalt pavement
4	Hot Recycled Bituminous Concrete	726	1031	291	287	2336	Can be obtained through processing 100% of excavated asphalt material through CPCR methods and reused as recycled asphalt pavement
OPTION 2 - Road Restoration with new WMM & Bituminous Concrete							
5	Backfilling with Natural/Excavated Soil	5266	4512	2294	1613	13686	Material requirement can be obtained through processing of excavated base and sub-base layers with additional material supplement (stone aggregates) if any required

Table 5.9: Estimated Quantities of Pavement -Layer wise for Road Restoration under REN/UG Cable Project (Package 2)							
S.No.	Pavement Layers for Road Restoration	Estimated Pavement Quantities - Layer wise in CU.M (Trench Type wise)					Remarks/Notes
		Type - 1	Type – 2	Type - 3	Type - 4	Total	
6	WMM (new material)	2633	6446	1967	1793	12838	New Material/Fresh Requirement
7	Bituminous Concrete in 2 layers (45 mm each) - new material	1634	1289	656	359	3938	New Material/Fresh Requirement

5.5.7.1 Impacts

The impacts of road restoration can be either due to re-deploying excavated bituminous materials as recycled asphalt pavement or use of entirely newer materials for road restoration and dispose-off all the excavated asphalt materials as a construction waste/debris.

The use of newer materials/resources in terms of bitumen, stone aggregates, and sand for road restoration is likely to cause more impacts as compared to re-deploying excavated bituminous materials.

The other associated common impacts of road restoration will be due to setting up and operation of work camp sites for wet macadam mix plants, bitumen mix plants and/or concrete mix plants and handling of bitumen, cement, sand, stone aggregates along with batch mixing operations for bitumen/concrete production, which will be common to both options of road restoration mentioned above.

5.5.7.2 Mitigation Measures

- Road restoration with Option 1 will involve laying of four layers namely; sand, recycled wet mixed macadam, cold recycled asphalt mix and final layer with hot recycled bituminous concrete. Road restoration with option 2 will involve backfilling of cable trenches with soil/sand followed by laying WMM & bituminous concrete layers. The pavement layers for road restoration under both options are given in **Table 5.9.**
- The laying of sand during road restoration is very similar to backing filling of trenches with sand after laying of cables (Ref chapter 5.5.5) and is to be carried out using transit mixers, fitted with flexible hoses for delivery of fine sand directly into cable trenches. This will enable to swiftly complete a uniform sand back filling operations and with minimal manual labour
- The marginal increase in dust levels due to fine sand can be contained through use of pressurized fine spray of water. All work sites will be stationed with one water tanker (6000 litres cap.) fitted with arrangements for pressurized fine spray with 600 metres of

hose reel.

- The sand backfilling operation, using tipper trucks and laying of sand through manual means is to be avoided as it is time consuming and involves double handling of materials at site with additional space requirement.
- In order to limit off-site impacts, sand is to be mandatorily sourced from sand mining operators, licensed and approved by the Department of Mines, Government of Andhra Pradesh.
- The recycled WMM, from the central plant, also is to be transported to operational area in rotating transit mixers fitted with flexible hoses for delivery directly into cable trenches. The un-segregated WMM shall be laid in two layers and compacted with suitable vibratory rollers to achieve desired compaction levels under optimum moisture conditions.
- The asphalt pavement and hot recycled bituminous concrete mix shall also brought to site in tipper trucks in un-segregated form and laid in place using customized pavers suitable for cable trench widths
- The laying of sand, wet mix macadam and asphalt pavement will not cause significant on-site impacts except for increase in dust and noise levels, limited to 2-3 days for all road restoration operations put together. The noise levels can be controlled through deployment of well maintained vehicles and equipment and conducting operations in a regulated and planned manner
- The traffic is to be regulated during the road restoration operations, in order to ensure smooth traffic movement and avoid congestion as a consequence of road restoration works
- In case of restoration of concrete roads, ready mix concrete shall be used, brought to the site through transit mixer(s) from a ready mix plant (RMC) located elsewhere. However, concrete will be sourced only from RMC plants having valid consents and permission or authorization of APPCB.
- Considering the required concrete volume and availability of the ready mix plants in the Visakhapatnam area, it will be economical and convenient to use the ready mix concrete in place of batch mixing of concrete on site, which is to be avoided, to possible extent. Such commercially operating ready mix concrete plants are available in Visakhapatnam.

5.5.8 Construction of Cable Joint Inspection Chambers

The REN/UG cable project will involve construction of cable joint inspection chambers at every 250 metres along cable route. These inspection chambers are essential for maintenance of underground cable network and house spare cable lengths (in loops) and facilitate cable jointing as well as periodic inspection and trouble shooting of problems after the underground cable network is commissioned. Normally, cable faults do occur at joints due to over loading, poor quality of cable or its insulation and/or bad workmanship of cable jointing itself.

The Package 2 of REN/UG cable project will require 350 inspection chambers, with clear dimensions of 2mx3mx2m (deep) for HT (33KV & 11KV) cables. The trenches which carry only LT cables might require a relatively smaller size inspection chamber with clear dimension of 1.5mx2.0mx1.5m (deep). The substation areas wise inspection chambers

required under Package 2 area is given in **Table 5.10**. All inspection chambers will be provided with one manhole cover of 560mm diameter and constructed with M25 grade RCC (reinforced cement concrete).

Table 5.10: Cable Joint/Inspection Chambers under Package 2 - REN UG Cable Project						
S.No.	**Substation Area**	**No. of Chambers - Trench Type wise**				**Total**
		Type - 1	**Type - 2**	**Type - 3**	**Type - 4**	
1	Vidyut Sakha	22	31	9	19	**80**
2	RK Beach	3	13	4	3	**24**
3	Kailasametta	7	10	3	1	**20**
4	TSR Complex	15	45	10	11	**81**
5	Indoor Dondaparty	2	23	10	4	**39**
6	Maddilapalem	23	38	5	8	**74**
7	Pandurangapuram	Not Applicable	12	7	12	**31**
8	**Total**	**73**	**172**	**49**	**57**	**350**

5.5.8.1 Impacts

The environmental impacts due to construction of RCC inspection chambers are not significant, generally transitory in nature and limited to 21 days. Moreover, these chambers will be constructed within the barricaded operational area, along cable trench and will be completed simultaneously along with cable laying works in a 500 metre long segment (ref **Table 5.3** for scheduled completion time for inspection chambers and cable works).

5.5.8.2 Mitigation Measures

The mitigation measures during construction of inspection chambers shall comprise.

- Location of inspection chambers are to be pre-determined during on-site marking of cable route itself during site preparation activity itself and demarcated on road with yellow paint (7.5 cm wide strips)
- Location of inspection chambers shall not foul with any other underground utilities, sewer manholes and/or chambers of telecom department and shall be at least 3 m away from any other similar appurtenants. Accordingly, location of inspection chambers can be marginally adjusted to avoid fouling with other pre-existing utilities
- Construction of inspection chambers is to be commenced, concurrently with cable in (500 metres segment) laying operations, so as to complete both inspection chamber and cable laying works in the estimated 21 days. This will avoid lag in cable laying and construction of inspection chambers and cable jointing works as well. Moreover, this will also facilitate complete road restoration in one go and opening up of fully restored road to public in all respects
- The top level of inspection chamber is to be finished at least 40mm below the existing road level, so that 40mm thick bituminous concrete as part of road restoration can be laid over inspection chamber as well (excluding manhole cover), so that only the manhole

cover is visible after road restoration is completed

- Under no circumstances, top level of inspection chamber shall be finished above the existing road level and thus pose hazard to pedestrian as well as vehicular traffic, after cable laying operations
- Inspection chambers shall be provided with one 560mm extra duty manhole cover to withstand heavy traffic and shall avoid ingress of water into inspection chamber during rains
- M25 grade ready mix concrete for inspection chambers shall be sourced from ready mix concrete plants having valid consents and authorization of APPCB.

5.5.9 Cable Jointing

The underground cables, after laying in trenches are to be jointed in order ensure continuity. Normally, cables are laid in such a way to ensure all cable joints can be essentially housed at inspection chambers spaced at every 250 metres. Normally, straight through heat shrinkable jointing kits of desired voltage grade are used for both HT and LT cable jointing works.

The heat shrinkable joints have good insulating & sealing characteristics, high mechanical strength and excellent resistance to weathering and chemical reaction like ultra violet radiations and alkaline soils. More importantly, the heat shrinkable joints take just about 4 to 5 hours to complete one joint work and work can be completed swiftly unlike resin joints, which takes nearly 24 hours.

5.5.9.1 Impacts

The cable jointing works does not cause any environmental impacts. Depending upon trench and cable configuration, there could be cable joints at every 250 metres or at every 500 metres along cable route. Normally, cable faults do occur only at joints, thus cable joints need access for repair or rejoining with additional spare lengths as a pre-requisite in underground cable network. Thus, cable joints by design, are to be essentially housed only in inspection chambers.

5.5.9.2 Mitigation Measures

- All cable jointing works are to be carried out as per recommended procedures/specifications by the manufacturer with genuine cable jointing materials
- All cable jointing works are to be carried out in dry conditions and during clear days, with no possibility of rains. In case of unseasonal rains, water proof tarpaulins shall be used to cover the work site at inspection chamber.
- No cable jointing work is to be carried out during rains or under wet conditions. The inspection chamber shall be in dry condition, before cable jointing work is resumed
- The cable joints within the inspection chamber shall be supported on steel portals on either side of the cable trench, so that the no cable or joint within the chamber remain in hanging position for more than 0.45m at a stretch.
- The inspection chamber frame and manhole cover shall fit together well and further joints are sealed with water proof cement mortar (1 cement: 4 cement fine sand) to avoid ingress of water into inspection chambers during rains and/or storm water blockages on

the road at a later stage.

5.6. Opening of Operational Area/COI for Public Use

The barricaded operational area in 500 metres long segment shall be opened up only after the road restoration works are completed. One of the most important requirements, prior to opening of operational area is installation of cable route markers at every 250 m along the work completed stretch.

5.6.1 Impacts

The impacts from opening of operational area could be in the form of remnants of road restoration works, waste materials/rejects from road restoration works or cable laying operations. Other impacts could be left out unpaved areas or uneven surfaces between old and new surfaces and blockage of drainage outlets along road side of the barricaded operational area.

5.6.2 Mitigation Measures

- Ensure no area is left out unpaved during the road restoration within operational area,
- Ensure levels of newly laid or restored road level match with old and existing pavement levels with no unevenness surfaces
- Hitherto, barricaded operational area is to be cleared of all remnants of road restoration works, waste materials/rejects from road restoration works or cable laying operations and all such debris are to be disposed off at approved locations
- In order to limits dust levels during clearing operations, gentle sprinkling of water with fine spray to be carried out
- Prior to vacating the barricaded area, all road side outlets to storm drains alongside of barricaded area are to be checked
- All road side drain chutes, both upstream and downstream of operational area shall be checked and blockages, if any are to be cleared, so that road drainage will not be affected aftermath of cable laying operations.
- All work force deployed in clearing operations shall be provided with PPEs like safety helmets, face masks, protective gear with reflective jackets and safety shoes mandatorily

5.7. On site Workforce

The preparation of site, trench excavation, cable lowering, jointing, back filling of trenches, and road restoration including site cleanup will require both skilled and un-skilled workforce. The estimated work force requirement for completing all operations for laying of 500m length underground cable will be 25, excluding supervisory/management staff. Considering that only 1 operational area will be opened up per substation area at any given point of time, the total workforce requirement for cable laying and construction of inspection chambers will be 210 as given in **Table 5.11**.

Table 5.11: Workforce Requirements for UG Cable Laying under Package 2				
S.No.	Substation Area	On site Work Force (excluding Supervisory Staff) Requirement*		
		Laying UG Cable (7 Segments) @ 25 workforce/ per operational area of 500m segment	Construction of Inspection Chamber (per chamber)	Total*
1	Vidyut Sakha	25	5	30
2	RK Beach	25	5	30
3	Kailasametta	25	5	30
4	TSR Complex	25	5	30
5	Indoor Dondaparty	25	5	30
6	Maddilapalem	25	5	30
7	Pandurangapuram	25	5	30
	Total	**175**	**35**	**210**

**excludes miscellaneous work force like mason/plumbing crew, watch & ward staff, traffic warden & others*
***Considering max. 1 operational area of 500m long cable route segments per substation area*

5.7.1 Impacts

The most visible impact is safety at work place (operational area) and health issues for the deployed work force for all levels and types (skilled and unskilled). **Table 5.12** presents the permissible durations of exposure to specific noise level. The workforce who are likely to exposed beyond 100 dB(A) shall be given one break every two hours.

Table 5.12: Permissible Duration for Workers Exposed to Specific Noise Levels		
S.No.	Permissible Duration (Hours/Day)	Sound Level (dBA)
1	16	85
2	8	90
3	4	95
4	2	100
5	1.5	102
6	1	105
7	0.5	110
8	0.25	115
Source: OSHA – Technical Manual		

Other impacts could be due to inadequate facilities at workforce camps, if any established and distances to be commuted to work site among others.

5.7.2 Mitigation Measures

- All work force shall be subjected to an orientation program, which familiarize them with work requirements, safety practices at work, safe distances to keep from earth moving equipment, first aid facilities, emergency response, on-site sanitation facilities and practices to be adopted, rights and privileges of workforce among others. Orientation

shall also include concern for safety of public around operational areas as well

- All work force deployed in operational areas shall be provided with PPEs like safety helmets, face masks, gloves, protective gear with reflective jackets and safety shoes. It shall be mandatory to wear them at work site. The PPEs shall be provided at no cost to workforce and shall be replaced once in six months. Any lost PPEs shall be provided at subsidized rates
- Visitors/officials to worksite are to be provided with PPEs (hard hats and safety shoes) and shall be briefed ongoing operations on that specific time and related safety requirement at work site including safe distances to keep, while at site visit
- Work force shall be subjected only to standard work shifts/hours. Overtime allowances shall be paid with ceiling limits. Working beyond such ceiling limits shall be discouraged, even if, so desired workforce or contractor
- All workforce deployed shall be governed by Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996, with regards to safety and welfare measures (including equal wages for men and women) for workers employed at building and other construction sites.
- Provision of one mobile toilet of 2 seater capacity (1 men and 1 women with separate entrances) shall be stationed at a suitable place within 100 metres from each operational area of 500 m long segment. The mobile toilet shall have at least 1000 litres overhead water storage, well maintained and in usable condition at all times. Bottom tanks shall be regularly cleaned and over head tank replenished as per requirement. Work force shall be oriented to use mobile toilets and avoid using public toilets and/or nearby open places/parks
- Every operational area shall be provided with one mobile drinking water kiosk having a storage of 300 litres and placed at a suitable place within 100 metres from work site
- The operational work site shall have first aid kits and details of major/nearby hospitals displayed prominently in local language, in case of emergency and/fatalities to work force and/or public, as a consequence of operations
- The supervisory staff shall be provided with wireless communication system (mobile telephones for better communication at operational area and also with other operational area within same substation area, in case of emergency or otherwise
- The work sites being within Visakhapatnam city limits, REN/UG cable project will provide skilled and unskilled employment opportunities largely to the local people. All work force is expected to return to their places of residence after work shift hours. For out station workforce if any, contractor shall provide rented residential accommodation with water, sanitation and allied facilities for comfortable stay. Pooled transportation facilities wherever required shall be provided to workforce as a welfare measure
- No work force camps will be set up under the project and largely local work force shall be employed.

5.8. Ambient Noise Levels at Operational Areas

Various rotating and moving equipment like excavators, tipper trucks, rollers, pavers and transit mixers will be used during various stages of cable laying operations. The typical

time frame to complete laying of a 500 metres underground cable segment is 21 days (ref **Table 5.3**). Moreover, many of these equipments will be deployed at different stages of work, either on continuous or intermittent basis depending upon work requirements. The activity wise deployment of equipments and respective sound pressure levels are given in **Table 5.13.**

Table 5.13: Potential Noise Sources & Corresponding Sound Power Level (for cable laying operations in a 500 metre long segment)

S.No.	Activity	Noise Source	Sound Power Level (dB(A))* (at 15 m from source)	Sound Power Level (dB(A))** (at 1.25 m from source)	Combination of Sources	Cumulative Sound Power Level (dB(A)) (at 1.25 m from source)
1	Initial Site Clean up	Nil - Only Manual Operations	-		-	-
2	Trench Excavation	Excavator (1 No.)	80	101	Excavator + Tipper Truck	110
		Tipper Truck (1 No.) - not continuous	88	109		
3	Backfilling	Tipper Truck	88	109		109
4	Road Restoration	Roller	74	95	Roller +Paver + Tipper Truck	112
		Paver	89	110		
		Tipper Truck	88	109		
5	Site Clean up	Nil - Only Manual Operations			-	-
6	Construction of Inspection Chamber	Concrete Mixer	85	106	Concrete Mixer	106

Note: Cumulative Sound Power Levels also include the background ambient noise levels
Cumulative Sound Power Levels are calculated using formula L∑ = 10log10 (10L1/10 + 10L2/10 + ….10Ln/10)
*Source: * http://www.fhwa.dot.gov/environment/noise/construction_noise/handbook/handbook09.cfm*
*** Computed using formula Lpd2 = Lpd1 +20 x log(d1 / d2)*

5.8.1 Impacts

The deployment of excavators, other moving/rotating equipment at cable laying operational areas will be for a maximum duration of 21 days and therefore it is unlikely to cause any long term impacts on local people or the work force.

However, in order to assess the likely cumulative noise levels during cable laying operations as a consequence of deploying different combination of equipments, MASdBmap version 0.5 noise modeling tool was used, which is on the same platform of CadnaA and Sound PLAN and suitable for linear sources.

The MASdBmap tool considered three different combinations or scenarios of cable laying activities and associated equipments likely to be deployed. The tool also considered the steel barricades provided on either side of operational area. The scenarios considered for noise modeling tool is given in **Table 5.14**.

The MASdBmap tool predicted cumulative noise levels at different distances from operational area for different cable laying activities as well as combination of sources and is given in **Table 5.14**. The noise attenuation effect of steel barricades for operational area can also be seen in the predicted noise levels at different distances in **Table 5.14.** The noise contour maps for different scenarios, considered in the modeling tool are given in **Annexure 3**.

Table 5.14: Noise Modeling Scenario

S.No	Scenario	Activity	Noise Source	Barrier
1	Scenario 1	Excavation	Excavator	with barrier (2m height) with barrier (2.5m height) without barrier
2	Scenario 2	Excavation/ Backfilling	Excavator + Tipper Truck	
3	Scenario 3	Road Restoration	Roller + Paver + Tipper Truck	
4	Scenario 4	Construction of Inspection Chamber	Concrete Mixer	

Table 5.15: Noise Attenuation Effect of M.S Barricades used under REN/UG Cable Project

S.No.	Activity	Cumulative Sound Power Level (dB(A)) at 1.25 m from source	Cumulative Distance from Source within Barricade Area			
			3.75 m	6.75 m	8.75 m	11.25 m
A	**With Barrier - 2m Height**					
1	Excavation	110	82.3	79.5	77.4	75.2
2	Excavation/Backfilling	109	81.3	78.5	76.4	74.2
3	Road Restoration	112	84.3	81.5	79.4	77.2
4	Construction of Inspection Chamber	106	78.3	75.5	73.4	71.2
B	**With Barrier - 2.5m Height**					
5	Excavation	110	81.7	79.1	77	75.3
6	Excavation/Backfilling	109	80.7	78.1	76	74.3
7	Road Restoration	112	83.7	81.1	79	77.3
8	Construction of Inspection Chamber	106	77.7	75.1	73	71.3
C	**Without Barrier**					
9	Excavation	110	97	90.1	85.9	83.1
10	Excavation/Backfilling	109	96	89.1	84.9	82.1
11	Road Restoration	112	99	92.1	87.9	85.1

Table 5.15: Noise Attenuation Effect of M.S Barricades used under REN/UG Cable Project						
S.No.	Activity	Cumulative Sound Power Level (dB(A)) at 1.25 m from source	Cumulative Distance from Source within Barricade Area			
			3.75 m	6.75 m	8.75 m	11.25 m
12	Construction of Inspection Chamber	106	93	86.1	81.9	79.1

The predicted cumulative noise levels due to cable laying operations given in **Table 5.15** indicates the following

- The cumulative sound pressure levels of equipment used for cable laying operations with barricades on both sides is within 85 dB(A) even at 3 metres distance. At this noise level, the permissible duration for exposure is 16 hours per day and will have no impact on workforce.
- The 2.0 metre height steel barricades, provided on either side of the operational area, also serve as a noise barrier and are effective in bringing down levels by 20% of cumulative sound pressure levels. (ref Chapter 4.4.14 for baseline ambient noise levels prevailing in Package 2 area)
- Without the barricades, the cumulative sound pressure levels exceed 95 dB(A) even at 3.75 metres. In such case, workforce is to be provided with one short break in pre-lunch and post lunch sessions or provided with ear muffs.
- The 2.5 metres height barricade is marginally more effective as a noise barrier than the 2.0 metres barricade but it will hinder loading and unloading operations into tipper trucks and therefore not considered

5.8.2 Mitigation Measures

- The steel barricades, as per design given in **Figure 5.1**, shall be fabricated and installed on either side and all along the 500 metres cable laying operational segment,
- The noise barriers shall be checked for its stability and bolted down on to ground, if required as a safety requirement, given the inclement weather conditions coupled with strong winds at Visakhapatnam, particularly between September and November as well as heavy traffic on some roads,
- The barricades shall be maintained in shape and good condition, and painted at periodic intervals as per approved design given in **Figure 5.1.**

5.9 Establishing of Store Yards and Work Camp Sites

The REN/UG cable project under Package 2 will require store yards and work camp sites. APEPDCL has open space at three of their existing sub stations, namely: Kotha Road SS, G J Hospital SS and Sagar Nagar Section Office, which are intended to be used as store yards for materials, although final decision is yet to be made,

In addition, land will also be required for work camp site to establish wet mix macadam plant, hot mix plants and all other activities like handling and storage of construction materials *viz.* sand, cement concrete slabs, excavated earth soil, milling of excavated materials as may be required,

At present, land for work camp sites is not yet identified. Most suitable location(s) will be in and around those lands, where routinely GVMC and Public Works Department, Government of Andhra Pradesh, establish their camp sites in Visakhapatnam.

5.9.1 Impacts

The impacts due to establishing store yards and work camp sites are transitory and quickly dissipate, once the operations are over, provided the sites are managed and restored to its previous state, after the project completion.

5.9.2 Mitigation Measures

- Essentially, barren lands or uncultivable lands and those away from human settlements shall be the most preferred choice for establishing work camp sites
- The selected land shall not warrant significant change in land forms or terrain, to make it suitable for establishing work camp sites
- In case, land had been earlier used for establishing work camp site and meets the above requirements, same shall be given preference
- Requisite consent to establish and consent to operate shall be obtained from APPCB
- The ambient air and noise levels within the work camps sites shall be monitored, once in month and corrective measures if any required shall be taken in order to be complaint with National Ambient Air Quality and Noise Standards
- All stipulated consent conditions by APPCB shall be strictly adhered and complied by contractor
- The work camp sites shall be access controlled with fixed entry and exit points
- The dust levels at the work camps sites is to be controlled through regular sprinkling of water through similar mobile tankers deployed at operational areas for cable laying
- Bitumen mix plants, deployed for REN/UG cable project shall conform to regulatory norms/requirements
- The site shall be cleared from all remnants of construction and debris and site restored to its previous state
- Surplus soil available from excavation of cable trenches (sub-base and base layers) can be used to grade the site, as well as to restore the site after works completion, if required
- The work camp sites shall mandatorily have designated paved areas for storage of used oils/lubes in plastic/HDPE drums, prior to their final disposal in APPCB approved disposal locations

5.10 IMPACTS AND MITIGATION MEASURES DURING OPERATION STAGE

The commissioning and operation of the REN/UG cable project in Package 2 area will not involve any activities that will have environmental impacts. On the contrary, the network will be resilient and/unaffected due to any natural calamities/cyclones, in line with the project

development objective.

However, if underground cables are subjected to higher loads than design, or due to poor quality of cables or due to poor workmanship of jointing, faults in cables may occur.

The underground cables are tested at various stages prior to laying and therefore under normal circumstances, the only weak link is poor workmanship of joints, which can cause cable faults. The cable joints normally are housed in cable joint inspection chambers and therefore re-doing of cable joints will not require opening up of cable trench.

In case cable fault occur at places other than joints, either due to over load or poor cable quality, the insulation gets heated up leading to puncture in insulation layer leading to direct earthing, which will cause tripping of circuit breakers. In such an unlikely event, exact location of faults can be identified through cable fault detector. Once, location is identified, cable trench will have to be opened up at fault location for rectification of cable, followed by restoration of all intermediate layers including road restoration as per project design.

The present cable configuration, particularly the cables laid in lower tiers (33KV and 11KV cables in trench type 1 and 2), would be very difficult to repair or even to gain access, in case of a fault at any intermediate location, other than the joints. The faults at any intermediate stretch in cables laid in upper tier in these trenches can be repaired through by opening up small length of cable trench.

5.10.1 Impacts

The cable faults occurring at joints will not have any environmental impacts. Rectification of joint can be completed in 3-4 hours and for this period, an area of 1.2 m x1.2 m, surrounding the manhole cover needs to be cordoned off with temporary barricades and opened up after work is done and site is restored. As result, there could be minor inconvenience to vehicular and/or pedestrian traffic limited for few hours only, depending upon location of specific inspection chamber.

Most importantly, fault in underground cables, either at joint or at any other location does not cause fire or any other hazard.

The HT and LT cables used under package 2 will have XLPE insulation, which can withstand higher loads as well as higher temperature as compared to cables with PVC insulation. Moreover, HT and LT Cables will have two sheaths of PVC sheets (inner and outer), both of which will be FRLS (fire resistant and low smoke), which prevent fire hazards.

In addition to these factors, even if the cable gets heated up due to over load and/or any other factor, which could lead to damage of the insulation and sparks when conductor comes in touch with armour, it will not erupt into a fire, because of lack of oxygen in the well packed and backfilled trench at 1.25 m below ground level, which otherwise could be a cause for fire, a common feature in over ground cables.

Thus, underground cables, by its nature do not result in fire hazard, except for developing a fault in terms of puncture in the insulation, leading to direct earthing, which in turn trips the circuit breaker (either earth fault relay/overcurrent relay/short circuit relay) at the respective substation and therefore disruption in services.

5.10.2 Mitigation Measures

The impacts or inconveniences due to cable faults can be largely controlled and/or mitigated as here under

- Cables shall be subjected to stringent quality checks at various levels *viz* testing at factory prior to dispatch, testing at storage yards, at work site prior to pull out and lowering and finally after lowering and before back filling of trenches
- Extreme care shall be taken not to over load the cables beyond its design load capacity, even more importantly for prolonged periods
- Adequate supervisory checks during cable jointing work and adhering to manufacturer's specifications/procedures as per relevant Indian Electricity Regulation, 1956(with latest amendments) and BIS 1255:1983
- In the event of cable faults at joints, the area around the man hole of inspection chamber (about 1.2mX1.2m), shall be barricaded and caution boards shall be put up for the public/vehicular traffic. Work shall be planned and swiftly completed. The work site around chamber shall be restored to its previous state. All waste materials from work site shall be removed with no trace any debris. The uneven surfaces, if any surrounding inspection chamber due to opening up of chamber cover shall also be rectified with rich cement mortar, as may be required, suitably
- In case of faults in cables at locations other than joints, which are laid in upper tiers (11 KV and LT cables in trench type 1 and 2), the area around cable fault location (about 1.2mX1.5m), shall be barricaded and caution boards shall be put up for the public/vehicular traffic. The cable trench shall be opened up at fault location for rectification of cable, followed by restoration of all intermediate layers including road restoration as per project design. Work shall be swiftly completed and work site shall be restored to its previous state. All waste materials from work site shall be removed with no trace any debris. The uneven surfaces, if any surrounding the opened up area shall also be restored to its previous state, suitably

5.11 IMPACTS AND MITIGATION MEASURES DURING REMOVAL OF OH INFRASTRUCTURE

5.11.1 General

Once the REN/UG cable project in Package 2 area is commissioned, the existing over head power distribution infrastructure, within the same package area is to be dismantled. The existing over head infrastructure, which is to be dismantled and transported to APEPDCL's designated store yards, is given in **Table 2.4** under Chapter 2.12.

The over head infrastructure comprises all types and sizes of conductors, insulators, straight and V-cross arms, guard wires, cement concrete poles, guy wires, power and distribution transformers and four pole structures for mounting of transformers among others.

At the store yards, all the removed infrastructure and brought to store yards will be subjected to technical assessment for its serviceability and balance life. All serviceable materials will be re-deployed elsewhere in non-cyclone affected areas and unserviceable materials will be disposed off as scrap by APEPDCL. The dismantled OH infrastructure under Package 2 is intended to be brought to APEPDCL's existing store yard at Simhachalam substation and special maintenance shed for transformers.

5.11.2 Impacts

None of the overhead infrastructure, which is removed and transported to designated store yards, will cause significant environmental impacts, except for the insulating oil in the transformers, which needs to be handled with adequate caution.

5.11.3 Mitigation Measures

- During removal of over ground infrastructure like poles, conductors, transformers and other related accessories, adequate safety precautions are to be taken to ensure public safety and the places shall be cordoned off with hazard tapes and caution boards
- Workforce, guy ropes and other appropriate tools required for safely bringing down the poles on to ground shall be deployed and ensure no damage to public property and/life shall occur during these operations
- All such removed infrastructure shall be transferred to designated store yards in appropriate transport vehicles, without endangering the public life and property during transit
- After removal of overhead infrastructure, the places shall be restored to match with surrounding places *viz,* when a pole has been dismantled, the pole location shall be restored to match with surrounding place, including filling up the foundation pit of the pole with sand/cement concrete and finishing to match with surrounding surfaces as may be required
- All transformers brought to store yards are to be technically tested for its usability and balance life at designated store yard at Simhachalam substation. All serviceable transformers will be redeployed elsewhere and unserviceable transformers will be deposed off through APPCB approved scrap dealers
- All other disposables and/or debris (after scavenging for scarp valuables) shall be disposed off at approved waste disposal sites at Kapulauppda/Tangudubilli/Giddijala, located between 25- 40 km north of Visakhapatnam.

5.12 WORKS SITE SAFETY DURING LAYING OF UNDERGROUND CABLES

5.12.1 Safety in Pits and Trenches

All pits and trenches works shall comply with works safety requirements but limited to:

- When a pit is to be left open overnight, proper barrier mesh and flashing lights, etc as required must be attached to pickets at least 300mm from the edge of the excavation or the pit must be covered
- Soil must be piled back from the edge of the pit at least 600mm
- Pits or trenches deeper than 1500mm, in normal soil may require a ladder for access and require shoring, benching or sloping of the sides of them. Pits or trenches may require shoring even if less than 1500mm deep and the soil is unstable.
- Undermining walls, foundations, streets or pavements are to be avoided otherwise proper shoring is required.
- Barriers shall be erected to prevent vehicles inadvertently falling into the excavation.

5.12.2 Occupational Health and Safety During Laying of Underground Cables

- All trenches to have safety barricades when left open for an extended period of time.

- Necessary Personnel Protective Equipment (PPE) to be provided to all work force engaged in laying of underground cables
- No materials/cables to be placed or stacked near the edge of any excavation.
- No load to be placed or moved near the edge of excavation, where it is likely to collapse on the work side
- Safe distance shall be maintained from edge of trench
- Materials will not to be placed or stacked near the edge of trench.
- No load to be placed or moved near the edge of trench, where it is likely to cause collapse of the trench
- No load/personnel movement across trench
- Manual handling awareness will be spread for load and electrical cables.
- Adequate rest periods shall be allowed, job rotation, minimize repetitious twisting and shoveling

5.12.3 Safety Working in the Vicinity of Traffic

- When working on road or in the vicinity of traffic, traffic management must be carried.
- Prior to commencing underground cable laying works, approval shall be obtained from the agency responsible for the care, control and management of the roads.
- Care should also be taken to ensure that all other required authorizations are obtained prior to the commencement of works.
- Lengthy delays may be experienced, if all necessary approvals are not obtained, increasing the risk of undesired traffic incidents.
- In addition, other agencies such as emergency services, police, public transport etc. in the area may need to be informed in advance of the underground cable laying works
- Where the proposed traffic management involves modification to existing signal phasing, number of traffic lanes and / or timing on roads; are to be approved through traffic police
- Work zone Road Safety Barrier will also be provided

5.12.4 Public Safety

- Cable markers shall be installed to indicate the location of all underground power cables.
- Compaction to specified standard
- Site cleared of debris and refuse
- Restoration of site after laying underground cables
- Proper marking with danger sign over electrical cable route and emergency numbers.

5.13 Occupational Health & Safety During Maintenance

- A hazard assessment must be carried out by the work crew prior to commencement of maintenance work to ensure that:
  - All hazards have been identified and assessed.
  - The appropriate controls have been put in place to mitigate the hazards.
  - All members of the work crew are aware of the hazards.
  - The safety of the public and other workers has been ensured.
  - APEPDCL has been notified of any proposed work in the vicinity of underground cables
  - Necessary personnel protective equipment (PPE) shall be provided to work.

- No workers shall physically handle a distribution cable of any type, if its condition is suspect or doubtful unless the cable is proved to be de-energized.
- No personnel shall physically handle a high-voltage cable, while it is live unless it is completely surrounded by an earthed sheath or screen, or both, and precautions are taken, where necessary, to avoid danger from induced voltages and transferred earth potentials. A high-voltage cable shall be isolated, earthed and proved to be de-energised on site prior to commencing maintenance work on the cable.
- Placing any pressure or load on exposed cables and or cable joints is not permitted.
- This is inclusive of stepping on to or using the cable or cable joint for support whilst working on or near the asset. If this is physically impractical, APEPDCL must be consulted on an alternate work method.

6.1 GENERAL

This chapter presents an analysis of alternatives considered in the project preparation to avoid or minimize both environmental and social impacts that would be inevitable, if technically optimal cable route alignment is followed. An analysis of various alternatives has been carried out prior to arriving at the technically best fit option with minimal environmental and social impacts.

The main issues along the operations area/COI along underground cable routes are the physical obstacles like unauthorized ramps/steps of private and/or government buildings, which have been extended on to roads for ease of access, existing over ground poles (telecom/ electricity/street light) and road side trees among others. The other issues are disruptions to underground public utilities like water supply, sanitary and drainage connections across cable route corridor, safety to pedestrians as well as road users apart from work force, who are directly involved for cable laying operations.

The social issues due to the UG cabling project are;

- Temporary loss of access to residential and commercial buildings
- Temporary impact on livelihood of squatters/street hawkers/vendors.

The route alignments considered in the REN/UG cabling project (as indicated in Chapter 2) is flexible and therefore this factor has been used to avoid most of the above mentioned obstacles within the operational area/corridor of impact (COI), while finalizing the cable route corridor.

6.2 WITH OR WITHOUT PROJECT SCENARIO

The ‘with’ and ‘without’ project scenarios are analyzed with respect to the development of the state by the backdrop of requirement of resilient electrical distribution infrastructure for sustained growth economy and consequent well-being of its citizens in the aftermath of cyclones/natural disasters.

The ‘with’ scenario of the REN/UG cabling project is expected to provide a resilient electrical network even if the coast of Visakhapatnam is struck with another cyclone/natural disaster, like the Hudhud in October 2014. The REN/UG cabling project is expected to minimize the miseries of people at large, minimize the damages to public and private property, help the state to handle the after effects of natural disaster(s), which the coastline of Andhra Pradesh, including Visakhapatnam stands exposed and most importantly help the state economy recover faster in the aftermath of natural disasters. The project also helps to upgrade the existing over head network to construct an upgraded underground electrical network, which can cater to the projected power demand as of year 2025.

The main objective of this component under APDRP is the conversion/replacement of all existing over head electrical network into underground cabling network so as have a resilient electrical network (REN), which can stand the vagaries of cyclones and reduce/prevent the miseries of people and resources for reconstruction including helping the state economy to recover faster in the aftermath of natural disasters.

If the REN/UG cabling project is not implemented, there is every likelihood that the existing over head electrical network within Visakhapatnam will stand exposed to damages and

destruction that comes along with the cyclones, the last being the Hudhud in October 2014. Moreover, existing OH electrical network would need investments for up-gradation to meet increasing power demand of Visakhapatnam in the coming years. Any further investments on the existing OH electrical infrastructure can't be justified, given the looming threat of cyclone disasters and the damages that comes along with that.

Therefore, the "with" project scenario, with its minor adverse impacts is more acceptable than the "without" project scenario which would mean an aggravation of the existing problems. Potential benefits of the proposed REN/UG cabling project are substantial and far-reaching in order to achieve all-round development of the State economy and progress for its people.

6.3 CABLE ROUTE ALTERNATIVES

The project preparation has considered several options/alternatives, during finalization of route alignment of the REN/UG cable project. The factors, which were considered included most optimal cable length, avoid or minimize relocation/shifting requirements of existing utilities along route alignment, avoidance of trees, which otherwise need felling, avoid or minimize road crossing points, minimum diversions to traffic as well as pedestrian traffic among others.

Any route alternatives, without considering optimal cable length, relocation/shifting requirements of utilities, avoidance of trees, minimum diversions of pedestrian and vehicular traffic will cause severe disruptions not only for project implementation but also for vehicular and pedestrians traffic, since cable routes are all spread across Visakhapatnam city's busy main roads to lanes and by-lanes. No provision of OFC and /or other communication cables have been included in the REN/UG cable project. This was warranted to minimize down time during restoration of faults in UG cables (in case), avoid multiplicity of required coordination during UG cable routine maintenance, particularly during cable fault repairs, to limit the width of the trench to bare minimum as trenches are along road and most importantly to maintain exclusivity as a safety requirement.

6.4 'OPERATIONS AREA' ALTERNATIVES

The project preparation has proposed four configurations of cable laying, but with a uniform trench width of 1 meter and varying depth in all cases under the project. In order to minimize disruptions to both pedestrian as well as to vehicular traffic, it is utmost necessary to limit the area of operation required for trenching, cable pullout, lowering, jointing, prior to refilling and restoring trench to its previous state and at the same time ensure minimum working space is available for completing work in a timely manner.

In order to limit the area of operations, several cable trench excavation methods were assessed for minimal operations area requirement and a 2.5 meters wide corridor as 'operational area or corridor of Impact' along the footpath, has been considered, which are to be opened up for cable laying operations in 500 meters long segments. The 2.5 meters wide corridor in 500 meters long segments is to be barricaded on both sides considering the following;

- The corridor of impact/operations area will be along footpath, with footpath/kerb being one edge, and other edge of corridor extending on to road up to a maximum of 2.5 m.

- In case of roads which do not have foot paths, the line of sight with trees/poles shall be considered as one edge of the 2.5 m wide corridor and other edge of corridor extending on to road up to a maximum of 2.5 m.
- The 2.5 meter wide corridor of impact/operations area is to be barricaded on both sides in 500 meters long segments along cable alignment with provision for temporary access at regular intervals to cross over across barricaded area for pedestrians as shown in **Figure 6.1 & 6.2** (Figure 4.1 reproduced as 6.1 for ready reference).
- Within the barricaded operational area, 1 meter wide cable trenches are to be excavated using mini excavators/ skid steer loaders like chain mounted Bobcat model E26 or Wheel mounted Vectra- model HEMAN 175 or wheel mounted model-JCB 155, trenchers, among others. Such mini excavators are especially designed and suited for excavations within limited operational areas and are commercially available with options for different attachments suited for operations like for rock breaking, trenching, cable pulling, earth back filling and compacting operations.
- The mechanical excavations are to be essentiality supplemented by manual excavation at some places in order to maneuver minor obstacles within the barricaded operational area like kerb/road side small trees/saplings, telephone/electric poles, which will otherwise require shifting or removal for movement of excavators, if mechanical means of excavation is to be adhered all through the alignment.
- Other operations like cable pull out, lowering, refilling of trenches, removal of excess earth, compacting of backfilled earth etc can be done by using the same mini excavators, with additional accessory attachments. Thus, no operations related to cable laying work is ordinarily expected to spill out on to either footpath or the road, outside the barricaded area.
- The operational areas can be moved ahead in 500 meter long segments, once all required cable laying operations are completed including restoration of trenched area to its previous state as required/specified.
- The contractors shall be provided with adequate open areas (at least two to three locations per package) to store inventories like cable rolls, cement concrete slabs,
- earth/sand for refilling, cement concrete batch mixers for restoration of trench area among others. The provision of open areas for inventories will minimize disruptions to vehicular/pedestrian movement near barricaded operational areas and avoid unwarranted storage of construction materials on roads.
- The barricaded areas in each segment shall be provided with fixed exit and entry points for bring in required inventories and taking out debris or disposables out of the operations area.
- The operational areas can be either on left or right side of the road depending upon of the cable route alignment considered in the project preparation.

In case, excavations are to be carried out using standard/full size excavators, the corridor of impact or required width of operations area required will be at least 3.5 m, which will further reduce the available lane space for traffic movement and can lead to disruptions to vehicular traffic.

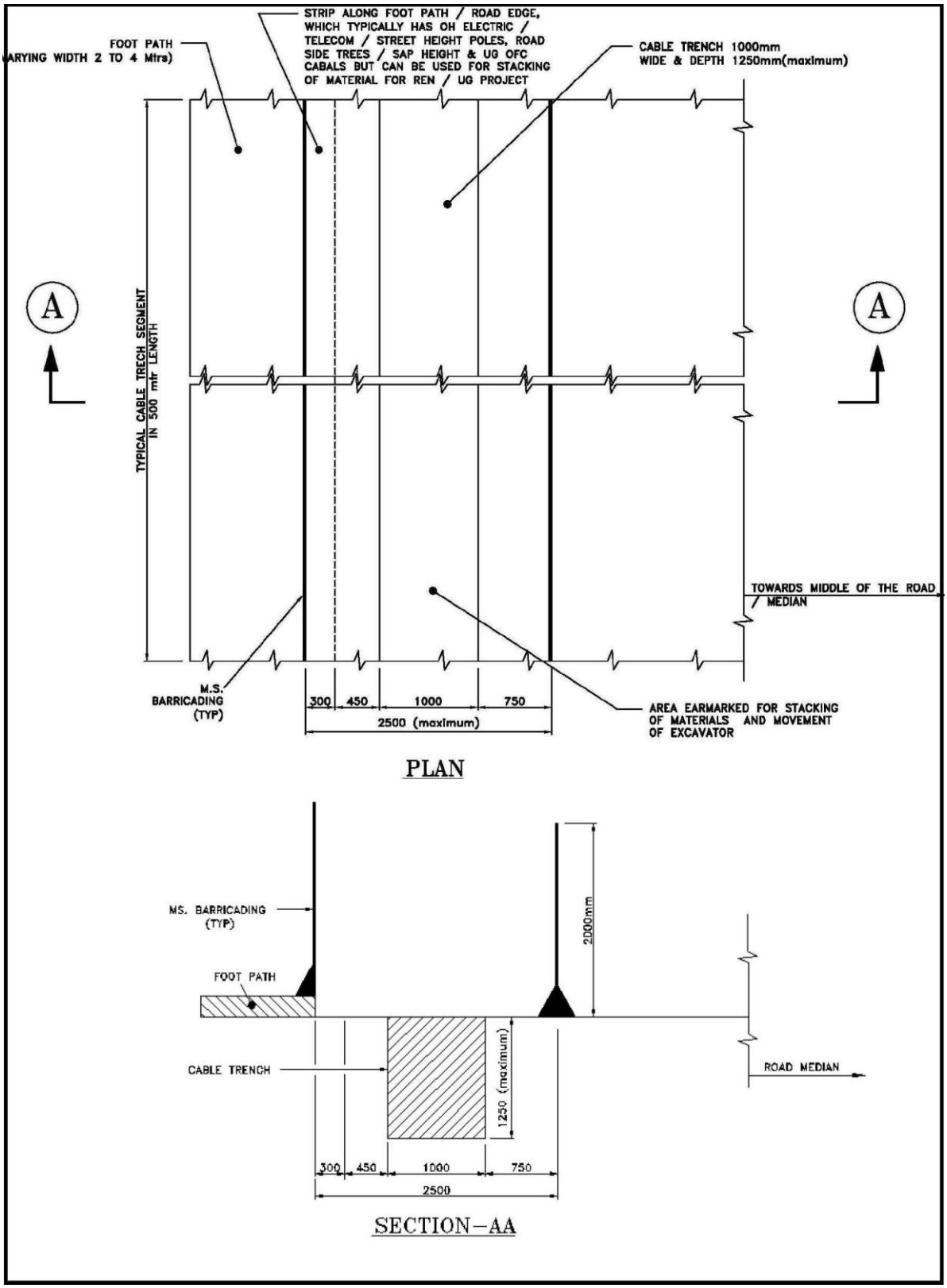

Figure 6.1: Barricaded operational area/corridor of impact for UG cable laying operations

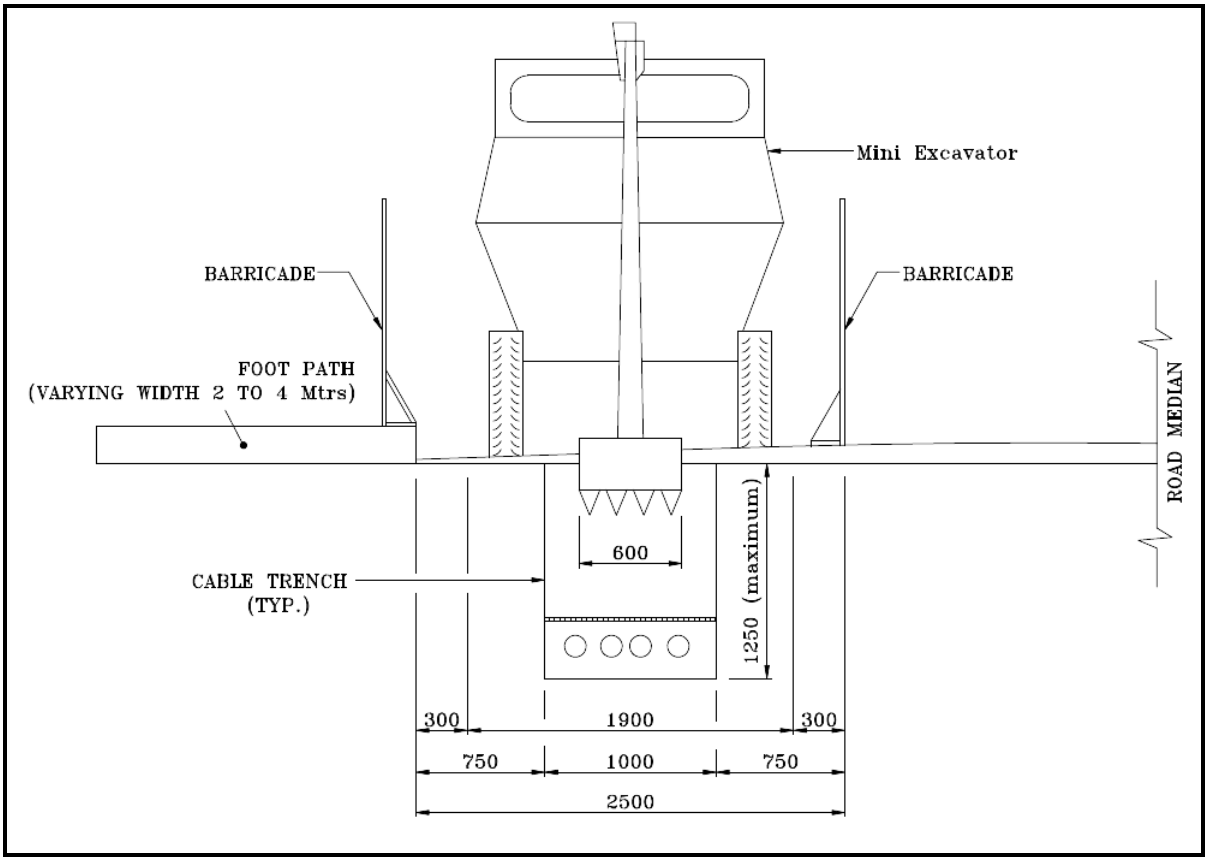

Figure 6.2: Corridor of Impact/ Operational Area for trench Excavation

Alternatively, if corridor of impact/operations area is to be limited to bare minimum, even then, required width will be 1.6 m and in such case trench excavation needs to be carried out through manual excavation. In case manual excavation is adopted, other operations like cable pull out; lowering into trenches will spill out on to roads and outside the barricaded area for limited periods during cable laying, which can lead to traffic disruptions. The manual excavation may be essentially required in narrow roads, where LT cables are required to be laid. Also, manual excavation of cable trenches for the entire UG cabling work will be time consuming and prolong the implementation of project.

6.5 ECONOMIC IMPACTS & BENEFITS OF REN/UG CABLE PROJECT

The economic impacts of recurring natural calamities along coast line of Visakhapatnam and the benefits of REN/UG cable projects are given in sub chapter 2.3 & 2.6 of chapter 2-Project Description

7.1. General

This chapter summarizes public/stakeholder consultations undertaken as part of environmental and social impact assessments of REN/UG cable project within Package 2 area of Visakhapatnam City.

7.2. Stake Holder Consultations

The stake holder consultation meetings were conducted at two stages: one at package area level to involve a broader section of stake holders at package or even beyond at city level and second stage consultations at respective substation areas along the UG cable routes, to involve directly the community, who will be in some way or the other will be affected by the project.

The package level consultations were conducted on 21st October, 2016 wherein local leaders, elected representatives, prominent persons, NGO representatives, concerned govt. department officials from across the city were invited. All the invitees were handed over project brochures both in local language and English at the venue of consultation meeting and prior to the commencement of the consultation meeting.

During the public consultation meeting, a comprehensive power point presentation was made to enable invitees a complete understanding of the project dimensions and its possible implications. Altogether, 116 people, comprising both women and men, constituting elected representatives (member of parliament, member of legislative assembly, present and past municipal corporation council members), local people/residents including women, Residents (Colony) Welfare Association Representatives, Public Representatives, telecom department(BSNL), Traffic Police and officers from APEPDCL among others attended consultation meeting.

The stake holder consultations at respective substation area levels were conducted at 6 locations namely Ramalayam Veedhi (TSR Complex), Sri Yerukamanba Devasthanam Temple (Indoor Dondaparty), Kalabharat Auditorium (CMR Middlapalem), Dobi Colony (Pandurangapuram), Jagdhabba Back Side (Vidyut Sakha) and Sri Ranga Puram (RK Beach) on various dated between April 30, 2015 and May 4, 2016. All the stakeholders attended the consultation meeting were handed over handouts providing information about the project and requirement for laying of underground cables under the project.

The summary of stakeholders' composition at both package and at respective substation area consultations are given in **Table 7.1**.

Table 7.1: Summary of Stakeholders' Composition at Both Package & Substation Area Consultations							
Sl No	**Stake Holder Consultations**	**Total Persons Attended**	**Males**	**Females**	**% Males**	**% Females**	**No. of Locations**
A	**Sub-station area wise Consultations along cable routes**						
1	Ramalayam Veedhi (TSR Complex)	15	9	6	60	40	1
2	Sri Yerukamanba Devasthanam Temple (Indoor Dondaparty)	16	3	13	18	82	1
3	Kalabharat Auditorium (CMR Middlapalem)	14	6	8	42	58	1
4	Dobi Colony (Pandurangapuram)	15	6	9	40	60	1
5	Jagdhabba Back Side (Vidyut Sakha)	15	5	10	33	67	1
6	Sri Ranga Puram (RK Beach)	15	6	9	40	60	1
	Sub Station wise Total	90	35	55	38	62	6
B	**Package Level- Multi Stake Holders**						
1	Vaisakhi Jala Udyanavanam, Suryabagh, Visakhapatnam	**116**	**85**	**31**	**73**	**27**	**1**
Total	**Total Number of Stake Holders at Package and Substation area level**	**206**	**129**	**86**	**55.5**	**44.5**	**7**

7.3. Issues Raised During Stakeholder Consultations

The issues raised by the stakeholders at both package as well as at substation area level were almost similar except for the intensity and depth of awareness of project dimensions and associated issues. The stakeholders at package level were more outspoken, completely aware of the project dimensions and issues associated with project whereas the stakeholders at substation area levels were directly concerned with the likely inconveniences that they are likely to face during project implementation. Thus, two stage stakeholder consultations gave an insight to a wide ranging perception of the community about project.

Table 7.2 presents the most prominent and common issues raised during stakeholder consultations at both levels. The EMP proposed under the REN/UG cable project has considered all relevant issues/concerns that surfaced during stake holder consultations.

The EMP has included adequate cost provision, wherever required to ensure all issues raised during stakeholder consultations are addressed/implemented during project implementation.

Table 7.2: Issues Raised During Public Consultations and its Reply/Redress in EMP		
SL No	**Issues Raised During Public Consultations**	**Reply to Issues Raised/Redress in EMP**
1	Is there any provision for optical fibre cable within the underground cable trenches?	No provision of OFC and /or other communication cables have been included in the REN/UG cable project. This was warranted to minimize down time during restoration of faults in UG cables (in case), avoid multiplicity of required coordination during UG cable routine maintenance, particularly during cable fault repairs, to limit the width of the trench to bare minimum as trenches are along road and most importantly to maintain exclusivity as a safety requirement.
2	Is the future load growth taken into account?	The load flow studies of existing OH system (at present levels) and load condition of year 2022 has been duly carried out. The HT and LT cables used will have XLPE insulation, which can withstand higher loads as well as higher temperature as compared to cables with PVC insulation. Moreover, HT and LT Cables will have two sheaths of PVC sheets (inner and outer), both of which will be FRLS (fire resistant and low smoke), which prevent fire hazards.
3	Is there any equipment for identification of cable faults	Under the REN/UG cable project, cable fault locating instruments will be deployed, which can detect the exact location of the cable fault with less than 1 metre accuracy. Once, the location has been detected, faulty sections will be isolated and cable restoration works will be undertaken with minimum down time through dedicated O & M team.
4	What is the procedure of laying cables in narrow streets and slum areas?	Cable laying in narrow streets and slum areas will be done through manual digging with minimum cable trench width. Even, if this NOT feasible, then cables will be laid over head hung on EXTRA strong overhead poles up to individual customer end, to ensue minimum inconvenience to local people.
5	There should be a Social Expert from Implementation Unit to resolve social issues	Dedicated social officers will be deployed for the entire duration of the project implementation stage to address and resolve all complaints with minimum time frame. UG cable project will also have dedicated Grievance Redressal Mechanism to resolve social issues. Adequate fund provisions have been accordingly made in EMP.

Table 7.2: Issues Raised During Public Consultations and its Reply/Redress in EMP		
SL No	**Issues Raised During Public Consultations**	**Reply to Issues Raised/Redress in EMP**
6	Will there be any effect of UG Cable system on proposed metro rail system?	Metro rails are generally being aligned along the median/centre of the road whereas underground cable under REN/UG project is being aligned along edge of the road. Therefore, there will be any direct conflict of alignments. However, as and when required adequate coordination will be ensured with Metro authorities at all levels for resolution of matter, if any
7	Is there any proposal for concrete duct or cable directly buried in ground?	Cables will be laid in underground trenches with 1 meter wide and maximum depth of 1.25 metre and cables will be laid in layers as per predetermined configuration. Four types of UG cable trenches are considered for 33, 11 and LT cables. No provision for concrete ducts have been considered for laying of UG cables on an all through basis as it is expensive.
8	Whether the UG Cable system has any effect on water supply lines and underground drainage system?	During excavation utmost care will be taken, as a pre-cautionary measure to ensure no public utilities like water supply pipes, sanitary/sewer pipes, telecom, electric cables and any other utilities are disrupted/damaged. In case any such disruption/damage, on-site crew comprising mason, plumber, carpenter/sheet metal fabricator with all required resources will be deployed to restore the damaged utility with least down time. Adequate cost provisions have been included in the EMP to address this concern.
9	Is there any proposal to lay underground cables to individual services?	REN/UG cable project is being implemented to convert all over head 33,11KV and LT cables into underground, to nullify or minimize the damages during natural calamities like HUDHUD. The individual customers will also be connected through underground cables from the distribution transformers points.
10	Is there any detailed survey and blue print prepared in co-ordination with GVMC?	The underground cable route alignments have been prepared on a very detailed GIS based city maps, which shows all existing utilities. Required co-ordination with GVMC has been carried out and same will be maintained throughout the project implementation stage
11	What precautions will be taken to protect other utility services from damage due to laying of UG cables?	During excavation utmost care will be taken, as a pre-cautionary measure to ensure no public utilities like water supply pipes, sanitary/sewer pipes, telecom, electric cables and any other utilities are disrupted/damaged. In case any such disruption/damage, on-site crew comprising mason, plumber, carpenter/sheet metal fabricator with all required resources will be deployed to restore the damaged utility with least down time. Adequate cost

Table 7.2: Issues Raised During Public Consultations and its Reply/Redress in EMP		
SL No	**Issues Raised During Public Consultations**	**Reply to Issues Raised/Redress in EMP**
		provisions have been included in the EMP to address this concern.
12	The corridor of UG Cables shall be marked clearly above the ground level so as to avoid possible accidents while digging by other utilities.	Cable markers will be installed to indicate the location of all underground power cables all along cable route alignment. Also, colour coding of cables are being followed to easily identify the cable type. i.e. different colours for 33KV, 11KV and LT cables are being used. Further, all UG cable trenches are being provided with RCC cable covers and warning tapes, which will help in easy detection of cables during any digging/excavation works.
13	After charging the cable, the faults are to be attended immediately and faulty sections are to be isolated automatically.	Under the REN/UG cable project, cable fault locating instruments will be deployed, which can detect the exact location of the cable fault with less than 1 metre accuracy. Once, the location has been detected, faulty sections will be isolated and cable restoration works will be undertaken with minimum down time through dedicated O & M team.
14	The detailed execution plan shall be shared with traffic police so as to arrange for diversion of traffic.	Traffic diversion plans, wherever required for a specific site/stretch, will be prepared in consultation and/under approval of traffic police well in advance and No work will be undertaken in anticipation of permissions and approvals

Some of the photographs, depicting stake holder consultations at different levels are given here under. The project information brochure provided to all stakeholders at consultation meeting along with list of attendees is given in **Annexure 4**.

PUBLIC CONSULTATION AT SRI YERUKAMAMBA DEVASTHANAM TEMPLE, AKAYYAPALEM ROAD, INDOOR DONDAPARTY SS

PUBLIC CONSULTATION AT KALABHARATI AUDITORIUM ROAD, RATHY MARKET, MADDILAPALEM SS

PUBLIC CONSULTATION AT DOBI COLONY, PANDURANGAPURAM SS

PUBLIC CONSULTATION AT RAJKA STEET, SREE RANGA PURAM, RK BEACH FEEDER

INTERACTION WITH AMBULATORY VENDORS (Bundy owners/vendors)

PUBLIC CONSULTATION AT RAMALAYAM VEEDHI, TSR COMPLEX FEEDER

PUBLIC CONSULTATION AT JAGDHABBA BACK SIDE VIDYUT SAKHA FEEDER

8.1 GENERAL

This chapter summarizes an environmental management plan (EMP), which includes measures for avoiding or mitigating environmental impacts, anticipated during construction, operation and maintenance of the REN/UG cable project in Package 2 area. The chapter also includes the budgetary provisions for implementing the EMP.

8.2 BUDGETARY COSTS FOR EMP IMPLEMENTATION AND SUPERVISION

The implementation of many of the measures included in EMP largely constitutes good construction practices and therefore, there are considered as incidental to works. However, some measures are considered as additional requirement to mitigate or avoid environmental, health and safety concerns during the implementation of REN/UG cable project. Adequate cost provisions have been included for such measures, which are considered as additional requirement whereas measures and these are incidental to work are deem to have been included in the quoted tender/bid price by the contractor.

The budgetary provision for EMP implementation in Package 2 area of REN/UG cable project is estimated to be **INR 490 lakhs,** as given in **Table 8.1.** Break-up of budgetary provisions for EMP is given in **Table 8.2**.

The EMP will be integrated in the contract/bidding documents as **MANDATORY CONTRACTUAL OBLIGATIONS.** Thus, the EPC contractor is expected to be fully conversant with the EMP requirements of REN/UG cable project and accordingly make required provisions for implementing the EMP at the bidding stage itself.

8.3 ENVIRONMENTAL MANAGEMENT PLAN

The Environmental Management Plan includes the measures for avoiding or mitigating environmental impacts during pre-construction, construction and post-construction phases of the project.

The EMP is summarized in **Table 8.3**. The EMP also indicate the role and responsibilities of PIU and EPC contractor for planning and implementation of suggested measures in the EMP.

Table 8.1: Abstract of Budgetary Provision for EMP Implementation for Package 2 Area under REN/UG Cable Project			
S. No.	**Item Particulars**	**Budgetary Provision Rs in Lakhs**	**Remarks/Notes**
A	EMP Measures, considered incidental to works, deem included in quoted bid price	Nil	These measures are to be essentially implemented by contractor and costs deem included in quoted bid price by contractor
B	EMP Measures, considered additional requirement to be implemented by contractor (excludes cost of road restoration, cost of which shall be as per quoted bid price by contractor)	476	Costs are budgetary provisions. Contractor can make his own assessment and accordingly include in bid price. Payment shall be made as per actual by PMC /PIU
C	EMP Implementation Supervision by PMC/PIU	Nil	This shall be the responsibility of PMC under PIU. The cost of EMP Implementation Supervision shall be borne by PMC as per their quoted rates.
D	Total Cost of EMP Implementation and Supervision (Total of A + B +C)	**476**	None
	Add Contingencies @3% of 476 Lakhs	**14**	
	TOTAL COST of EMP IMPLEMENTATION (rounded off) – Rs in Lakhs	**490**	

Table 8.2: Summary Budgetary Provision for EMP & RAP Implementation and Supervision for Package 2 Area under REN/UG Project (This Budgetary provision shall operate in conjunction with EMP Provisions in Table 8.3 of EIA Report as well as EIA Report as a whole)					
S.No.	**Item Particulars**	**Unit**	**Rate (in Rs.)**	**Total Quantity**	**Total Amount (in Lakhs)**
A	**EMP MEASURES, CONSIDERED INCIDENTAL TO WORKS AND DEEM INCLUDED IN THE QUOTED TENDER / BID PRICE BY CONTRACTOR**				**EMP MEASURES, CONSIDERED INCIDENTAL TO WORKS AND DEEM TO BE INCLUDED IN THE QUOTED TENDER / BID PRICE BY CONTRACTOR**
1	Site cleanup and removal of all waste materials/debris lying within each 2.5 metre wide and 500 metre long operational area /cable laying segment				
2	Ensure roadside drain chutes are cleared on both upstream and downstream sides of operational area, prior to commencement of cable laying operations and these drains are to be periodically cleaned throughout the cable laying phase, followed by final cleanup just prior to opening the operational area(s) for traffic. Also, ensure no water logging occurs along barricaded operational area during rainy days/season				
3	Stacking of sand bags in polypropylene (used cement) bags, along inner side of barricades as required, preventing seepage /water logging of cable trenches in wet season/rainy days. In case of excess water logging, trenches shall be emptied using dewatering pump, as may be required				
4	Ensure all tipper trucks are loaded only up to permitted capacities and adequately covered with wetted net cloth, so that en-route dust and spills avoided. Alternatively, water resistant tarpaulins can also be used to cover trucks. In such case, the top surface of loaded material(s) viz. excavated soil or bitumen chunks or debris shall be wetted, prior to covering with tarpaulins				
5	Provision of safe and adequate temporary intermediate access (fabricated MS planks of adequate size, strength and build) across barricaded area for adjacent building occupants as per requirements				
6	Ensure utmost care is taken that no underground utilities are damaged during trench excavation. In case of damage to any utilities like water/sewer/sanitary lines as a consequence of trench excavation works, same is to be restored with least down time through deployment of dedicated on-site crew group comprising mason, plumber, carpenter and sheet metal fabricator stationed at operational areas with all required tools and equipments. The onsite crew shall be provided with mobile van (MUV type) for ease of movement across operational areas within the package. The number of crew group(s) deployed shall commensurate with number of active operational areas so as to ensure no unwarranted/undue delay in restoration of damaged utilities due to inadequate crew group(s). Note: Provision of crew and with mobile van (MUV type) for ease of movement is a paid item as per the quoted price by bidder.				
7	During all excavation operations, regular sprinkling of water with pressurized fine spray shall be carried out to contain/limit dust levels within APPCB norms as may be required				
8	After the completion of underground cable laying works and prior to opening up of operational area for traffic, the site has to be cleaned and all waste materials/ debris are to be removed and disposed at approved locations/sites				
9	All types of excavated materials from operational areas are to be transported either to work camp sites for reuse and /or to approved locations for safe disposal				

Table 8.2: Summary Budgetary Provision for EMP & RAP Implementation and Supervision for Package 2 Area under REN/UG Project (This Budgetary provision shall operate in conjunction with EMP Provisions in Table 8.3 of EIA Report as well as EIA Report as a whole)		
10	All vehicles /equipment deployed at operational areas shall be in good working condition and mandatorily have valid Pollution under control certificates, while being deployed on this project.	
11	Establishing work camp sites for macadam mix plants, hot mix plants and stacking of inventories for cable laying operations and restoring it to previous state, in all respects	
12	No workforce camps shall be set up at any of the operational areas. All work force are to be provided with suitable type of rented accommodation, if required or can return to normal places of residence. Pooled transportation facilities as may be required, shall be provided by contractor	
13	All traffic diversion plans (specific site/stretch wise) wherever required are to be prepared by contractor, shall be prepared in consultation with APEPDCL and requisite approvals from traffic police shall be sought by APEPDCL well in advance (at least 7 days). Approved traffic diversion plans are to be implemented by the contractor during entire duration of cable laying operations, at a specific site/stretch	
14	All road cutting permissions shall be obtained at least 7 days in advance from GVMC and no excavation shall be commenced without requisite permission and approvals and intimation to PIU	
15	All operational areas shall be access controlled with fixed entry and exit points and shall have watch and ward facilities at all times. All workforce shall be provided with identity cards.	
16	After dismantling of overhead infrastructure, the places shall be restored to match with surrounding places viz, when a pole has been dismantled, the pole location shall be restored to match with surrounding place, including filling up the foundation pit of the pole with sand/cement concrete and finishing to match with surrounding surfaces as may be required.	
17	All roads shall be restored to its previous condition and ensure that old and newly laid surfaces match without any uneven surfaces. The road restoration cost is a paid item as per the quoted price by bidder.	
18	First aid facilities and free emergency care shall be provided to all workforce and third party and no cost shall be recovered from them on this account – The contractor shall have CAR policy to cover both Contactor and APEPDCL.	
19	Transit mixers with delivery hoses shall be used for backing filling of trenches with sand, to minimize space requirements at operational areas and avoid double handling of materials	
20	All supervisory staff shall be provided with mobile phones for better communication across all operational areas, in case of emergency or otherwise	

B	ESTIMATED COSTS FOR IMPLEMENTATION OF EMP MEASURES CONSIDERED AS ADDITIONAL REQUIREMENTS TO BE IMPLEMENTED BY CONTRACTOR (EXCLUDES COST OF ROAD RESTORATION USING RECYCLED WMM AND RECLAIMED ASPHALT PAVEMENT, COST OF WHICH SHALL BE AS PER QUOTED BID PRICE BY CONTRACTOR			
	EMP Item Particulars	**Basis of Estimation**	**Units and Cost per unit**	**Total Amount (in lacs)**
1	Fabrication and Erection of MS barricades on both sides of the cable trench alignment	Considering 7 operational areas within the package at any given point of time & 500m length of barricade per operational area, Total length of barricading required (7x500x2 sides)	7,000 metres	**336.00**
		Total no. of barricades required, considering 2.5m long x 2.0m height barricade	7,000/2.5	
		Total no. of barricades	2,800	
		Fabrication Cost of each barricade as specified	Rs 20,000/barricade	
		Total Cost of barricades	20,000x2800	
		Total Cost	Rs 56000000	
		Total cost of barricading for package 2, considering 50% of the cost of charged for package 2 area, balance being residual value + 10% cost for shifting barricades from one to next operational area(rehandling),	**Rs 56000000x0.6**	
2	Provision of LED strip lighting to MS barricades as a safety measure during night hours	Length of Barricading for installing LED Strip lighting (only towards roadside to be provided) per operational area	500m	**8.75**
		Total no. of operational areas permitted at any given time in all 7 substation areas of package 2	7	
		Total length of Barricading for which LED strip lighting to be provided	500x7 = 3500 metre	
		Cost of LED Strip lighting	Rs 250/ metre	
		Total cost of LED Strip lighting	**3500x250**	

B	ESTIMATED COSTS FOR IMPLEMENTATION OF EMP MEASURES CONSIDERED AS ADDITIONAL REQUIREMENTS TO BE IMPLEMENTED BY CONTRACTOR (EXCLUDES COST OF ROAD RESTORATION USING RECYCLED WMM AND RECLAIMED ASPHALT PAVEMENT, COST OF WHICH SHALL BE AS PER QUOTED BID PRICE BY CONTRACTOR			
	EMP Item Particulars	**Basis of Estimation**	**Units and Cost per unit**	**Total Amount (in lacs)**
3	Installation of caution/sign/diversion boards on both upstream and downstream sides of operational area as per requirement of specific stretch	No. of Caution/ Diversion Boards required per 500m operational area/ segment	6	**15.47**
		Total no. of operational areas/segment of 500 metres each, considering 92.15 km of UG cable trench length	92.15x1000 / 500 =184	
		Considering each board can be reused maximum 5 times, Total Boards required	184x6/5 =221	
		Total boards required say	221	
		Average cost of each board as per IRC Specifications	Rs 7000/- Board	
		Total cost of boards(after deducting 10% for salvage value and adding 10% for shifting cost across different sites/operational areas)	**221 X 7000**	
4	Provision of 7 mobile toilets - 4 wet type and 3 dry type(bio-digester) of DRDO approved design and each mobile toilet fitted with 2 seats (1 seat for male and 1 seat for female) with separate entrances), wet type toilets fitted with 1000 litres overhead water storage tank, and all toilets stationed at a suitable place within 100 metres from operational area, with one attendant	Total no. of operational areas/segments at any point in time	7	**38.78**
		Considering 1 mobile toilet/operational area, total mobile toilets required (4 wet type and 3 dry type)	7	
		Cost of one wet type mobile toilet (MS fabricated) 2 seats (1 male& 1 female with separate entry), fitted with 1000 litre overhead tank and 500 litre cap. bottom tank	Rs 300000	
		Total cost of mobile toilets- 4 no.s of wet type	Rs 1200000	

B	ESTIMATED COSTS FOR IMPLEMENTATION OF EMP MEASURES CONSIDERED AS ADDITIONAL REQUIREMENTS TO BE IMPLEMENTED BY CONTRACTOR (EXCLUDES COST OF ROAD RESTORATION USING RECYCLED WMM AND RECLAIMED ASPHALT PAVEMENT, COST OF WHICH SHALL BE AS PER QUOTED BID PRICE BY CONTRACTOR			
	EMP Item Particulars	**Basis of Estimation**	**Units and Cost per unit**	**Total Amount (in lacs)**
		Cost of water @ 150 litre/day for 21 days duration/operational area x 110 operational areas (for 60% wet type toilet) @ Rs. 0.5 /litre	Rs 173250	
		Cost for emptying of bottom tanks through mobile suction machine @ 3 times/21 days/110 operational areas @ Rs 750/emptying operation	Rs 247500	
		Total cost of 3 dry type (bio-digestor) of DRDO approved design with 2 seats(one male and 1 female)@ Rs 4,50,000 per toilet	Rs 1350000	
		Shifting Cost of Mobile toilet from one operational area to another @ Rs 750/shift/184 operational areas	Rs 138000	
		Man day cost of mobile toilet attendants @ Rs 450/day/21/184 operational areas	Rs 1738800	
		Total Cost	Rs 4847550	
		Total cost of deploying mobile toilet at all operational areas after deducting 20% salvage value	**Rs 3878040**	
5	Provision of mobile drinking water counter/kiosk, fabricated from stainless steel with 300 litre capacity, with at least two taps, with bottom tank to collect waste water and stationed at a suitable place within 100 metres from operational area, with one common attendant for	Fabrication cost of one mobile drinking water kiosk made of S.S. with at least two taps, 300 litre water holding capacity & bottom tank (300 litre holding capacity) to collect used water	1,25,000/kiosk	**14.50**
		Total cost of Kiosks for 7 operational areas	Rs 875000	

B	ESTIMATED COSTS FOR IMPLEMENTATION OF EMP MEASURES CONSIDERED AS ADDITIONAL REQUIREMENTS TO BE IMPLEMENTED BY CONTRACTOR (EXCLUDES COST OF ROAD RESTORATION USING RECYCLED WMM AND RECLAIMED ASPHALT PAVEMENT, COST OF WHICH SHALL BE AS PER QUOTED BID PRICE BY CONTRACTOR			
	EMP Item Particulars	**Basis of Estimation**	**Units and Cost per unit**	**Total Amount (in lacs)**
	both Mobile toilet and drinking water kiosk	Cost of Water @ 200 litre/day/kiosk/21 days/operational area/184 operational areas @ Rs 0.5 /litre -	Rs 386400	
		Shifting cost of Kiosk from one operational area to other - 184 operational areas @ Rs 750/shift	Rs 138000	
		Emptying of bottom tanks through sewer suction machine 3 times over 21 days of operational area/184 segment (3x750x184)	Rs 414000	
		Attendant cost is not considered separated. Already included under mobile toilet(common attendant for mobile toilet and drinking water kiosk)	0	
		Total cost of drinking water kiosk at all operational areas	18,13,400	
		Total cost of deploying drinking water kiosk at all operational areas after deducting 20% salvage value	**14,50,720**	
6	Deploying a on-site crew group, comprising mason, plumber, carpenter/sheet metal fabricator at all operational areas, on full time basis , provided with mobile van(MUV type) and all required tools/equipment/materials	Total cost of deploying 3 skilled workers with 3 assistants (Carpenter, mason and metal sheet/fabricator for 18 months at Rs 750 per day for skilled worker and Rs 450 for unskilled worker	1944000	**37.44**
		Total cost of providing one multi utility pick-up van with 6 seats and provision for keeping tools and equipments including driver, fuel and routine vehicle maintenance for 18 months at Rs 1,00,000 per month . Moble pick up van also shall have one operational	18,00,000	

B	ESTIMATED COSTS FOR IMPLEMENTATION OF EMP MEASURES CONSIDERED AS ADDITIONAL REQUIREMENTS TO BE IMPLEMENTED BY CONTRACTOR (EXCLUDES COST OF ROAD RESTORATION USING RECYCLED WMM AND RECLAIMED ASPHALT PAVEMENT, COST OF WHICH SHALL BE AS PER QUOTED BID PRICE BY CONTRACTOR			
	EMP Item Particulars	**Basis of Estimation**	**Units and Cost per unit**	**Total Amount (in lacs)**
		mobile number		
		Total cost of deployment of on-site crew for restoring damaged utilities and provided with mobile van excluding cost of damaged materials (only labour cost)	37,44,000	
7	Provision of traffic wardens along operational areas, near to junctions/intersections	No. of Persons/location/8 hour shift	2	**25.20**
		Duration	3 weeks x 7 days	
		No. of Locations	100	
		Total Mandays	4200 mandays	
		Cost	Rs 600/manday	
		Total cost	Rs 2520000	
	TOTAL COST OF EMP IMPLEMENTATION (Total of B)			**476**
			Add Contingencies @3%	**14**
			TOTAL COST OF IMPLEMENTATION (Total of B) in Lakhs	**490**

Table 8.3: Environmental Management Plan (EMP) for Package 2 of REN/UG Cable Project, Visakhapatnam (This shall be read and operated in conjunction with EIA Report and the budgetary cost provisions made for EMP implementation by Contractor under supervision of PIU-EHS)				
Sl. No.	**Project Stage/Activity**	**Environmental Management Measures**	**Responsibility**	
			Planning and Execution	**Supervision/Monitoring**
PRE-CONSTRUCTION STAGE- REGULATORY REQUIREMENTS PRIOR TO TENDER AWARD				
1	Package 2 area	Obtain if any clearance or permission is required.	Team Leader/ Environment and Social Safeguards Specialist, PIU-EHS PIU	Team Leader/ Environment and Social Safeguards Specialist, PIU-EHS PIU
CONSTRUCTION STAGE				
1	Orientation for EPC Contractor	• Conduct briefing and/or orientation for EPC Contractor on the extent of the areas covered under package 2 of REN/UG Cable Project, regulatory compliance requirements, EIA/EMP provisions and requirements under the project, grievance redress mechanism for both social and environmental issues, public safety aspects at work place and reporting requirements under the project. The orientation shall also include ➢ requirement of mandatory induction training requirements by Contractor for workforce, at all levels (including induction training and/or orientation for new entrants and/or different disciplines throughout construction phase) covering the EIA and EMP requirements of the REN/UG Project ➢ To record and maintain safety at workplace & fatalities of all types, particulars of public utilities damaged/restored, grievances received/resolved and any other matter of relevance to EMP, provisions under the project ➢ Contractor shall designate a dedicated senior level functionary to function as EPC-EHS	Team Leader/ Environment and Social Safeguards Specialist, PIU-EHS PIU	Environmental Officer and Safety Officer and field level PIU-EHS officers under the overall guidance of Team Leader, PIU-EHS

Table 8.3: Environmental Management Plan (EMP) for Package 2 of REN/UG Cable Project, Visakhapatnam (This shall be read and operated in conjunction with EIA Report and the budgetary cost provisions made for EMP implementation by Contractor under supervision of PIU-EHS)				
Sl. No.	**Project Stage/Activity**	**Environmental Management Measures**	**Responsibility**	
			Planning and Execution	**Supervision/Monitoring**
		officer and EPC-Social Officer, who shall solely be responsible for implementation of all EMP and RAP provisions in close co-ordination/consultation with PIU-EHS. The EPC-EHS shall also be responsible in resolving all complaints/grievances with respect to disruption of utilities from affected building owners and/or local people or any related matter in a time bound manner as stipulated in the GRM. The GRM is provided in EIA report. ➢ Briefing shall include strict compliance against child labour, bonded or forced labour, minimum wages and awareness about sexually-transmitted disease such as HIV/AIDS to prevent potential incidence. ➢ Contractor shall be clearly made aware of the EMP measures, considered incidental to works and deem to be included in the quoted tender/bid price by contractor and EMP measures, which are considered as additional requirement, for which cost provisions have been included. Accordingly, contractor shall be encouraged to implement the provisions and achieve the expected outcome. These are given as part of the EMP cost estimates and Annexed to this EMP.		
2	Regulatory Compliances by Contractor	• Consent to Establish and Consent to Operate (CTE & CTO) shall be obtained, for work camp sites established for macadam mix plants and hot bitumen mix plants under the project. All consent conditions stipulated by APPCB are to be compiled • No work camp sites for macadam or bitumen hot mix plants are to be set up or operated by contractor prior to obtaining the CTE and CTO from APPCB.	EPC-EHS and and field level PIU-EHS officers	Environmental Officer and Safety Officer and field level PIU-EHS officers under the overall guidance of Team Leader, PIU-EHS
3	Establishing work camp sites	• PIU in consultation and requisite approvals from GVMC shall identify suitable lands, which can be used as material stock yards and work camp sites for establishing	EPC-EHS	Environmental Officer and

Table 8.3: Environmental Management Plan (EMP) for Package 2 of REN/UG Cable Project, Visakhapatnam (This shall be read and operated in conjunction with EIA Report and the budgetary cost provisions made for EMP implementation by Contractor under supervision of PIU-EHS)				
Sl. No.	**Project Stage/Activity**	**Environmental Management Measures**	**Responsibility**	
			Planning and Execution	**Supervision/Monitoring**
	and material stacking yards	macadam mix plants, hot mix plants and storage of construction materials by the EPC contractor during construction phase • Under no circumstances, contractor shall use the cable laying route alignments as an interim stack yard for materials of any kind /type even for limited durations of less than a day • Essentially, barren lands or uncultivable lands and those away from human settlements shall be the given selected for establishing work camp sites • The selected land shall not warrant significant change in land forms or terrain, to make it suitable for establishing work camp sites • In case, land had been earlier used for establishing work camp site and meets the above requirements, same shall be given preference • Requisite consent for establishing(CFE) and consent for operate(CTO) shall be obtained from Andhra Pradesh Pollution Control Board • The ambient air and noise levels within the work camps sites shall be monitored, once in month and corrective measures if any required shall be taken in order be complaint with National Ambient Air Quality and Noise Standards • All stipulated consent conditions by APPCB shall be strictly adhered and complied by contractor • The work camp sites shall be access controlled with fixed entry and exit points • The dust levels at the work camps sites is to be controlled through regular sprinkling of water through similar mobile tankers deployed at operational areas for cable laying • Bitumen mix plants, deployed for REN/UG cable project shall conform to regulatory norms/requirements • The site shall be cleared from all remnants of construction and debris and site restored to	and and field level PIU-EHS officers	Safety Officer and field level PIU-EHS officers under the overall guidance of Team Leader, PIU-EHS

Table 8.3: Environmental Management Plan (EMP) for Package 2 of REN/UG Cable Project, Visakhapatnam (This shall be read and operated in conjunction with EIA Report and the budgetary cost provisions made for EMP implementation by Contractor under supervision of PIU-EHS)				
Sl. No.	**Project Stage/Activity**	**Environmental Management Measures**	**Responsibility**	
			Planning and Execution	**Supervision/Monitoring**
		its previous state, after completion of REN/UG cable project • Surplus soil available from excavation of cable trenches (sub-base and base layers) can be used to grade the site, as well as to restore the site after works completion, if required		
4	Site Clearance and preparation	• Cable route, cable trench of 1.0 metre width as well as 2.5 metre wide operational area is to be demarcated on ground with yellow paint (7.5 cm wide minimum). The location of inspection chambers (size 2.0x2.5x2.0 metres deep or as per requirement) at every 250 metres interval along cable route, also to be marked on ground with yellow paint • While, demarcating the cable route and cable trench, shall mandatorily avoid removal /shifting of any of over ground road side infrastructure like poles (all types and sizes) and trees (all types and sizes), with exception of ramps, steps which are extending onto road. • Ensure, centreline of 1.0 metre wide cable trench coincide with centreline of 2.5 metre wide operational area, with 750mm wide working space availability on both sides of cable trench (Refer Figure 4.1 of EIA report). • The cable routes and strip plans for entire package 2 area is provided in Volume I - Environmental Screening Report. The cable route plans are also provided in bid/contract documents of REN/UG cable project • In case, cable routes are along commercial and busy roads, requisite approvals from traffic police shall be obtained at least 7 days in advance prior to start of site clearance operations in such stretches. The strip plans provided in Volume I can be used in planning of any traffic diversions, if required and /or for seeking approvals from traffic police. • The environmental screening has identified 191 sensitive receptors along 92.15 km of roads in which cable routes are aligned, the receptors include like hospitals, schools/educational institutions/ function halls etc along cable routes in all seven substation areas (Ref Volume I Environmental Screening Report for locations of all such receptors).	EPC-EHS and and field level PIU-EHS officers	Environmental Officer and Safety Officer and field level PIU-EHS officers under the overall guidance of Team Leader, PIU-EHS

Table 8.3: Environmental Management Plan (EMP) for Package 2 of REN/UG Cable Project, Visakhapatnam (This shall be read and operated in conjunction with EIA Report and the budgetary cost provisions made for EMP implementation by Contractor under supervision of PIU-EHS)				
Sl. No.	**Project Stage/Activity**	**Environmental Management Measures**	**Responsibility**	
			Planning and Execution	**Supervision/Monitoring**
		• Details of Information about cable laying operations, scheduled work completion time in such specific stretches shall be shared with all such institutions/occupants of buildings at least 7 days in advance, prior to commencement of works. Their requirements with respect to access or traffic diversions or any other concerns shall be considered in operations planning and scheduling of work and adhered to without any lapses on any account • The occupants of other buildings/establishments along operational areas to be barricaded shall be informed 7 days in advance about cable laying operations, scheduled work completion time, restriction in access for limited time and their specific requirements, if any with respect to temporary access and arrangements shall be discussed and finalised prior to barricading and commencement of trench excavation • Prior to commencement of excavation works, carry out minor repairs to foot paths (including making good all uneven surfaces along 500 metre cable route segment) adjacent to barricaded area (wherever applicable) to ensure pedestrian safety as a result of reduced walkway due to barricading on the road side. • All operations shall be restricted to only day hours in residential areas. Only in case of commercial areas, which are most unlikely to disturb residential pockets, the operations, can be carried out at night hours with adequate floodlit arrangements and ensure operations are not a hazard to night traffic • At any given point of time, only 500 metre length operational area shall be opened up for cable laying operations at a particular location and a maximum one such operational areas per substation zone. Prior to moving on to next 500 metre segment, all works in the previous segment shall be completed in all respects including road restoration (excluding bituminous layers) and worksite shall be completely cleared, prior to opening to traffic. The laying of the bituminous layer is to be subsequently taken up immediately after the natural compaction, expected to take place within 3-4 weeks or as determined based on site conditions.		

Table 8.3: Environmental Management Plan (EMP) for Package 2 of REN/UG Cable Project, Visakhapatnam (This shall be read and operated in conjunction with EIA Report and the budgetary cost provisions made for EMP implementation by Contractor under supervision of PIU-EHS)				
Sl. No.	**Project Stage/Activity**	**Environmental Management Measures**	**Responsibility**	
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		• Prior to commencement of excavation operations, permission for road cutting from GVMC and approvals from traffic police, wherever required shall be obtained in advance. The telecom department shall be informed about the cable laying operations. • Once required permissions from GVMC and traffic police are in place, barricade(s) shall be placed on either side of the 2.5 metre demarcated operational area. A suggested typical design for barricade, which is suitable for city a road, is given in Figure 5.1 of EIA report. The barricade will not only help to significantly to contain and limits the impacts of cable laying to the operational area itself but will also act as a noise barrier. • Sand/earth filled polypropylene bags (used cement bags) are to be placed along inner side of both barricades, to prevent seepage and water logging of cable trenches during rainy days. Seepage and water logging will not only prolong cable laying operations but will also prolong inconvenience to public and vehicular traffic as a result of barricaded operational area for extended period • The barricades shall be provided with energy efficient LED strip lighting system (on only roadside) as a hazard safety for traffic moving at nights and late nights. The LED lighting system shall be switched on between sunset and sunrise hours mandatorily, for the entire duration of cable laying operations in any segment. • All work force deployed for cable laying operations shall be mandatorily provided induction training, which shall include awareness about the safety practices at work places, safe distances to be maintained around moving equipment like excavators etc, health and safety issues with particular emphasis on public safety and on-site sanitation practices at worksite during cable laying operations. • Every 500 metre segmental operations area shall be stationed with one mobile water tanker of 6000 litres capacity to meet all operational area water requirements. The water tanker shall be fitted with arrangements for a pressurized fine spray and a hose reel of 600 metre length. Typically, water shall be used for dust suppression during site preparation, excavation, consolidation of backfilling layers and wetting of net cloth covered		

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		over tipper trucks, prior to their dispatch from operations site and site clean up after completion of cable laying • All workforce deployed at site irrespective of level, shall mandatorily wear personnel protective equipment (PPE) like safety helmets, face masks, ear plugs, protective gear with reflective jackets and safety shoes. • Use of well-maintained and less than 5-year old earth excavators/moving equipment shall be ensured to limit the noise levels to a large extent. • At some locations like busy roads with commercial complexes and particularly near or ahead of junctions, location specific traffic diversion plans are to be planned and implemented to ensure smooth passage of traffic and avoid congestion. Same may be finalised in consultation/approval of traffic police, well in advance of at least 7 days. • Diversion notice boards, or caution notice boards for both pedestrian as well as vehicular traffic at all appropriate required locations, both on upstream and downstream both sides of the barricaded area shall be installed, so that approaching traffic can move with caution. All boards shall be as per code of practice for road signs IRC: 67-2012 • Trained traffic wardens with reflective hand held batons and jackets, helmets and safety shoes are to be deployed at places, wherever barricaded operation areas are near to road junctions/intersections in order to ensure smooth movement of traffic. • One crew group comprising mason, plumber and carpenter/sheet metal fabricator (with required labour assistants) shall be assigned with two 500 metre long segment operation areas within same substation areas to rectify the damages to underground utilities like water supply pipelines, sewer lines, drainage and/or sanitary connections or provide temporary access during excavation. The crew shall be provided with all resources by contractor to restore damaged utilities with least down time. The same crew group shall be deployed to restore the damaged steps, ramps during trench excavation works to ensure proper drainage alongside barricaded operational area during and after rains.		

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		• Every 500 metre segment operation area shall be stationed with one mobile toilet and parked at a suitable place within a maximum distance of 100 metres from the operational area. The mobile toilet shall have at least 1000 litres capacity overhead water tank and replenished regularly. The toilet shall be well maintained and in usable condition at all times. The bottom tanks shall be emptied on a regular basis. • The workforce shall be instructed to use the mobile toilets, specially provided under the project and not to use any other public/open places or public toilets • Every 500 metre operational area shall be stationed with one drinking water kiosk with minimum 300 litres capacity, replenished regularly. The kiosk shall be placed at a suitable place within 100 metres from operational area • The Operational area shall display/maintain list of nearby hospitals for attending to any injury/ fatalities either to workforce and/or to public as a result of cable laying activities. The site shall also have a first aid kit and field level supervisory staff shall have undergone first aid training/orientation. • Since the work is being carried out along roads in commercial as well as residential areas, utmost attention shall be exercised to swiftly complete all operations including cable trench backfilling, prior to opening up the barricaded area for public use with shortest possible time.		
5	Excavation of Cable Trenches (Asphalt/Bitumen Layers)	• Excavation of pavement (asphalt) layers, shall preferably carried out through cold milling machines, suited for operations within 2.5m wide operational areas, since these machines leave a clean road cut edge, which is an essential requirement for the subsequent road restoration stage. Cold milling machines, which can do the milling operations within limited widths between 1 to 1.5 m and pavement thickness up to 330 mm are available in India either for outright purchase or on hire basis. • Alternatively, pavement (asphalt) can be cut using specially designed accessory for road cut (pavement breaker) fitted onto the mini excavators or even with the back hoe of the	EPC-EHS and and field level PIU-EHS officers	Environmental Officer and Safety Officer and field level PIU-EHS officers under the overall guidance of Team Leader,

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		excavators itself. • All pavement cut materials are to be transported to work camp sites for milling and processing through CPCR (central plant cold recycling) method for redeployment as reclaimed asphalt pavement during road restoration works, if decided to be reused. • The base and sub base materials are to be excavated through compact mini excavators to the extent possible. Mini excavators, which can excavate trenches within 2.5 m wide barricaded operational area are commercially available viz Bobcat 450, Vectra 175, JCB Robot 135 Skid steers with trencher and backhoe attachments/accessories • Deploying mini excavators will enable to carry out all excavation operations within barricaded operational area and thus avoid disruptions/diversion to both pedestrian and vehicular traffic. • Mechanical excavations are to be essentiality supplemented by manual excavation at some stretches in order to manoeuvre minor obstacles within the barricaded operational area like kerb/road side small trees/saplings, telephone/electric poles, which will otherwise require shifting or removal for movement of excavators, if mechanical means of excavation is to be adhered all through the alignment. • The excavated material from sub base and base layers is to be tested and if found to be useful for reusing as wet mixed macadam (WMM), then it needs to be transported to a central WMM mix plant, to make it suitable for reuse as WMM as per required gradation requirements in accordance with IRC guidelines or MoRTH(Ministry of Road Transport and Highways). • The excavated material (base and sub base layers) is almost akin to natural soil, can be beneficially used in embankment construction or filling low lying areas and/ or can be sourced to other area development projects, commanding commercial value. Therefore, options for deploying these excavated material, to the extent of nearly 61314 cu.m needs to be explored.		PIU-EHS

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		• Another possible option is transportation of surplus excavated material to GVMC's disposal locations, which require large quantities of construction debris/soil either for closure of existing dumpsites at Kaupaluppda or construction of approach road and other infrastructure at the two other locations at Tangudublli/Giddijala, where GVMC is developing new waste disposal sites. During EIA studies, GVMC has confirmed such requirements. In any case, GVMC shall have to establish facility to receive and process the waste, as per the recently notified Construction and Demolition Waste Management Rules, 2016 either directly or through an operator. • The tipper trucks, which carry the pavement cut materials or the sub base and base materials, are to be covered with net cloth and wetted by water sprinkling by pressurized system prior to dispatch at all times. Alternatively, top surface of the loaded material can also be wetted through water sprinkling and covered with water proof tarpaulins to avoid enroute spills and dust. All tipper trucks shall be mandatorily loaded only up to designated capacities. • The excavation at some specific locations along operational area may warrant partial removal of unauthorized ramps/steps along cable routes. At all such locations, temporary access across barricaded area are to be provided as an interim measure to avoid/minimize inconvenience to occupants of the buildings along REN/UG cable route corridor. • During excavation utmost care shall be taken to ensure no public utilities like water supply pipes, sanitary/sewer pipes, telecom, electric cables and any other utilities are disrupted /damaged. In case any such disruption/damage, contractor shall immediately deploy the EMP provisioned on-site crew comprising mason, plumber, carpenter/sheet metal fabricator with all required resources to restore the damaged utility with least down time • Except for damaged public utilities, EMP includes cost provision for restoration/replacement of all such ramps/steps/other structures, damaged due to cable trenching operations. All payments shall be made as per actual measures at site and		

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		approval of PIU-EHS • All work force involved in excavation operations are to be sensitised to keep safe distances from moving equipment and provided with PPEs like safety helmets, safety shoes, face masks, ear plugs, and protective gear with reflective jackets mandatorily. All personnel exposed to noise levels for prolonged duration will be provided with one additional break in pre and post lunch session breaks, so as to limit their exposures. • In order to suppress dust levels during trench excavation, periodical sprinkling of water through tankers fitted with pressurized fine spray has to be carried out, through mobile water tankers fitted with pressurized spray system with hose reel. • Any grievance related to disruption of services/utilities/damaged structures due to REN/UG project be attended and resolved with least downtime as per GRM and records shall be maintained		
6	Cable Pullout and Laying	• Prior to cable pullout, the excavated cable trenches are to be checked for any cavities on sides and same are to be filled up with rich cement concrete, to avoid entry of any rodents into trench at a later date. • Also, cable trenches are to be properly graded to ensure an even surface all through and devoid of any sharp objects/metal pieces/protruding stores at trench bottom/sides, to rule out damages to cables, while laying or at a later date. • Once the trench excavation is completed to required dimensions, cables (as per required sizes and configuration) need to be pulled out from cable coils through mini excavators used for trench excavation fitted with required additional accessories. • To the extent possible, cable pull out and lowering operations shall be limited to barricaded operational area and manual operations are avoided • During cable pull out and lowering operations, the work site shall have water proof transparent tarpaulins to cover cable trenches to prevent seepage or water logging of	EPC-EHS and and field level PIU-EHS officers	Environmental Officer and Safety Officer and field level PIU-EHS officers under the overall guidance of Team Leader, PIU-EHS

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		trenches due to rains (seasonal or unseasonal), as a contingency measure. Any slippages on this account will not only delay cable laying operations, but as a consequence will further prolong the work completion time, thereby inconvenience to both public and vehicular movement gets extended. • The transparent tarpaulins can be hung across 2.5 metre wide barricaded operational area (in small lengths), which will facilitate work even during rainy/cloudy days. • The work sites during cable lowering and backfilling shall be completely access controlled to prevent theft and vandalisation of cables. The barricaded operational areas are to be mandatorily access controlled and barred for entry by un-authorized persons from public safety point of view as well. • The cable pull out, lowering operations can pose safety concerns and therefore all work force deployed in operations are to be properly trained to keep safe distances and provided with all required PPEs like safety helmets, face masks, ear plugs, protective gear with reflective jackets and safety shoes mandatorily • All cables in the lower tier (11 and 33KV cables in Trench Type 1 and 2) shall be drawn through cable conduits (of any suitable type and material); having a minimum of 40% extra space and conduit ends are embedded in the walls of the inspection chambers on either side. This will facilitate attending to cable fault at places other than joints, without resorting to opening up entire cable stretch and gain easy access to cables in lower tier. • In case of any faults in such lower tier cables, which are in conduits, cables can be pulled out for repairs outside and pushed back into conduits and joints can be redone at both ends, all of which require least effort.		
7	Trench Backfilling Operations with Sand and other	• In order to avoid on-site space requirements and pace up sand filling operations, sand back filling is to be carried out using transit mixers, normally used to transport and pour ready mix concrete. • Use of transit mixers fitted with flexible hoses for delivery of fine sand directly into cable	EPC-EHS and and field level PIU-	Environmental Officer and Safety Officer and field level

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	back filling layers as required	trenches will enable to swiftly complete a uniform sand back filling operations and with minimal manual labour • The marginal increase in dust levels due to fine sand can be limited through use of pressurized fine spray of water. All work sites will be stationed with one water tanker (6000 litres cap.) fitted with arrangements for pressurized fine spray with 600 metres of hose reel. • In order to limit off-site impacts, fine sand is to be mandatorily sourced from sand mining operators, licensed and approved by the Department of Mines, Government of Andhra Pradesh. A copy of the license for sand mining has to be submitted to PIU-EHS, prior to procurement. • The sand backfilling operation, brought to site in tipper trucks is normally carried out through manual means; which is time consuming and will involve double handling of materials at site with additional space requirement and therefore shall be avoided, the extent possible. • Backfilling operations, particularly WMM shall be carried out in layers not exceeding 15 cm along with required level of consolidation and compaction at optimum moisture content to achieve maximum density • Proper compaction at optimum moisture content(OMC) will enable a firm base and sub base and prevents cracking of upper bitumen pavement layers and increase life and smooth riding surface, benefitting road users • Mechanical compactors with vibratory rollers (width of sub 1 metre) are available, which can work effectively for trench backfilling operations shall be deployed for better results. Models like ATLAS COPICO LP 6500 Double drum Rollers are best suited for compacting trenches with limited width such as in present case	EHS officers	PIU-EHS officers under the overall guidance of Team Leader, PIU-EHS

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8	Construction of Inspection of Chambers	• Location of inspection chambers are to be pre-determined during on-site marking of cable route itself during site preparation activity itself and demarcated on road with yellow paint (7.5 cm wide strips) • Location of inspection chambers shall not foul with any other underground utilities, sewer manholes and/or chambers of telecom department and shall be at least 3 m away from any other similar appurtenants. Accordingly, location of inspection chambers can be marginally adjusted to avoid fouling with other pre-existing utilities • Construction of inspection chambers is to be commenced, concurrently with cable in (500 metre segment) laying operations, so as to complete both inspection chamber and cable laying works in the estimated 21 days. This will avoid lag in cable laying and construction of inspection chambers and cable jointing works as well. Moreover, this will also facilitate complete road restoration in one go and opening up of fully restored road to public in all respects. • The top level of inspection chamber is to be finished to be at least 40mm below the existing road level, so that 40mm thick bituminous concrete as part of road restoration can be laid over inspection chamber as well (excluding manhole cover), so that only the manhole cover is visible after road restoration is completed • Under no circumstances, top level of inspection chamber shall be finished above the existing road level and thus pose hazard to pedestrian as well as vehicular traffic, after cable laying operations. • Inspection chambers shall be provided with one 560mm extra duty manhole cover to withstand heavy traffic and shall avoid ingress of water into inspection chamber during rains • M25 grade ready mix concrete for inspection chambers shall be sourced from ready mix concrete plants having valid consents and authorization of APPCB	EPC-EHS and and field level PIU-EHS officers	Environmental Officer and Safety Officer and field level PIU-EHS officers under the overall guidance of Team Leader, PIU-EHS

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9	Cable Jointing at Inspection Chambers	• All cable jointing works are to be carried out as per recommended procedures/specifications by the manufacturer with genuine cable jointing materials • All cable jointing works are to be carried out in dry conditions and during clear days, with no possibility of rains. In case of unseasonal rains, water proof tarpaulins shall be used to cover the work site at inspection chamber. • No cable jointing work is to be carried out during rains or under wet conditions. The inspection chamber shall be in dry condition, before cable jointing work is resumed • The cable joints within the inspection chamber shall be supported on steel portals on either side of the cable trench, so that the no cable or joint within the chamber remain in hanging position for more than 0.45m at a stretch. • The inspection chamber frame and manhole cover shall fit together well and further joints are sealed with water proof cement mortar (1 cement: 4 cement fine sand) to avoid ingress of water into inspection chambers during rains and/or storm water blockages on the road at a later stage	EPC-EHS and and field level PIU-EHS officers	Environmental Officer and Safety Officer and field level PIU-EHS officers under the overall guidance of Team Leader, PIU-EHS
10	Road Restoration and clean up operations	• Road restoration, particularly bituminous layers shall be taken up only after 3-4 weeks of cable trench backfilling to allow for natural compaction or as determined based on site conditions. • Road restoration with new materials or with recycled WMM and reclaimed asphalt pavement, as the case may be will involve laying of four layers namely; sand, fresh/new or recycled wet mixed macadam, cold new or recycled asphalt mix and final layer with hot new or recycled bituminous concrete as per details given in Table 5.9 of EIA report. • The laying of sand during road is to be carried out using transit mixers, fitted with flexible hoses for delivery of fine sand directly into cable trenches. This will enable to swiftly complete a uniform sand back filling operations and with minimal manual labour. In order to limit off-site impacts, sand is to be mandatorily sourced from sand mining operators,	EPC-EHS and and field level PIU-EHS officers	Environmental Officer and Safety Officer and field level PIU-EHS officers under the overall guidance of Team Leader, PIU-EHS

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		licensed and approved by the Department of Mines, Government of Andhra Pradesh. • The increase in dust levels due to fine sand can be contained through use of pressurized fine spray of water. All work sites will be stationed with one water tanker (6000 litres cap.) fitted with arrangements for pressurized fine spray with 600 metres of hose reel. • The recycled WMM, from the central plant, also is to be transported to operational area in rotating transit mixers fitted with flexible hoses for delivery directly into cable trenches. The WMM shall be laid in two layers and compacted with suitable vibratory rollers to achieve desired compaction levels under optimum moisture conditions. • The asphalt pavement and hot bituminous concrete mix shall also brought to site in tipper trucks in un-segregated form and laid in place using customized pavers suitable for cable trench widths • The laying of sand, wet mix macadam and asphalt pavement will not cause significant on-site impacts except for increase in dust and noise levels, limited to 2-3 days for all cable trench backfilling (excluding bituminous layers) operations put together. • The noise levels during this operation shall be controlled through deployment of well-maintained vehicles and equipment and conducting operations in a regulated and planned manner • The traffic is to be regulated during the road restoration operations, in order to ensure smooth traffic movement and avoid congestion as a consequence of road restoration works • In case of restoration of concrete roads, ready mix concrete shall be used, brought to the site through transit mixer(s) from a ready mix plant (RMC) located elsewhere. However, concrete will be sourced only from RMC plants having valid consents and permission or authorization of APPCB.Such commercially operating ready mix concrete plants are available in Visakhapatnam.		

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		• Care shall be taken during the road restoration works so as not to leave out any areas unpaved within the operational area and bordering the operational areas. • Also, care shall be taken to match the levels of old and newly restored surfaces, so as to have an even surface after restoration • All damaged ramps, steps and other structures, within operational area are to be restored to its previous state per requirements and in consultation with respective building owners, • The operational area is to be thoroughly cleaned for all debris, either un-unusable materials or all unwanted materials are to be collected and disposed in approved locations by GVMC located at Kapulauppada, Tangudubbipalli/Giddijala, between 25-40 km north of Visakhapatnam. • All drainage outlets into storm drains along barricaded area are to be checked for blockages, if any and cleared. • The barricaded area shall be opened up only after ensuring these measures and site cleanup, prior to moving on to next 500 metre cable route segment.		
11	Construction vehicles, equipment and machinery	• All vehicles, equipment, and machinery deployed for cable laying operations shall be in good condition, maintained and preferably not less than 5 years old. • The EPC Contractor shall ensure that all vehicles, equipment and machinery used for construction are regularly maintained and meet emission limits set by APPCB and Motor Vehicles Acts & Rules. • The Contractor shall keep a record of the PUC certificates for all vehicles/equipment/machinery used for the Project and will be made available to PIU-EHS	EPC-EHS and and field level PIU-EHS officers	Environmental Officer and Safety Officer and field level PIU-EHS officers under the overall guidance of Team Leader, PIU-EHS
12	Water	• Water requirements of project are to be met from only existing tube wells, with the approval	EPC-EHS	Environmental

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	requirement of project	of PIU-EHS • Visakhapatnam falls under safe category and therefore sourcing of ground water shall not pose any restrictions to REN/UG Project. • Surface water bodies SHALL NOT be chosen for sourcing or meeting requirements of the REN/UG project.	and and field level PIU-EHS officers	Officer and Safety Officer and field level PIU-EHS officers under the overall guidance of Team Leader, PIU-EHS
13	Workforce for cable laying operations stockyards	• All work force shall be subjected to an orientation program, which familiarize them with work requirements, safety practices at work, safe distances to keep from earth moving equipment, first aid facilities, emergency response, on-site sanitation facilities and practices to be adopted, rights and privileges of workforce among others. Orientation shall also include concern for safety of public around operational areas as well • All work force deployed in operational areas shall be provided with PPEs like safety helmets, face masks, gloves, protective gear with reflective jackets and safety shoes. It shall be mandatory to wear them at work site. The PPEs shall be provided at no cost to workforce and shall be replaced once in six months. Any lost PPEs shall be provided at subsidized rates • Visitors/officials to worksite are to be provided with PPEs (hard hats and safety boots & safety jackets) and shall be briefed ongoing operations on that specific time and related safety requirement at work site including safe distances to keep, while at site visit • Work force shall be subjected only to standard work shifts/hours. Overtime allowances shall be paid with ceiling limits. Working beyond such ceiling limits shall be discouraged,	EPC-EHS and and field level PIU-EHS officers	Environmental Officer and Safety Officer and field level PIU-EHS officers under the overall guidance of Team Leader, PIU-EHS

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		even if, so desired workforce or contractor • All workforce deployed shall be governed by Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996, with regards to safety and welfare measures (including equal wages for men and women) for workers employed at building and other construction sites • One mobile toilet of 2 seater capacity (1 men and 1 women with separate entrances) shall be stationed at a suitable place within 100 metres from each operational area of 500 m long segment. The mobile toilet shall have at least 1000 litres overhead water storage, well maintained and in usable condition at all times. Bottom tanks shall be regularly cleaned and overhead tank replenished as per requirement. Work force shall be oriented to use mobile toilets and avoid using public toilets and/or nearby open places/parks • Every operational area shall be provided with one mobile drinking water kiosk having a storage of 300 litres and placed at a suitable place within 100 metres from work site • The operational work site shall have first aid kits and details of major/nearby hospitals displayed prominently in local language, in case of emergency and/fatalities to work force and/or public, as a consequence of operations • The supervisory staff shall be provided with wireless communication system(walkie-talkie) supplemented with mobile phones for better communication at operational area and also with other operational area within same substation area, in case of emergency or otherwise • The work sites being within Visakhapatnam city limits, REN/UG cable project will provide skilled and unskilled employment opportunities largely to the local people. All work force is expected to return to their places of residence after work shift hours. For out station workforce if any, contractor shall provide rented residential accommodation with water, sanitation and allied facilities for comfortable stay. Pooled transportation facilities wherever required shall be provided to workforce as a welfare measure		

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		• No work force camps will be set up under the project and largely local work force shall be employed.		
14	Transport of Materials to Operational areas	• Public safety has to be ensured at all times during transportation and protruding of materials outside the body line of the trucks/vehicles shall be strictly prohibited and suitable size of trailers shall be used in such cases • Contractor shall only deploy well-maintained and less than 5-year old vehicles for transportation of construction materials, cable coils etc, to ensure reduced noise levels and vehicular emissions.	EPC-EHS and and field level PIU-EHS officers	Environmental Officer and Safety Officer and field level PIU-EHS officers under the overall guidance of Team Leader, PIU-EHS
15	Strom Water Drainage Management at Operational areas	• EPC Contractor shall ensure that no construction materials like earth, stone, or are disposed off in a manner that can block the flow of drainage in and around the operational areas. • All road side drain chutes on either side of the barricaded operational area (longitudinally) shall be checked and cleared for any blockages, so as to ensure free flow of storm water and prevent stagnation of water near or after the barricaded operational area and inconvenience thereof to vehicular as well as pedestrian traffic.	EPC –EHS	PIU-EHS and Independent 3rd Party agency appointed by PIU and PIU-Site In charge (at Package level)
16	Potential water pollution from use of fuel, lubricants, and their storage/handling areas at material	• EPC Contractor shall take pre-cautionary measures to ensure that no water pollution occurs through surface runoff from construction vehicle parking areas, fuel/lubricants storage sites, vehicle, and machinery/equipment maintenance sites. • EPC Contractor shall ensure that all vehicle/machinery and equipment operation, maintenance and refuelling shall be carried out in such a manner that spillage of fuel and lubricants do not contaminate soil and groundwater.	EPC-EHS and and field level PIU-EHS officers	Environmental Officer and Safety Officer and field level PIU-EHS officers under the overall

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Sl. No.	**Project Stage/Activity**	**Environmental Management Measures**	**Responsibility**	
			Planning and Execution	**Supervision/Monitoring**
	stock yards	• Areas used for handling of fuel and lubricants, wherever applicable shall be lined with impermeable material to prevent groundwater and soil contamination in the event of accidental spills.		guidance of Team Leader, PIU-EHS
17	Potential increase of dust level at work sites	• EPC Contractor shall take every precaution to reduce the level of dust from operational areas thorough regular sprinkling water through water tankers fitted with pressurized fine spray system and stationed at all operational areas. • The frequency of water sprinkling shall be determined based on site-specific requirements to contain dust generated from cable laying activities.	EPC-EHS and and field level PIU-EHS officers	Environmental Officer and Safety Officer and field level PIU-EHS officers under the overall guidance of Team Leader, PIU-EHS
18	Construction debris and waste disposal	• All construction waste materials shall be disposed of at locations approved by GVMC located at Kapulauppada, Tangudubbipalli/Giddijala, between 25-40 km north of Visakhapatnam • All vehicles carrying such waste materials for disposal shall be covered with net cloth and wetted prior to dispatch to avoid enroute spillages on roads, causing inconvenience and visual impacts to local population. Alternatively, tarpaulins can be used. In such cases, top surface of loaded materials is to be wetted and then covered with tarpaulins. All tipper trucks shall be loaded only to their designated capacities and no over loading shall be allowed	EPC-EHS and and field level PIU-EHS officers	Environmental Officer and Safety Officer and field level PIU-EHS officers under the overall guidance of Team Leader, PIU-EHS

Table 8.3: Environmental Management Plan (EMP) for Package 2 of REN/UG Cable Project, Visakhapatnam (This shall be read and operated in conjunction with EIA Report and the budgetary cost provisions made for EMP implementation by Contractor under supervision of PIU-EHS)				
Sl. No.	**Project Stage/Activity**	**Environmental Management Measures**	**Responsibility**	
			Planning and Execution	**Supervision/Monitoring**
19	Clean-up operations, restoration and rehabilitation	• EPC Contractor shall undertake site clean-up of operations as approved by PIUI-EHS. • The clean-up operations by EPC Contractor prior to demobilization and shall include removal of construction debris, unused/waste materials, etc. and disposal of same at approved locations by GVMC/PIU-EHS	EPC-EHS and and field level PIU-EHS officers	Environmental Officer and Safety Officer and field level PIU-EHS officers under the overall guidance of Team Leader, PIU-EHS
20	Environmental monitoring at construction sites	• Monthly monitoring of ambient air quality, noise level, at selected sampling locations across package area representing different categories like residential, commercial, sensitive areas along cable routes, work camp sites and during different stages of of cable laying operations shall be undertaken through an external laboratory approved by APPCB. • This item shall be operated by PIU-EHS. The EPC-EHS shall only provide required assistance at site and facilitate monitoring activities and further take any corrective measures required to main ambient air and noise levels at operational areas, if any required as may be determined by PIU-EHS	Field d Level Officers of PIU-EHS and Independent 3rd Party APPCB agency appointed by PIU	Environmental Officer and Safety Officer and field level PIU-EHS officers under the overall guidance of Team Leader, PIU-EHS
21	Community participation	• Communication channel will be kept open with local people around and along operational areas to ensure that cable laying activities are not causing undue inconvenience to the local people. • All grievance(s) related to disruption of services/utilities/damaged structures due to REN/UG project be attended and resolved with least downtime as per GRM and records shall be maintained	EPC-EHS and and field level PIU-EHS officers	Environmental Officer and Safety Officer and field level PIU-EHS officers under the overall guidance of Team Leader,

Table 8.3: Environmental Management Plan (EMP) for Package 2 of REN/UG Cable Project, Visakhapatnam (This shall be read and operated in conjunction with EIA Report and the budgetary cost provisions made for EMP implementation by Contractor under supervision of PIU-EHS)				
Sl. No.	**Project Stage/Activity**	**Environmental Management Measures**	**Responsibility**	
			Planning and Execution	**Supervision/Monitoring**
				PIU-EHS
22	Implementation of Grievance Redress Mechanism (GRM)	• PIU-EHS in coordination with EPC Contractor shall set-up a GRM as given in EIA report as soon as contract is awarded and mobilization of contractor. • PIU-EHS and EPC–EHS shall inform the affected persons (APs) on the grievance redress procedure, who to contact and when, where and how to file a grievance, time likely to be taken for redress of minor and major grievances, etc. The number of grievances recorded and resolved and the outcomes will be disclosed in the PIU office and also included in the periodic progress reports of EMP implementation monitoring and audit reports submitted to PMU for review. • Package-level GRM shall receive any complaints/grievances (either orally or in documented form) from local people/adjacent building owners) related to EHS and PAP issues or disruption of services/utilities and resolve matters expeditiously in a time bound manner.	Field level PIU-EHS officers in coordination with EPC-EHS	Environmental Officer and Safety Officer and field level PIU-EHS officers under the overall guidance of Team Leader, PIU-EHS
REN/UG CABLE PROJECT OPERATION PHASE – PACKAGE 2 AREA				
23	Shifting of existing overhead utilities and handling of transformer oil	• Once the REN/UG cable project is commissioned, the existing overhead electrical distribution infrastructure shall be dismantled • All reusable equipment as determined by PIU shall be stacked in approved locations in the manner as decided by PIU for redeployment in non-cyclone affected areas as determined by APEPDCL • All disposable equipment as determined by PIU shall be stacked in approved locations in the manner as decided by PIU • Contractor shall ensure public safety as well as safety of work force during the dismantling of the existing overhead electrical distribution infrastructure as well as its transport to approved locations • Trained and experienced work force shall be deployed for dismantling OH infrastructure.	EPC-EHS and and field level PIU-EHS officers	Environmental Officer and Safety Officer and field level PIU-EHS officers under the overall guidance of Team Leader, PIU-EHS

Table 8.3: Environmental Management Plan (EMP) for Package 2 of REN/UG Cable Project, Visakhapatnam (This shall be read and operated in conjunction with EIA Report and the budgetary cost provisions made for EMP implementation by Contractor under supervision of PIU-EHS)				
Sl. No.	**Project Stage/Activity**	**Environmental Management Measures**	**Responsibility**	
			Planning and Execution	**Supervision/Monitoring**
		The work force shall be provided with all required safety gears for working at height and other PPEs like safety boots, reflective jackets, hard hats, among others • After dismantling of overhead infrastructure, the places shall be restored to match with surrounding places viz, when a pole has been dismantled, the pole location shall be restored to match with surrounding place, including filling up the foundation pit of the pole with sand/cement concrete and finishing to match with surrounding surfaces as may be required. • The serviceable materials like transformers, which have pollution potential due to leakage of oils/lubes, shall be stored on impermeable surfaces areas within store yards prior to redeployment or disposal as scarp, as the case may be. All such impermeable surfaces shall be covered • All other disposables and/or debris (after scavenging for scarp valuables) shall be disposed off at approved waste disposal sites at Kapulauppda/Tangudubilli/Giddijala, located between 25- 40 km north of Visakhapatnam.		
24	Cable Faults during Operation Stage	• Cables shall be subjected to stringent quality checks at various levels viz testing at factory prior to dispatch, testing at storage yards, at work site prior to pull out and lowering and finally after lowering and before back filling of trenches, to rule out damages to cables due to handling at each stage • Extreme care shall be taken not to over load the cables beyond its design load capacity, even more importantly for prolonged periods • Adequate supervisory checks during cable jointing work and adhering to manufacturer's specifications/procedures as per relevant Indian Electricity Regulation, 1956, and latest amendments thereof. • In the event of cable faults at joints, the area around the man hole of inspection chamber (about 1.2mX1.2m), shall be barricaded and caution boards shall be put up for the public/vehicular traffic. Work shall be planned and swiftly completed. The work site around	EPC-EHS and and field level PIU-EHS officers	Environmental Officer and Safety Officer and field level PIU-EHS officers under the overall guidance of Team Leader, PIU-EHS

Table 8.3: Environmental Management Plan (EMP) for Package 2 of REN/UG Cable Project, Visakhapatnam (This shall be read and operated in conjunction with EIA Report and the budgetary cost provisions made for EMP implementation by Contractor under supervision of PIU-EHS)				
Sl. No.	**Project Stage/Activity**	**Environmental Management Measures**	**Responsibility**	
			Planning and Execution	**Supervision/Monitoring**
		chamber shall be restored to its previous state. All waste materials from work site shall be removed with no trace any debris. The uneven surfaces, if any surrounding inspection chamber due to opening up of chamber cover shall also be rectified with rich cement mortar, as may be required, suitably. • In case of faults in cables at locations other than joints, which are laid in upper tiers (11 KV and LT cables in trench type 1 and 2), the area around cable fault location (about 1.2mX1.5m), shall be barricaded and caution boards shall be put up for the public/vehicular traffic. The cable trench shall be opened up at fault location for rectification of cable, followed by restoration of all intermediate layers including road restoration as per project design. Work shall be swiftly completed and work site shall be restored to its previous state. All waste materials from work site shall be removed with no trace any debris. The uneven surfaces, if any surrounding the opened up area shall also be restored to its previous state, suitably		

9.1. GENERAL

This chapter summarizes an institutional arrangement for EMP implementation supervision along with a grievance redress mechanism for the package 2 area of REN/UG cable project.

9.2. INSTITUTIONAL ARRANGEMENTS FOR EMP IMPLEMENTATION MONITORING

The REN/UG cable project will be implemented by the APEPDCL and a dedicated PIU will be housed within APEPDCL.

Within the PIU, the EMP implementation supervision is proposed to be carried out through a two tier system. At tier 1, PIU will appoint one position; One Environmental cum Social Safeguards Specialist position. This functionary will be the team leader for overseeing the implementation of EMP as well as RAP (resettlement action plan) at field level through the second tier positions.

The second tier positions for field level supervision of EMP will comprise one environmental officer and one EHS/Safety officer. Each of these officers will be designated to supervise EMP implementation in two packages. The EPC contractor will also designate one EHS Officer for each package, who will be primarily responsible for implementation of EMP at package level. The field level EHS officers at tier 2 level will report to the team leader at tier 1 level.

The proposed institutional arrangement is given in **Figure 9.1**, which also include a similar 2 tier arrangement for implementation supervision of RAP through social specialist positions.

All the environmental and social specialist positions required for EMP and RAP implementation supervision will be provided by PMC, appointed by PIU under APEPDCL.

9.3. ROLES AND RESPONSIBILITIES

The roles and responsibilities of the team leader and EHS officers are to essentially commensurate to implement the EMP provisions. Accordingly, the day to day functioning, roles and responsibilities of the respective positions are to be chartered out by the respective designated team leaders. However, the broadly expected roles and responsibilities of the each of the positions during EMP implementation supervision are listed hereunder but limited to the following;

9.3.1. Role of Team Leader - Environment and Social Specialist, One Position

- Finalize Implementation Supervision Monitoring Checklist/Formats to be adopted/followed by Contractor during project implementation phase in accordance with EMP and with further modifications, if any required
- The formats/checklists shall cover all crucial phases like initial site cleanup, on site marking of cable routes/trenches, demarcation of area to be barricaded and adequately cover all other stages of project completion stage, up to opening up the barricaded area to traffic

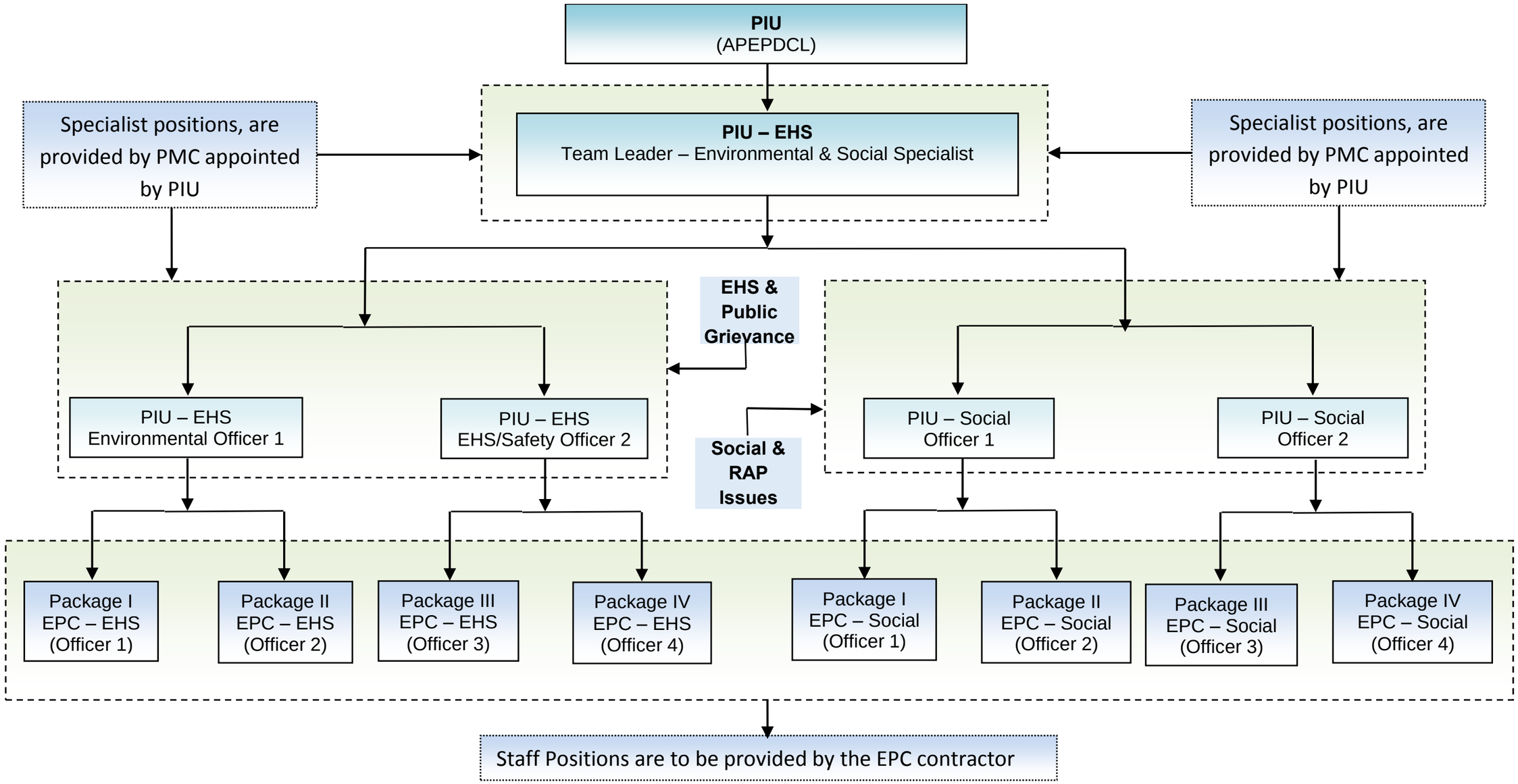


Figure 9.1: Institutional Arrangement for Implementation & Supervision of EMP & RAP

- Organize an orientation/training to contractor's personnel at project management and supervisory staff levels to sensitize EMP requirements of the REN/UG cable project and compliance thereof off at every stage of project implementation and adherence of the same by the workforce at all times
- Provide guidance to filed level EHS officers in capturing the information from the operational areas as per the developed formats and documentation
- Preparation of periodic progress reports viz, monthly, quarterly, half yearly and yearly reports as per PMU's requirements and interface with PMU as required
- Conduct EHS safety awareness campaign periodically at work places/operational area so as to increase awareness and sensitize of workforce and keep up tempo of workforce
- Carryout refresher orientations to project management and supervisory staff levels to sensitize EMP requirements at least once in six months
- Celebrate safety weeks, award work force, who have been tracked/identified to follow and adopt EMP practices and on site sanitation practices
- Ensure all required resources for implementation of EMP are provided by Contractor at all operational areas, through PIU-In-charge
- Document the performance /achievement/results obtained in terms of environment, safety health and safety issues as a consequence of implementation of the EMP measures for the REN/UG cable project and also identify any new set of measures, required to improve the EMP or improve its implementation supervision
- Ensure REN/UG cable project is compliant with all regulatory /statutory compliances at all times including compliances by Contractor
- As a member of the grievance redress committee, resolve any grievance, which has been escalated to GRC, within the stipulated time frame as per GRM

9.3.2. Role of Environmental and EHS/Safety Officers- Two Positions

- Assist team leader in all aspects of developing checklists, provide orientation to workforce and contractor's personnel abut EMP requirements, health and safety aspects at worksites among others
- Prepare daily, weekly and monthly progress reports of EMP implementation supervision and assist team leader in preparing monthly, quarterly and half-yearly progress reports
- Based on the checklist formats, establish the stages, at which contractor has to seek prior approvals at various stages of project implementation issues and ensure adherence by contractor to the same
- Organize an orientation/training to contractor's personnel at workforce level to sensitize EMP requirements of the REN/UG cable project and compliance thereof off at all different stages of project implementation and adherence of the same by the workforce at all times

- Ensure contractor submit all information for which prior approvals and/clearances are required from PIU-EHS, based on the established stages and agreed upon with contractor
- Assist Team Leader in conducting EHS safety awareness campaign at work places/operational area so as to increase awareness and sensitize of workforce
- Ensure documentation of the EMP implementation by Contractor on a daily basis through actual field visits and correlate with the data submitted by Contractor's Environmental Officers
- Interact with contractor's counterpart to keep abreast of the work progress and any potential issues which requires advance actions by PIU-EHS
- Coordinate with Contractor's counterpart in seeking timely approvals/consent from traffic police and other local authorities
- Document the performance /achievement/results obtained in terms of environment, safety health and safety issues as a consequence of implementation of the measure of the REN/UG cable project and also identify any new set of measures are required to improve the EMP or improve its implementation supervision
- Ensure REN/UG cable project is under regulatory /statutory compliances at all times including the compliances by Contractor
- Ensure and oversee the efforts of contractor's EHS officer in resolving all grievances within the time frame stipulated in GRM, as a routine and top priority task
- Explore additional options and resolve the grievances, which remains un-resolved at package level, prior to escalating it to GRC
- Ensure contractor make available all required resources at operational areas for implementation of EMP
- Ensure contractor deploy required staff for EMP implementation, including its supervision
- Make field visits to all operational areas at least once on a daily basis and ensure the EMP measures are being implemented as per requirements
- Ensure Contractor's Environmental Officer submits filled in checklists as per actual EMP implementation, on a daily basis
- Mandatorily all operational area to be visited during site cleanup, and onsite marking and demarcating the area to be barricaded, and prior to opening up of area for traffic and ensure all required EMP provisions are in compliance
- Non-compliance by contractor on any of the issues relating to EMP implementation at any stage, shall be escalated to Team Leader for appropriate intervention and corrective measures
- Document daily, weekly progress made for EMP implementation supervision and assist team leader in preparing daily, weekly and monthly reports
- Ensure mobile toilets, mobile drinking water kiosks and mobile water tankers for dust control are being replenished regularly and are maintained and used appropriately

- Ensure dust control measures are being followed as per requirement and no undue dust levels prevail/or seen at operational areas
- Ensure workforce are provided with all required/appropriate PPEs and same is being used while at work
- Ensure Contractor's Environment Officer is documenting all Environment, Health and Safety issues at Operational areas including injuries, fatality to workforce and/or public as consequence of project operations
- Ensure the Operational Area specific crew like mason/plumber/carpenter and sheep metal fabricator are available at site all times and any damage to utilities are being attended without any unreasonable delays and well within time fame stipulated in GRM
- Resolve all grievances received at the package level, under assistance from EPC-EHS Officer of Contractor, within the stipulated time frame in GRM

9.4. Qualification and Experience Requirements

Environmental and Social Safeguards Officer (Safeguards Management Lead Person/team leader): The designate shall be a post graduate in environment engineering /science with at least 10 years of experience in environmental management of infrastructure development projects, out of which at least 5 years shall be in linear projects or equivalent experience in any type of laying underground utilities.

Environmental Safeguards Officer: The designate shall be a post graduate in environment engineering /science with at least 5 years of experience in environmental management of infrastructure development projects, out of which at least 3 years shall be in linear projects or equivalent experience in any type of laying underground utilities

EHS Officers: The designate shall be a graduate in civil/environmental engineering /science with at least 5 years of experience in environmental management of infrastructure development projects, out of which at least 3 years shall be in linear projects or equivalent experience in any type of laying underground utilities. In case of candidates with OHSAS training/certification and specific work experience as an EHS officer at any major construction work sites, the qualifications and experience can be relaxed suitably.

Social Safeguards Officers: The designate shall be a post graduate in social sciences with at least 7 years of experience in preparation of Social Impact Assessment and implementation of Resettlement Action Plans for infrastructure development projects, out of which at least 3 years shall be preferably in linear projects

EHS Officers to be deployed by Contractor: The EHS designate officers to be deployed by Contractor shall be graduate in civil/environmental engineering/science with at least 5 years of experience in environmental or construction management of infrastructure development projects, out of which at least 3 years shall be in linear projects or equivalent experience in any type of laying underground utilities. In case of diploma holders, the candidate shall have a minimum of 7 years of similar experience. The qualifications and experience of the candidates with OHSAS training/certification and specific work experience as EHS/safety officer at any major construction work sites, can be relaxed suitably.

9.5. Monitoring Frequency and Responsibility

The monitoring responsibility and frequency of monitoring EMP implementation supervision in line with the suggested institutional arrangements (Figure 9.1) is given in **Table 9.1**. The various aspects that are to be monitored during EMP implementation supervision are also given in **Tables 9.2** and **9.3**. The checklist for development of Worksite Safety Management Plan also is given in Table **9.4**.

The checklists given in Tables 9.1 to 9.4 are illustrative and to be finalized by PIU-EHS unit within PIU prior to mobilization of contractor.

Table 9.1: Monitoring Frequency and Responsibility for REN/UG Cabling Project

S.No.	Particulars	Frequency	Reporting Responsibility	Monitoring responsibility
1	Operational Area – Commencement Report	At every instance	PIU-EHS officers under guidance of Team Leader - Environmental & Social Specialist	Team Leader – Environmental & Social Specialist
2	Daily Progress Report	Daily by close of Working Hours-6 PM	PIU-EHS officers	Team Leader (Environmental & Social Specialist) under the assistance of PIU-EHS officers
3	Weekly Progress Report	Weekly, by end of Week - Saturday 6PM	PIU-EHS officers under guidance of Team Leader - Environmental & Social Specialist	Team Leader (Environmental & Social Specialist) under the assistance of PIU-EHS officers
4	Operational Area – Closing Report	At every instance	PIU-EHS officers under guidance of Team Leader - Environmental & Social Specialist	Team Leader – Environmental & Social Specialist under the assistance of PIU-EHS officers
5	Monthly Progress Report	Monthly, by last working day of the month	Team Leader - Environmental & Social Specialist under the assistance of PIU-EHS officers	Team Leader – Environmental & Social Specialist
6	Quarterly Progress Report	Quarterly, by last working day of month, every Quarter	Team Leader - Environmental & Social Specialist under the assistance of PIU-EHS officers	Team Leader – Environmental & Social Specialist
	Annual Consolidated Report	Annual, by last working day every year or every	Team Leader - Environmental &	Team Leader – Environmental &

7		3rd quarter as required	Social Specialist under the assistance of PIU-EHS officers	Social Specialist
8	Project Completion Report - EMP Implementation	As and when Project is declared commissioned	Team Leader - Environmental & Social Specialist under the assistance of PIU-EHS officers	Team Leader – Environmental & Social Specialist
9	Environmental Monitoring covering areas in and around all operational areas, work camp sites. The parameters monitored shall be ambient air quality and ambient noise level	Monthly (AAQ Parameters shall cover PM_{10}, $PM_{2.5}$, SO_2, NO_2, CO, Noise levels shall include Leq Day and Leq Night)	Independent NABL/MOEF&CC accredited Laboratory and appointed by PIU-EHS	Team Leader-Environmental & Social Specialist

Note:

1. The periodic progress report shall capture status of EMP measures, implemented by contractor and shall list compliance(s) and non-compliance(s), to respective measures as well as compliance(s) to consent conditions stipulated by APPCB. The report shall include a list of Actions to be Taken and Action Taken Report by the contractor, which shall also be monitored by the PIU-EHS.
2. The periodic progress report shall cover all operational areas as well as designated work camp sites and store yards along with the environmental monitoring carried out covering all operational areas, where work is under progress and work camp sites as may be required.

Table 9.2 Illustrative Checklist for Opening Up of Operational Area *(Similar checklists are to be prepared by PIU-EHS, for different stages of the project including Operational area closing report based on EMP for compliance monitoring by EPC Contractor)*				
Sl No	**Checklist Items prior to Operational Area Commencement**	**Provided**		**Remarks/Notes**
		Yes	No	
1	Site cleanup and removal of all waste materials/debris lying within the 2.5 metre wide operational area			
2	Minor Repairs to footpath to remove all unevenness, alongside of barricaded area for pedestrian safety in 25mm thick PCC(1:4:8) or 20mm thick cement concrete mortar(1:6)			
3	On-site marking of cable route, cable trench and 2.5 metre wide area to be barricaded, with 7.5 cm wide strip of yellow paint, at each of the 500 metre length operational area			
4	Fabrication and Erection of MS barricades on both sides of the cable trench alignment as per design			
5	Stacking of sand bags in polypropylene (used cement) bags, along inner side of both barricades, to prevent seepage /water logging of cable trenches			
6	Provision of LED strip lighting to MS barricades as a safety measure during night hours (on road side only)			
7	Installation of caution/sign/diversion boards on both upstream and downstream sides of operational area as per requirement of specific stretch as per site assessment/requirement of traffic police			
8	Obtaining requisite approvals from traffic police for traffic diversions at least 7 days in advance. Traffic diversion plans, wherever required for a specific site/stretch, shall be prepared in consultation and/under approval of traffic police well in advance and No work shall be undertaken in anticipation of permissions and approvals			
9	Obtaining requisite approvals from GVMC for road cutting permissions at least 7 days in advance. No work shall be undertaken in anticipation of permissions and approvals			
10	Inform telecom and other departments, at least 7 days in advance prior to site clean-up and commencement of excavation of road			
11	Cleaning of roadside drain chutes on both upstream and downstream sides of operational area			
12	Ensure, no water logging occurs along barricaded operational area during rainy days			
13	Provision of Mobile Water Tanker of 6000 litres capacity, at Operational Area, fitted with pressurized spray system and 600m hose reel			
14	Provision of 2 seater Mobile Toilet (1 seat for men and 1 seat for women) with separate entrances), fitted with 1000 litres overhead water storage tank, and stationed at a suitable place within 100 metres from operational area, with one attendant			
15	Provision of Mobile Drinking Water Counter/Kiosk, fabricated from stainless steel with 300 litre capacity, with at least two taps, with bottom			

Table 9.2 Illustrative Checklist for Opening Up of Operational Area *(Similar checklists are to be prepared by PIU-EHS, for different stages of the project including Operational area closing report based on EMP for compliance monitoring by EPC Contractor)*				
Sl No	**Checklist Items prior to Operational Area Commencement**	**Provided**		**Remarks/Notes**
	tank to collect waste water and stationed at a suitable place within 100 metres from operational area, with one common attendant for both Mobile toilet and drinking water kiosk			
16	Deploying a on-site crew group, comprising mason, plumber, carpenter/sheet metal fabricator at Operational area, on full time basis but common for two operational areas within the same sub-station areas. The crew shall have access to all required resources are provided to restore the damaged utilities like water supply connections, sanitary/sewer connections etc, with least down time, once excavation commences			
17	Provision of water resistant tarpaulins at Operational area to cover barricaded area, during rainy days (as a contingent measure)			
18	Provision of water resistant tarpaulins at Operational area to cover tipper trucks carrying excavated material either to central work camp sites and/or to approved disposal sites to prevent enroute dust and spills			
19	Provision of personal protection gear(PPE) for all workforce at operational area			
20	Provision of traffic wardens along operational areas, near to junctions/intersections, wherever required			
21	All vehicles /equipment deployed at operational areas shall be less than 5 years old, in good working condition and mandatorily have valid Pollution under Control Certificates, while being deployed on this project			
22	Provision of intermediate access across barricaded area for adjacent building occupants as per requirements			
23	No workforce camps shall be set up at any of the operational areas. All workforce are to be provided with suitable type of rented accommodation, if required or can return to normal places of residence.			
24	All supervisory staff shall have wireless communication system(walkie-talkie) supplemented with mobile phones for better communication at operational area and also with other operational area within same substation area, in case of emergency or otherwise			
25	First aid facilities and free emergency care facilities at operational area. Contents of first aid box shall be as per attached list)			
26	All operational areas shall be access controlled with fixed entry and exit points, and shall have watch and ward facilities at all times. At least 2 Waste bins (25 litre capacity beach) shall be kept at entry and exit points of operational area, regularly emptied and cleanly maintained			

Signature of EPC-EHS **Signature of PIU-EHS**

Table: 9.3 Illustrative Checklist for Closing of Operational Area *(Similar checklists are to be prepared by PIU-EHS, for different stages of the project including Operational area closing report based on EMP for compliance monitoring by EPC Contractor)*				
Sl No	**Checklist Items prior to Operational Area Closing Report**	**Provided**		**Remarks/Notes**
		Yes	No	
1	Whether Road Restoration works has been completed without any left out or unpaved areas within the 2.5 metre wide operational area			
2	All restored paved surfaces matches with evenly with old surface without any unevenness			
3	Whether Operational area has been cleared off all types of waste materials			
4	Whether MS barricade have been moved to next segment of the operational area and site cleared			
5	Whether drain chutes along hitherto barricaded operational area has been checked for any blockages and cleared thereof if any. This shall also include drain chutes on both upstream and downstream sides of barricaded area up to at least 100 meters on either sides			
6	Whether all diversion and caution boards have been removed and previous boards has been restored, if any			
7	Whether all other site infrastructure like mobile tankers, Toilets, Drinking water kiosks have been moved to new places as per requirements			
8	Whether all intermediate access provided across hitherto barricaded area for adjacent building occupants as per requirements have been removed including all remnants			
9	Whether all ramps/steps/minor extensions of structures, although illegal have been restored to its previous state as per requirements of the building occupants			
10	Whether all grievances/complaints/requests/concerns received from people during the cable laying operational phase have been resolved. And confirm if any such issue /matter pending			
11	Whether construction of inspection chamber has been completed and is provided with manhole cover. The operational area shall not be declared open, unless inspection chambers are provided with manhole covers and fixed properly as a safety requirement			
12	Whether any damaged kerb/footpath edges and/or any other over ground pre-existing infrastructure has been restored, if any damaged during cable laying operations within hitherto barricaded operational area			

Signature of EPC-EHS **Signature of PIU-EHS**

Table 9.4 Checklist for Development of Work Site Safety Management Plan

*(This Worksite Safety Management Plan shall be prepared in conjunction with EMP measures provided in **Tables 8.2 & 8.3** of EIA report)*

The worksite safety management plan (WSMP) shall be prepared by the contractor and get it approved by the PIU-EHS, during mobilization period and prior to commencement of site operations. The WSMP shall essentially address the following

1. All operational areas (every 500 metre cable laying segment is construed as one operational area), shall have a designated one safety officer and one social officer. The safety officer shall be versed with all safety requirements in a similar working environment and preferably have undergone OHSAS 18001-Occupational Health and Safety Management Systems – Implementation Training. The social officer shall be primarily responsible to handle all public concerns/requirements/grievances with regard to requirements for intermediate access walkways, restoration of damaged utilities, ramps steps etc among other social and safety issues
2. All workforce deployed (at all levels), shall have demonstrated experience in underground cable laying operations, excavation of trenches in urban areas for similar utilities like water supply, sewerage and drainage projects, road construction and /or paving works. The work force shall also have experience in operation and maintenance of underground cables per requirement of work.
3. Induction training of all workforce (at all levels), with particular emphasis on expected EMP measures as well as environmental, health and safety requirements under the project
4. Operational areas shall have fixed access controlled entry and exit points with adequate lighting arrangements at night. All visitors to operational areas are to be briefed about safe distances and emergency response mechanism available at site and provided with safety boots, helmets and mandatorily accompanied by designated official, prior to getting into/ around operational area.
5. All construction and earth moving equipment deployed shall be less than 5 years, well maintained and good working condition at all times
6. Barricading operational areas with intermediate access to adjacent building occupants as per requirements. Barricading shall have LED lighting as a hazard prevention measure for traffic during night hours. If required barricades shall be bolted/anchored down on to ground for stability and safety, during inclement weather conditions
7. The workforce shall strive to maintain a cordial communication channel with the building occupants along operational areas, and any contentious issue(s) raised shall be responded politely and matter escalated to concerned designated safety officer /social officer
8. Provision of safe and adequate walkway plat forms, properly rested on firm ground/base across barricaded operational areas. The walkway platforms shall be made of wooden planks or MS plates of adequate strength (at least 3 times more than requirement)
9. To ensure public safety at all stages of cable laying operations, minimal disruptions to traffic movement along barricaded area, minimal inconveniences to pedestrian and occupants of buildings along cable routes
10. Provision of on-site crew at all operational areas, comprising mason, plumber, carpenter/sheet metal fabricator with all resources to repair any damaged underground

utilities with least down time in close coordination with social officer and concerned building owner/occupant

11. Ensure safety of public and no undue inconvenience is caused to vehicular traffic during movement of materials in and out of operational areas through deployment of traffic wardens
12. All cable rolls, cradles and hauler(s) for cable pullout shall all be placed on firm ground and properly anchored so that it does not get toppled and/or sets into motion, which could pose a safety issue and can cause hazard
13. Provision of personal protection equipment(PPEs) for all workforce and to make it mandatory for the workforce to wear them at all times during working hours
14. Orientation of workforce to keep safe distances from moving equipments and all such areas shall be access regulated only for authorized workforce
15. Provision of fully equipped First Aid Post and all required emergency numbers of nearby hospitals, at all operational area(s), in case of any injury/fatal accident to workforce or to public as a consequence of cable laying operations
16. Provision to record/document all types of incidents, which has led to some form of injury (irrespective of minor/major/fatal) to workforce or to bystanders as a consequence of cable laying operations. The cause(s) of such incidents shall be investigated and corrective measures identified, shall be immediately implemented to prevent recurrence of such incidents.
17. Deployment of Traffic wardens at or near road intersections(junctions) to ensure smooth movement of traffic alongside of barricaded area
18. Provision of onsite sanitation facility through deployment of well-maintained mobile toilet and mobile drinking water kiosk and ensure it is used by workforce
19. Conduct safety awareness drill periodically and award workforce who adhere and practice safety measures at operational areas

All cable testing, jointing, testing and commissioning shall be conducted in strict conformance to India Electricity Regulations Act, 1956, with its latest amendments

9.6. GRIEVANCE REDRESS MECHANISM

The REN/UG cable project will not involve any land acquisition and therefore grievances related to inadequate compensation and associated issues are not anticipated. However, the most common/potential grievances could be but not limited to the following;

- Inadequate/inappropriate arrangements for access to occupants of buildings across barricaded area
- Damaged utilities like water supply, sewer/sanitary/drainage pipes etc during excavation and being non-responsive and time delays in restoration
- Noise and dust levels during construction
- Damaged ramps, steps and associated small structures during excavation, which are being shabbily restored and/or done without considering their views and/or not matching with previous condition
- Safety to pedestrian and vehicular traffic and public safety as a consequence of project operations
- Works are being executed at a slower pace, causing undue delays, which in turn extended period of their inconveniences

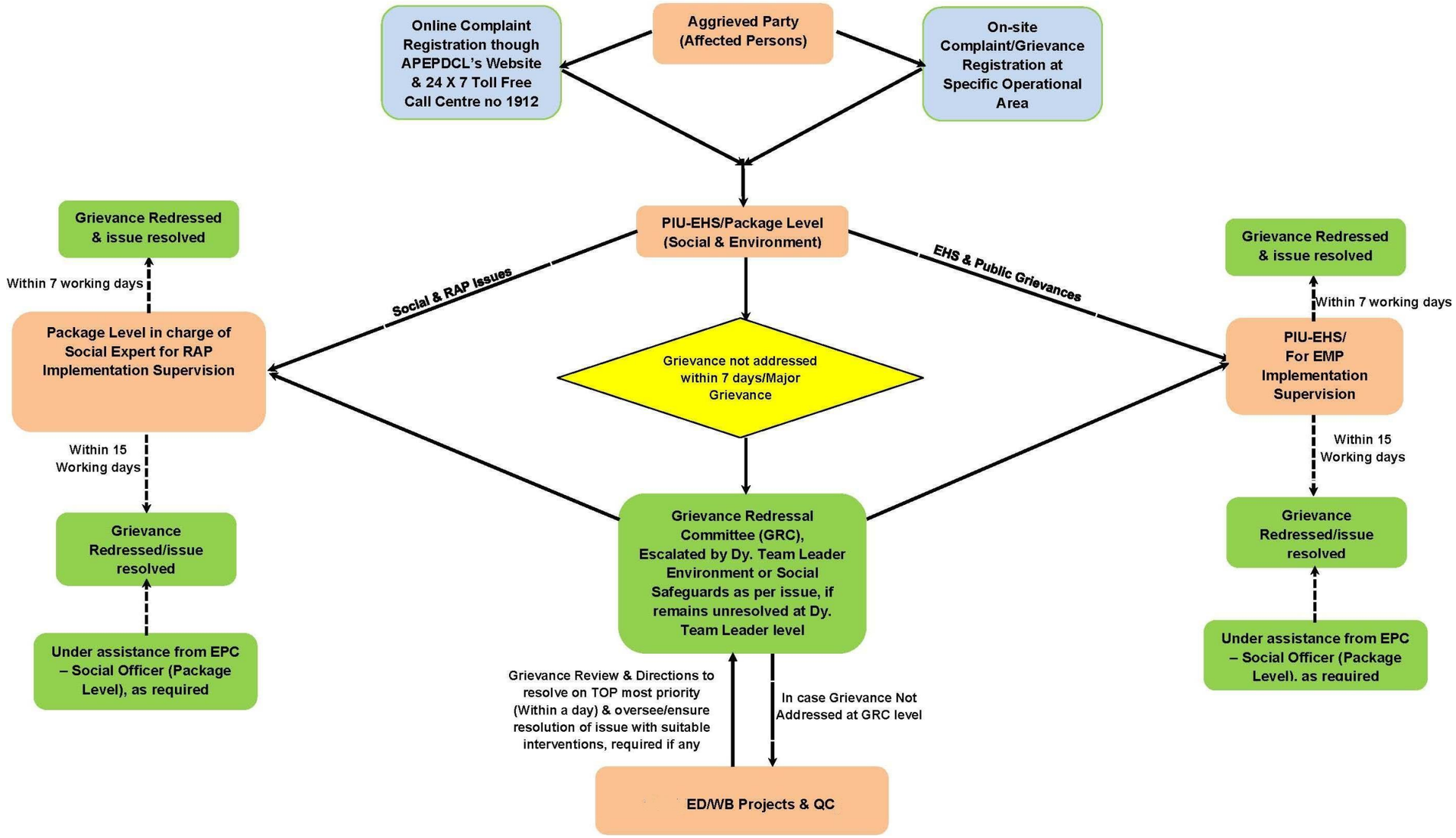
APEPDCL through its PIU for REN/UG cable project will establish a robust and responsive grievance redress mechanism to handle all types grievances within in a reasonable time frame and in a responsible way. The absence of a responsive grievance mechanism could trigger public resentment, despite the benefits, that the project can usher on society.

The REN/UG cable project will establish a package wise grievance redress mechanism (GRM) as shown in the **Figure 9.2**. The PIU will be primarily responsible for implementing the GRM, the contractor will also be severally and jointly responsible to receive and resolve complaints in a time-bound and effective manner and in close co-ordination with PIU.

The PIU-EHS, the package level in-charge for EMP implementation and supervision will establish a procedure for receiving grievances both online (through APEPDCL's web site) and offline at respective operational areas. APEPDCL will widely publicize and extend its present online compliant registration system as well as 24x7 call centre number 1912(displayed on barricades at operational areas) to receive complaints/grievances related to REN/UG cable project. The GRM will include procedure for recording/documenting key information, and evaluating and responding to the complaints as per time frame stipulated in GRM. All concerns received/raised through the GRM are to be addressed earnestly, transparently and in a time bound manner, without retribution to the grieved/affected person(s).

The PIU and contractor periodically will inform the general public along the cable route alignments, which have been opened up for cable laying on the available grievance redress procedure(s), whom to contact and when, where and how to file a grievance, time likely to be taken to redress minor and major grievances, etc.

The type and number of grievances received, resolved and outcomes are to be displayed /disclosed at PIU and included in the periodic progress reports and documented for the entire project implementation phase.



Note: GRC comprises:
PIU- In charge
Team Leader PIU – Environment & Social Safeguards
Sr. Management Representative of (EPC) Contractor
Sr. Representative Social Officer, appointed for RAP implementation

EHS: Environment, Health & Safety
PIU: Project Implementation Unit (PIU)
EPC: Contractor appointed for Project Implementation, appointed by PIU
PIU-EHS: Designated Environmental Officer (Package wise), appointed by PIU through PMC
PIU-SO: Designated PIU Social Officer (Package wise), appointed by PIU through PMC
EPC-EHS: Designated Environmental Officer (Package wise) appointed by Contractor
EPC-Social: Designated Social Officer (Package wise), appointed by Contractor

Figure 9.2: Grievance Redressal Mechanism under REN/UG Project

ANNEXURE 1
Test Reports of Ambient Air Quality & Noise Monitoring by Bhagavathi Ana Labs & Teamlabs

BHAGAVATHI ANA LABS

TEST REPORT

Name & Address of the Customer M/s Deccan Consulting Engineers Pvt Ltd. B-98/5A- 3rd Floor, Joshi Colony, Behind BALCO Market, IPE Extension, New Delhi: 110092 **Kind Attn: Mr.Hari Prakash**	**Lab Reference No:**	BALPL/2015-16/ENV-0172
	Test Report Issue Date:	31.03.2016
	Your Ref:	Email
Sample Particulars: **Noise Level Monitoring**	**Email Dated**	10.03.2016
	Date of Registration	20.03.2016
Dt of Safmpling : 16.03.2016 to 17.03.2016	**Date of commencement of Analysis**	20.03.2016
	Date of completion of Analysis	22.03.2016
	Sample condition at receipt	OK
Sample Collected by Bhagavathi Ana Labs Pvt Ltd		**Page:1 of 1**

S.No.	Date	Location	Noise dB(A)		Longitude	Latitude
			Day Time Lday	Night Time Lnight		
1	16 / 03 / 2016	Siripuram	62.5	49.8	N 17° 41' 411"	E 83° 14' 195"
2	16 / 03 / 2016	Shivajipalem	58.2	47.6	N 17° 44' 064"	E 83° 19' 628"
3	17 / 03 / 2016	Peddawaltair East Point Colony	66.5	46.5	N 17° 43' 558"	E 83° 20' 190"
4	17 / 03 / 2016	MVP - Sector 7	60.2	44.8	N 17° 44' 529"	E 83° 20' 197"

L_{day}	L_{day} is defined as the equivalent noise level measured over a period of time during day (6am to 10pm) , by recording 15 readings per hour.
L_{night}	L_{night} is defined as the equivalent noise level measured over a period of time during night(10pm to 6am), by recording 15 readings per hour.

Instrument Used for Monitoring : Lutron SL 4001 - Sound Level Meter.

Authorized Signatory

E. Shyam Sundar
Head Environment.

Bhagavathi Ana Labs Pvt. Ltd. *Central Laboratory - Industrial Testing Division*
(A Bureau Veritas Group Company)
Plot No. 7-2-C 14, Industrial Estate, Sanathnagar, Hyderabad - 500 018, INDIA
Tel.: +91 40 23811535, 23711536 • www.bhagavathianalabs.com • centrallab.hyderabad@in.bureauveritas.com

Note: This Report is subject to the terms and conditions mentioned overleaf

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BHAGAVATHI ANA LABS

TEST REPORT

Name & Address of the Customer M/s Deccan Consulting Engineers Pvt Ltd. B-98/5A- 3rd Floor, Joshi Colony, Behind BALCO Market, IPE Extension, New Delhi: 110092 **Kind Attn: Mr.Hari Prakash**	**Lab Reference No:**	BALPL/2015-16/ENV-0172
	Test Report Issue Date:	31.03.2016
	Your Ref:	**Email**
Sample Particulars: Ambient Air Quality for PM_{10}, $PM_{2.5}$, SO_2, NO_X, CO	**Email Dated**	10.03.2016
Dt of Sampling : 16.03.2016 to 19.03.2016.	**Date of Registration**	20.03.2016
	Date of commencement of Analysis	20.03.2016
	Date of completion of Analysis	22.03.2016
	Sample condition at receipt	OK
Sample Collected by	**Bhagavathi Ana Labs Pvt Ltd**	**Page:1 of 1**

TEST RESULTS

S.No.	Date	Location	PM_{10} ug/m³	$PM_{2.5}$ ug/m³	SO_2 ug/m³	NO_X ug/m³	CO PPM	Longitude	Latitude
1	16 / 03 / 2016	Siripuram	115	41	25.4	31.3	0.81	N 17° 41' 411"	E 83° 14' 195"
2	16 / 03 / 2016	Shivajipalem	122	44	27.1	34.5	0.85	N 17° 44' 064"	E 83° 19' 628"
3	17 / 03 / 2016	Peddawaltair East Point Colony	130	35	26.9	37.3	0.86	N 17° 43' 558"	E 83° 20' 190"
4	17 / 03 / 2016	MVP - Sector 7	110	32	25.6	33.5	0.84	N 17° 44' 529"	E 83° 20' 197"
5	18 / 03 / 2016	Siripuram	120	40	23.4	35.4	0.93	N 17° 41' 411"	E 83° 14' 195"
6	18 / 03 / 2016	Shivajipalem	117	38	24.3	35.6	0.89	N 17° 44' 064"	E 83° 19' 628"
7	19 / 03 / 2016	Pedda waltair East Point Colony	122	41	27.4	36.9	0.82	N 17° 43' 558"	E 83° 20' 190"
8	19 / 03 / 2016	MVP - Sector 7	114	38	23.9	34.8	0.84	N 17° 44' 529"	E 83° 20' 197"

Authorized Signatory

E. Shyam Sundar
Head Environment.

Bhagavathi Ana Labs Pvt. Ltd. *Central Laboratory - Industrial Testing Division*
(A Bureau Veritas Group Company)
Plot No. 7-2-C 14, Industrial Estate, Sanathnagar, Hyderabad - 500 018. INDIA
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Note: This Report is subject to the terms and conditions mentioned overleaf

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भारत का राजपत्र
The Gazette of India

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पर्यावरण और वन मंत्रालय

अधिसूचना

नई दिल्ली, 3 जनवरी, 2014

का.आ. 21 (अ).—केन्द्रीय सरकार, पर्यावरण (संरक्षण) नियम, 1986 के नियम 10 के साथ पठित पर्यावरण (संरक्षण) अधिनियम, 1986 (1986 का 29) की धारा 12 और धारा 13 की उपधारा (1) के खंड (ख) द्वारा प्रदत्त शक्तियों का प्रयोग करते हुए, पर्यावरण और वन मंत्रालय, भारत सरकार की अधिसूचना संख्यांक का. आ. 1174(अ) तारीख 18 जुलाई, 2007 का और संशोधन करती है, अर्थात् :—

उक्त अधिसूचना से संलग्न सूची में, —

(क) क्रम संख्यांक 3, संख्यांक 46, संख्यांक 55, संख्यांक 57, संख्यांक 58, संख्यांक 61, संख्यांक 65, संख्यांक 68 और संख्यांक 69 और उससे संबंधित प्रविष्टियों के स्थान पर निम्नलिखित संख्यांक और प्रविष्टियां रखी जाएंगी, अर्थात् :—

(1)	(2)	(3)	(4)
"3	मैसर्स भगवती अन्ना लैब्स प्रा0 लि0, रजिस्ट्रीकृत कार्यालय और केन्द्रीय प्रयोगशाला, प्लाट सं0 7-2 सी7 और 8, एग्रोमेक औद्योगिक एस्टेट संतनगर, हैदराबाद-500018 (आंध्र प्रदेश)	(1) श्री भगवती हरि बाबू (2) श्री ए.वी.हनुमंता राव (3) श्री वी.राघवाचार्यलू	3.01.2014 से 2.01.2019
46	मैसर्स कोसमो कोंशियस रिसर्च लैबोरट्री "सर्वे हाउस" # 121, 2nd क्रॉस, नेहरु कालोनी, बैलारी-583103 (कर्नाटक)	(1) श्री जी.धावलेश्वर (2) श्रीमती वी.स्वर्णलता (3) श्री के.सोमशेखर राव	3.01.2014 से 2.01.2019
55	मैसर्स अनाकॉन लैबोरट्रीज़ प्रा0लि0, एफपी-34, 35 फूड पार्क, 5 स्टार ओद्यौगिक एस्टेट, बुटीबोरी, नागपुर-441122 (महाराष्ट्र)	(1) डा. (सुश्री) सुगंधा डी.गर्वे (2) सुश्री कविता सेगांवकर (3) श्री के.वेंकटेश्वर राव	3.01.2014 से 2.01.2019

57	मैसर्स रामकी एनवाईरो इंजीनियर्स लि. हैदराबाद वेस्ट मैनेजमेंट प्रोजक्ट, सर्वे नं. 684/1, डंडीगल (वी) कुतुबल्लापुर (एम) रंगारीडी जिला-रामकी-500 043 (आंध्र प्रदेश)	(1) श्री वी.विजय कुमार (2) श्री मदन कुमार डी.तिवारी (3) श्री के.वेंकटेश्वर राव	3.01.2014 से 2.01.2019
58	मैसर्स इंटरनेशनल टेस्टिंग सेंटर प्लॉट नं0 86, इंडसट्रीयल एरिया फेस-1, पंचकुला-134109 (हरियाणा)	(1) डा. प्रकाश कौर (2) श्री प्रेम कुमार (3) सुश्री पूनम शर्मा	3.01.2014 से 2.01.2019
61	मैसर्स मित्रा एस.के. प्राइवेट लि. (बेहाला लैबोरट्री) 620, डायमंड हार्बर रोड बेहाला इंडस्ट्रीयल एस्टेट, टूल रूम नं. 2/3/, 2/4 और 2/5, कोलकाता-700034 (पश्चिमी बंगाल)	(1) श्री सुदीप मुखुटी (2) सुश्री सुतापा भोमिक (3) सुश्री मौसमी सेनगुप्ता	3.01.2014 से 2.01.2019
65	मैसर्स एनवाइरोडिज़ाइन ईको लैब्स इको टावर, जानथा जंक्शन, पलारीवोत्तम, कोच्ची-682025 केरल	(1) श्री के.एल.एंटनी (2) सुश्री सुज़न अब्राहम (3) सुश्री सिमी के.के.	3.01.2014 से 2.01.2019
68	मैसर्स सांईटिफिक रिसर्च लैबोरट्रीज़ "श्यामली अपार्टमेंट" 90, लेक ईस्ट 4th रोड संतोषपुर, कोलकाता-700075 (वेस्ट बंगाल)	(1) डा. जोइरमोय मजुमदार (2) श्री कल्याण घोष (3) सुश्री पुर्बा खुखर्जी	3.01.2014 से 2.01.2019
69	मैसर्स साडेकर एनवाइरो इंजिनीयर्स प्रा.लि., बी-306/307, प्लाट नं. 61, पटेल एस्टेट, रेइस मगोस, वेरेम, आल्टो, ओल्ड बेटिम रोड, बर्डेज़, पोरवोरिम,पणजी-403101 (गोवा)	(1) श्री विशाल बासावन्नी सन्नाकी (2) श्री विनायक गंगाराम कुडकर (3) श्री स्वाति वैभव मोरे	3.01.2014 से 2.01.2019";

(ख) क्रम संख्यांक 113 और उससे संबंधित प्रविष्टियों के पश्चात्, निम्नलिखित क्रम संख्यांक और प्रविष्टियां अंतःस्थापित की जाएगी, अर्थात् :--

(1)	(2)	(3)	(4)
"114	मैसर्स इकोमेन लैबोरट्रीज़ प्रा.लि., फ्लैट नं0 8, 2nd फ्लोर, आरिफ चैंबर-v, सैक्टर- H, अलिगंज, लखनऊ-226024 (उत्तर प्रदेश)	(1) सुश्री रीना त्रिपाठी (2) डा0 ओम प्रकाश शुक्ला (3) श्री प्रवीण कुमार दुबे	3.01.2014 से 2.01.2019
115	मैसर्स टीम लैब्स एंड कंसलटेंटस् बी-115 तथा 509, अण्णापूर्ण ब्लाक आदित्य एन्कलेव, अमीरपेट हैदराबाद-500038 आंध्र प्रदेश	(1) श्री अंबावती रवि पवन कुमार (2) श्री एस.रमेश (3) श्री टी.रवि किरन	3.01.2014 से 2.01.2019
116	मैसर्स टीयूवी एसयूडी साउथ एशिया प्रा0 लि0, सी-153/1, ओखला ओद्यौगिक एस्टेट, फेस-1, नई दिल्ली-110020	(1) श्री प्रमोद कुमार (2) श्री अजय कुमार प्रमाणिक (3) श्री विजयानंद	3.01.2014 से 2.01.2019";

[फा.सं. क्यू-15018/23/2013-सीपीडब्ल्यू]

डा. राशिद हसन, सलाहकार

टिप्पण : मूल अधिसूचना भारत के राजपत्र, असाधारण, में संख्यांक. का.आ. 1174(अ), तारीख 18 जुलाई, 2007 द्वारा प्रकाशित की गई थी और तत्पश्चात् अधिसूचना सं0 का.आ. 1539(अ), तारीख 13 सितंबर, 2007, का.आ. 1811(अ), तारीख 24 अक्तूबर, 2007, का.आ. 55(अ), तारीख 9 जनवरी, 2008, का.आ. 428(अ), तारीख 4 मार्च, 2008, का.आ. 865(अ), तारीख 11 अप्रैल, 2008, का.आ. 1894(अ), तारीख 31 जुलाई, 2008, का.आ. 2728(अ), तारीख 25 नवंबर, 2008, का.आ. 1356(अ), तारीख 27 मई, 2009, का.आ.1802(अ) तारीख 22 जुलाई, 2009, का.आ.2399(अ) तारीख 18 सितंबर, 2009, का.आ. 3122(अ), तारीख 7 दिसंबर, 2009, का.आ. 3123(अ), तारीख 7 दिसंबर, 2009, का.आ. 142(अ), तारीख 21 जनवरी, 2010, का.आ. 619(अ), तारीख 19 मार्च, 2010, का.आ. 1662(अ), तारीख 13 जुलाई, 2010, का.आ. 2390(अ), तारीख 30 सितंबर, 2010, का.आ. 2904(अ), तारीख 8 दिसंबर, 2010, का.आ. 181(अ), तारीख 28 जनवरी, 2011, का.आ. 692(अ), तारीख 5 अप्रैल, 2011, का.आ. 1537(अ), तारीख 6 जुलाई, 2011, का.आ. 1754(अ), तारीख 28 जुलाई, 2011, का.आ. 2609(अ), तारीख 22 नवंबर, 2011, का.आ. 264(अ), तारीख 13 फरवरी, 2012, का.आ. 1150(अ), तारीख 22 मई, 2012, का.आ. 2039(अ), तारीख 5 सितंबर, 2012, का.आ. 2802(अ), तारीख 27 नवंबर, 2012 और का.आ. 2850(अ), तारीख 7 दिंसबर, 2012 तथा का.आ. 592(अ), तारीख 8 मार्च, 2013, का.आ. 945(अ), तारीख 8 अप्रैल, 2013, का.आ.2287(अ), तारीख 27 जुलाई, 2013, का.आ.2288(अ), तारीख 27 जुलाई, 2013, और का.आ.3489(अ), तारीख 26 नवंबर, 2013, द्वारा उसका संशोधन किया गया था ।

MINISTRY OF ENVIRONMENT AND FORESTS

NOTIFICATION

New Delhi, the 3rd January, 2014

S.O. 21 (E).—In exercise of the powers conferred by clause (b) of sub-section (1) of section 12 and section 13 of the Environment (Protection) Act, 1986 (29 of 1986) read with rule 10 of the Environment (Protection) Rules, 1986, the Central Government hereby makes the following further amendments in the notification of the Government of India in the Ministry of Environment and Forests, number S.O. 1174(E), dated the 18th July, 2007, namely :—

In the Table appended to the said notification,—

(a) for serial numbers 3, 46, 55, 57, 58, 61, 65, 68 and 69 and the entries relating thereto, the following serial numbers and entries shall be substituted, namely :—

(1)	(2)	(3)	(4)
"3	M/s Bhagavati Ana Labs Pvt. Ltd., Regd. Office and Central Laboratory Plot No. 7-2-C7 & 8/4, Industrial Estate Near Agromech Industries Santhnagar, Hyderabad - 500018 (Andhra Pradesh)	(1) Mr. Bhagavathi Hari Babu (2) Mr. A.V. Hanumantha Rao (3) Mr. V. Raghavacharyulu	3.01.2014 to 2.01. 2019
46	M/s Cosmo Conscious Research Laboratory" SURVEY HOUSE" # 121, 2nd Cross, Nehru Colony, Bellary - 583103 (Karnataka)	(1) Mr. G. Dhavaleshwar (2) Smt. V. Swarnalatha (3) Mr. K. Somasekhar Rao	3.01.2014 to 2.01. 2019
55	M/s Anacon Laboratories Pvt. Ltd., FP-34, 35 Food Park, 5 Star Industrial Estate, Butibori, Nagpur - 441122 (Maharashtra)	(1) Dr. (Ms.) Sugandha D. Garway (2) Ms. Kavita Saygaonkar (3) Mr. Yogesh Dhoke	3.01.2014 to 2.01.2019
57	M/s. Ramky Enviro Engineers Ltd. Hyderabad Waste Management Project, Survey No.684/1, Dundigal (V), Qutabullapur (M) Rangareedy District – 500 043 (Andhra Pradesh)	(1) Mr.V. Vijay Kumar (2) Mr.Madan Kumar D. Tiwari (3) Mr. K. Venkateswara Rao	3.01.2014 to 2.01.2019";
58	M/s. International Testing Centre, Plot No. 86, Industrial Area Phase-1, Panchkula-134109 (Haryana)	(1) Dr. Prakash kaur (2) Mr. Prem Kumar (3) Ms. Poonam Sharma	3.01.2014 to 2.01.2019
61	M/s Mitra S.K. Private Ltd., (Behala Laboratory) , 620, Diamond Harbour Road,	(1) Mr. Sudip Mukhuty (2) Ms. Sutapa Bhowmik	3.01.2014

	Behala Industrial Estate, Tool Room No. 2/3, 2/4 & 2/5, Kolkata – 700034 (West Bengal)	(3) Ms. Mousumi Sengupta	to 2.01. 2019
65	M/s Envirodesigns Eco Labs Eco Tower, Janatha Jn. Palarivattom, Kochi – 682025 Kerala	(1) Mr. K.L. Antony (2) Ms. Susan Abraham (3) Ms. Simi K.K.	3.01.2014 to 2.01. 2019
68	M/s Scientific Research Laboratory "SHYAMALI APARTMENT" 90, Lake East 4th Road 'Santoshpur, Kolkata - 700075 (West Bengal)	(1) Dr. Jyotirmoy Majumdar (2) Shri Kalyan Ghosh (3) Ms. Purba Mukherjee	3.01.2014 to 2.01. 2019
69	M/s Sadekar Enviro Engineers Pvt. Ltd., B-306/307, Plot No.61, Patel Estate, Reis Magos, verem, Alto, Old Betim Road, Bardez, Porvorim, Panaji – 403101 (Goa)	(1) Mr. Vishal Basawanni Sannakki (2) Mr. Vinayak Gangaram Kudkar (3) Ms. Swati Vaibhav More	3.01.2014 to 2.01.2019

(b) after serial number 113 and the entries relating thereto, the following serial numbers and entries shall be inserted, namely :—

(1)	(2)	(3)	(4)
"114	M/s Ecomen Laboratories Pvt. Ltd., Flat No. 8, 2nd Floor, Arif Chamber - V, Sector - H, Aliganj, Lucknow - 226024 (Uttar Pradesh)	(1) Ms. Reena Tripathi (2) Dr. Om Prakash Shukla (3) Mr.Praveen Kumar Dubey	3.01.2014 to 2.01.2019
115	M/s Team Labs and Consultants B-115 & 509, Annapurna Block Aditya Enclave, Ameerpet Hyderabad – 500038 Andhra Pradesh	(1) Mr. Ambati Ravi Pavankumar (2) Mr. S. Ramesh (3) Mr. T. Ravi Kiran	3.01.2014 to 2.01. 2019
116	M/s TUV SUD South Asia Pvt. Ltd., C-153/1, Okhla Industrial Estate, Phase-1, New Delhi - 110020	(1) Mr. Pramod Kumar (2) Mr. Ajay Kumar Pramanik (3) Mr. Vijayanand	3.01.2014 to 2.01. 2019";

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Dr. RASHID HASAN, Advisor

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(विज्ञान एवं प्रौद्योगिकी विभाग, भारत सरकार के अधीन स्वायत्तशासी निकाय)

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एन. वेंकटेश्वरन	अनिल रेलिया	प्रो. आशुतोष शर्मा
कार्यक्रम प्रबन्धक	निदेशक	अध्यक्ष

ANNEXURE 2
Methods for Recycling of Existing Asphalt Pavement

Recycling of Existing Asphalt Pavement for Underground Cable Project in Visakhapatnam, Andhra Pradesh

By
Prof. Prithvi Singh Kandhal

Background

Due to the frequently recurring incidences of cyclones in the coastal city of Visakhapatnam, Andhra Pradesh, it has been decided to convert all overhead electrical distribution system into underground network. The Package 2 of this project involves about 150 km of city roads, which are paved with asphalt materials and the underground cables is to be laid under these asphalt roads.

It has been planned to excavate cable trenches of 1.0 wide and 1.25 metre deep along the city roads of Visakhapatnam to lay underground cables. It is estimated that the average thickness of asphalt (mix of stone aggregate and bitumen binder) on the streets is about 250 mm because of repeated asphalt resurfacings placed on these streets in the past.

Digging the trench would require removal of this 250 mm thick asphalt and 1,250 mm of unbound material which probably consists of about 250 mm of Water Bound Macadam (WBM) which is primarily crushed stone base course, and about 1,000 mm of native soil subgrade.

It is quite common in India to use trench digging equipment such as excavator (for example, backhoe) or pavement breaker, which results in messy slabs or chunks of asphalt material, which are then transported and disposed off in a low lying area or landfill outside the city limits.

However, it is a common practice in developed countries like the US to recycle the reclaimed asphalt pavement (RAP) material (asphalt is 100% recyclable). In rare cases, limited quantities of broken asphalt are placed in approved landfills. However, such landfills must be encapsulated so that any leachate from petroleum based asphalt does not contaminate the groundwater. Finding suitable landfills is also becoming increasingly difficult in most countries.

There is no reason as to why the asphalt removed from the proposed trench in Visakhapatnam cannot be recycled in India considering the significant adverse effect on environment, which would result from not recycling. This is discussed in the following section.

Why Recycle?

The primary purpose of asphalt recycling in this project is to minimize adverse effect on environment. However, the financial implications will be discussed first.

This project involves removal of existing asphalt which is estimated to be 45,000 cu m in volume calculated as follows:

Length of project in km × 1000 × thickness of asphalt (m) × width of trench (m)
150 × 1000 × 0.250 × 1.2 = 45,000 cu m

The amount of RAP in metric tons (MT) = 45,000 cu m × 2.356 = 1,06,020 MT

Assuming that average bitumen binder content in the existing asphalt pavement layer(s) is 4 percent by weight and average stone aggregate is 96% by weight, the quantities and their respective costs of bitumen binder and stone aggregate are as follows:

4% Bitumen = 4,241 tons @ Rs. 50,000 per ton = Rs. 21.20 crores
96% Aggregate = 1,01,779 tons @ Rs. 500 per ton = Rs. 5.09 crores

Therefore, the total cost of bitumen binder and aggregate = Rs. 26.29 crores say Rs. 26.3 crores.

The preceding costs for Package 2 only are very high and significant especially because the bitumen binder is very expensive. That is why; bitumen is also called "black gold"; it is expensive than sugar on per kg basis. This has led to recycling of asphalt pavements as a normal procedure in developed countries. The most recycled material in the US at the present time is asphalt based on total tonnage.

Not only the quantities and costs of bitumen and aggregate are significant there are also problems of their availability. Bitumen is refined from petroleum crude which largely is imported in India from other countries. Also, sources (quarries) of good quality aggregate are depleting in India and it is difficult to open new quarries. For example, there are few sources of stone in Haryana and Punjab; stone aggregate has to be transported over very long distances from adjoining states.

If the existing asphalt is not recycled, it also presents the following environmental problems:

1. Dumping RAP in low lying areas or landfills has the potential of contaminating groundwater due to leaching of petroleum products from bituminous materials in RAP.
2. If the trench is filled back with new asphalt only it would require virgin bitumen binder and new aggregate. It requires considerable amount of energy to import crude oil, refine bitumen from it, and then transport the bitumen from the refinery to the project site. Likewise, it requires energy in quarrying, crushing/processing, and transporting the new aggregate from the quarry to project site. Unnecessary use of energy does impact the environment adversely and leaves carbon footprints.
3. India would unnecessarily lose carbon credits if asphalt recycling is not done on this project.

Recycling Strategies

The existing asphalt on the streets, which is estimated to be about 250 mm thick, will be removed by cold milling, which yields RAP of suitable size (about 40 mm

maximum) for both cold and hot recycling, usually without any further processing. Cold milling machines are easily available in India.

Cold milling machines have a cutting drum with tungsten carbide teeth (Figure 1) which effectively bite into the asphalt pavement to the desired exact depth.

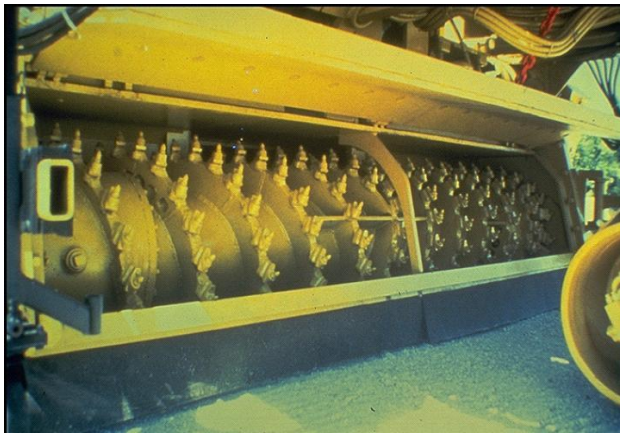


Figure 1. Milling drum with tungsten carbide teeth

Cold milling machines have numerous models based on their capabilities in terms of width and depth of milling. Machines which can do milling in narrow widths ranging from 1.0 m to 1.5 m and depth up to 330 mm for trenches are suited for the Visakhapatnam project and are available in India.

During cold milling operations, these machines simultaneously load the trucks with RAP thus causing minimal disruption to traffic on the streets (Figure 2). Thus there is no need to pile the RAP along the trench. Trucks transport the RAP to central plants for both cold recycling and hot recycling.

Figure 2. Cold milling machine loading RAP directly onto truck

There are four principal asphalt recycling methods: (a) hot mix recycling at central plant; (b) hot in-place recycling; (c) cold recycling at central plant; (d) cold in-place recycling; and (e) full depth reclamation. However, for this project, central plant cold recycling (CPCR) is most suited for the cold recycled base course to be placed in the

trench in about 240 mm thickness. For the 40 mm thick bituminous concrete (BC) wearing (surface) course, it is recommended to use hot mix recycling at central plant. Both are discussed below.

Central Plant Cold Recycling (CPCR)

Portable mixing plant suitable for CPCR is used for mixing RAP, mixing water, and new bitumen binder. A typical plant which is available in India is shown in Figure 3. Although bitumen emulsion (mixture of bitumen and water) can be used as new binder in cold recycling, it is recommended to use foamed bitumen for this project. This is because the cold recycled mix made with foamed bitumen can be stored at the plant site whenever required, thus providing flexibility in paving operations considering traffic on streets.

Figure 3. Typical portable mixing plant used for central plant cold recycling

Foamed bitumen is produced by injecting cold water in hot bitumen within a foaming device (Figure 4).

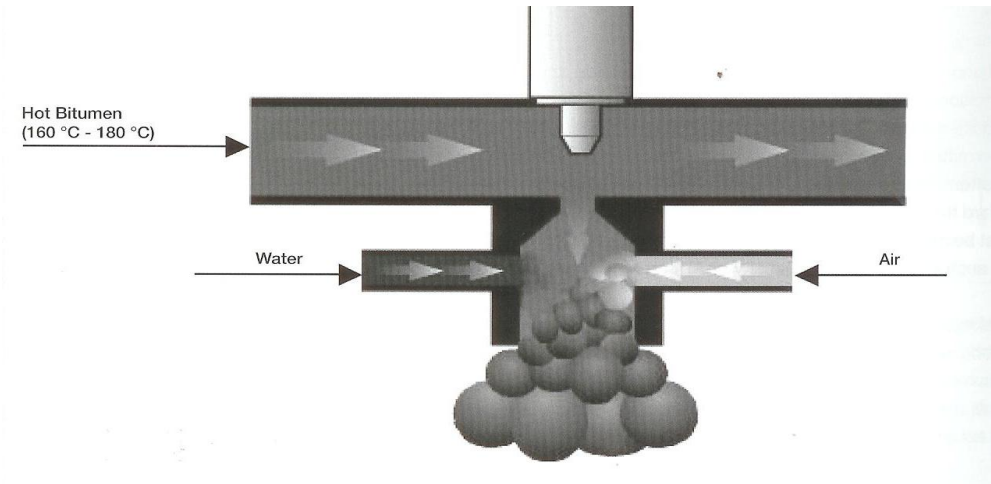


Figure 4. Foaming device for producing foamed bitumen

Normally, about 2 to 2.5 percent new bitumen (VG-30 Grade) is used. Foaming causes the bitumen to expand significantly and therefore coat RAP particles despite its relatively small amounts. Portland cement is sometimes required to be added to RAP to facilitate production of cold recycled mix using foamed bitumen. As mentioned earlier, the cold recycled mix can be stored at the plant or transported to the project site for laying it in the 1.2 m wide trench. Special pavers are available for filling trenches with asphalt mix (cold or hot).

In this project, loose cold recycled mix will be laid flush to the existing road surface. Small vibratory steel wheel roller will be used to compact the cold mix which will leave about 40 mm space at the top after compaction so that hot recycled BC Grading 2 mix can be placed later as wearing course.

Hot Mix Recycling

Part of the RAP at the central plant will be used to produce hot recycled BC Grading 2 mix to be placed 40 mm thick over the recycled cold base course in the trench. A batch type hot mix plant needs to be used after it is retrofitted for hot mix recycling. The retrofitting (Figure 5) involves providing two RAP supply bins one on the ground and the other on top of tower and a conveyor system for the RAP. The one-time cost of retrofitting a batch plant is about 25 lakh rupees at the present time.

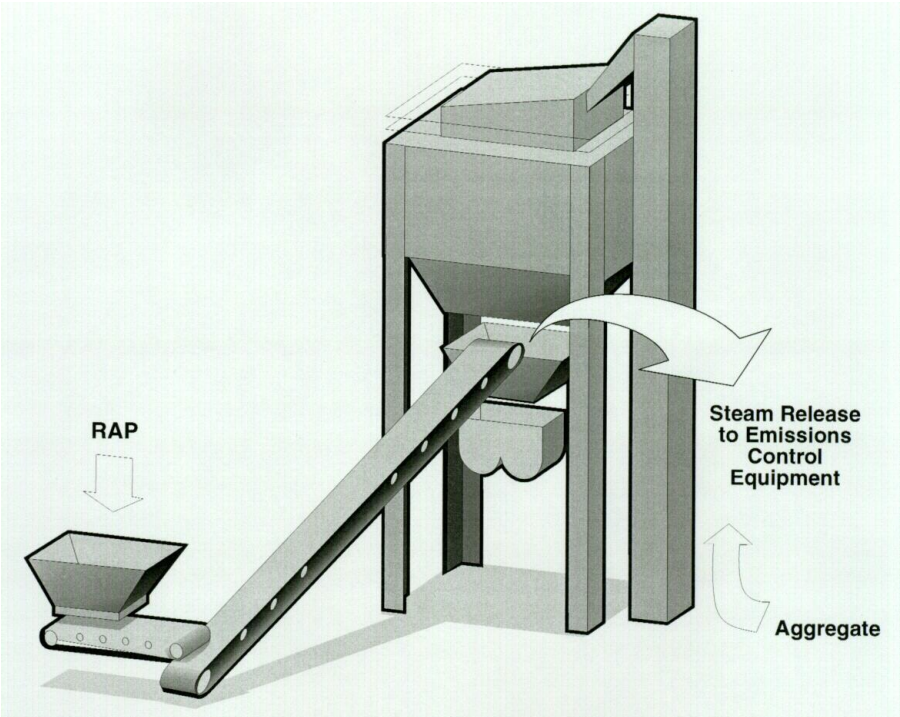


Figure 5. Modification to hot mix asphalt plant for hot recycling

Normally, 20-30% RAP is used in hot recycled asphalt mix; remaining being new aggregate and virgin bitumen binder. The hot recycled mix will be transported to the project site, laid over the cold recycled base course and compacted while it is hot. The 40 mm thick recycled BC Grading 2 mix will serve as wearing (surface) course and will be flush with the existing street surface after compaction. The hot recycled mix can be produced and placed after sufficient length of the trench (say 1 or 2 km) has been partially filled with cold recycled base course.

It should be mentioned that the hot recycled BC mix is considered equal or better than 100% virgin BC mix based on research conducted in the US because both have to meet the same standards of properties and quality. However, if it is not desired to retrofit the batch plant for hot recycling, using 100% virgin BC mix is also an option for this project.

Unbound Material under Existing Asphalt

After about 250 mm of existing asphalt is removed by cold milling, the remaining 1,250 mm of unbound material will need to be removed by conventional excavating methods. This will consist of probably 250 mm of water bound macadam (WBM) (crushed stone base course) and about 1,000 mm of natural soil subgrade.

After the underground cables are placed in the trench, both the natural soil and the WBM material can be placed in the trench and recompacted with a small steel roller. It would most likely be necessary to add water to both so that compaction can take place at optimum moisture content to achieve optimum density.

Recycling Guidelines and Specifications

Detailed recycling guidelines for cold recycling at central plant and hot recycling at central plant to be used on this project are available in the following two references:

1. Kandhal, Prithvi S. and Rajib B. Mallick. Pavement Recycling Guidelines for State and Local Governments. Federal Highway Administration Publication No. FHWA-SA-98-042, December 1997.

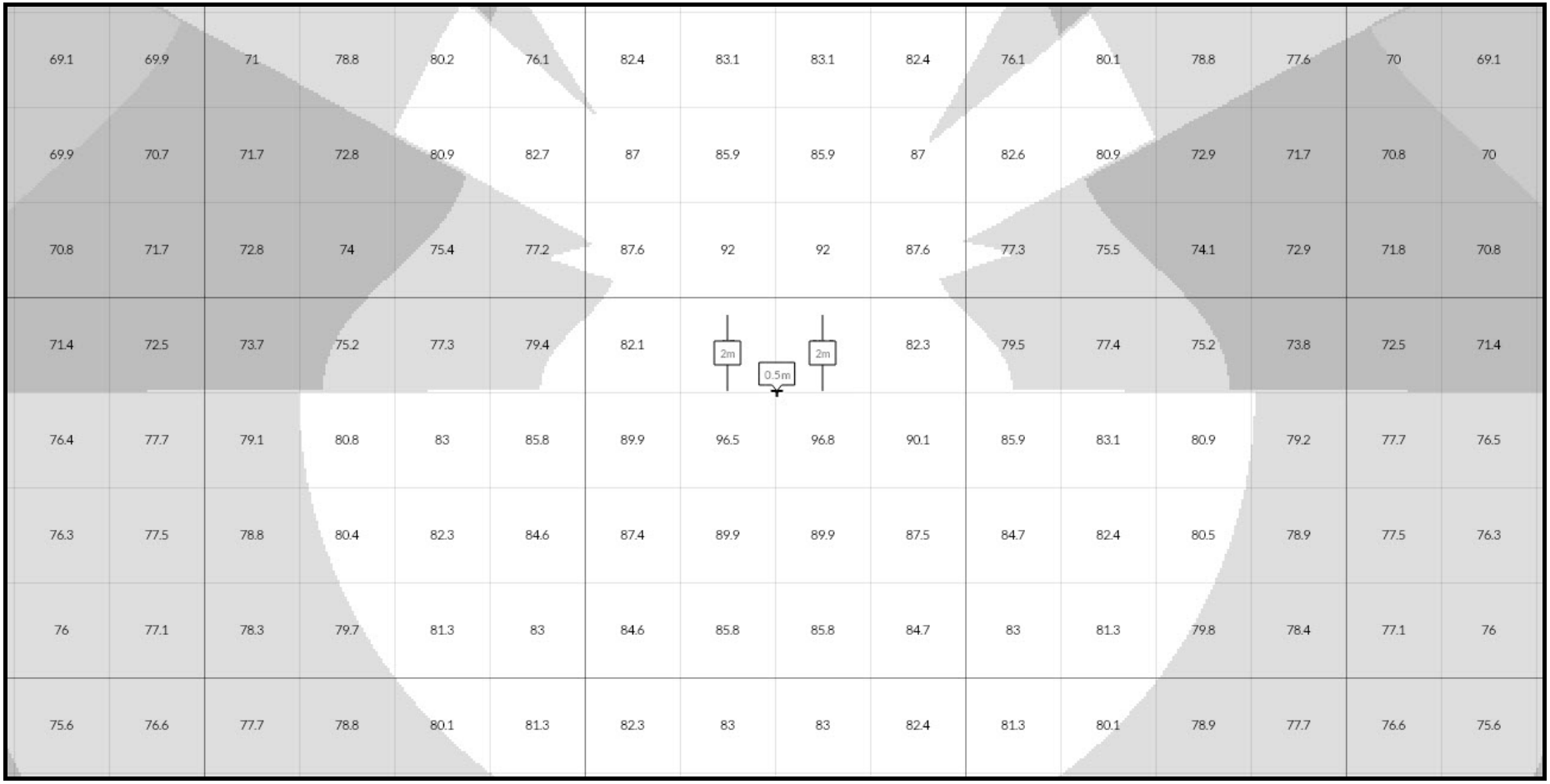
This US manual can be downloaded free at the following link:

http://www.scribd.com/doc/47299513/Pavement-Recycling-Guidelines-for-State-and-Local-Governments-Federal-Highway-Administration-Publication-No-FHWA-SA-98-042-December-1997

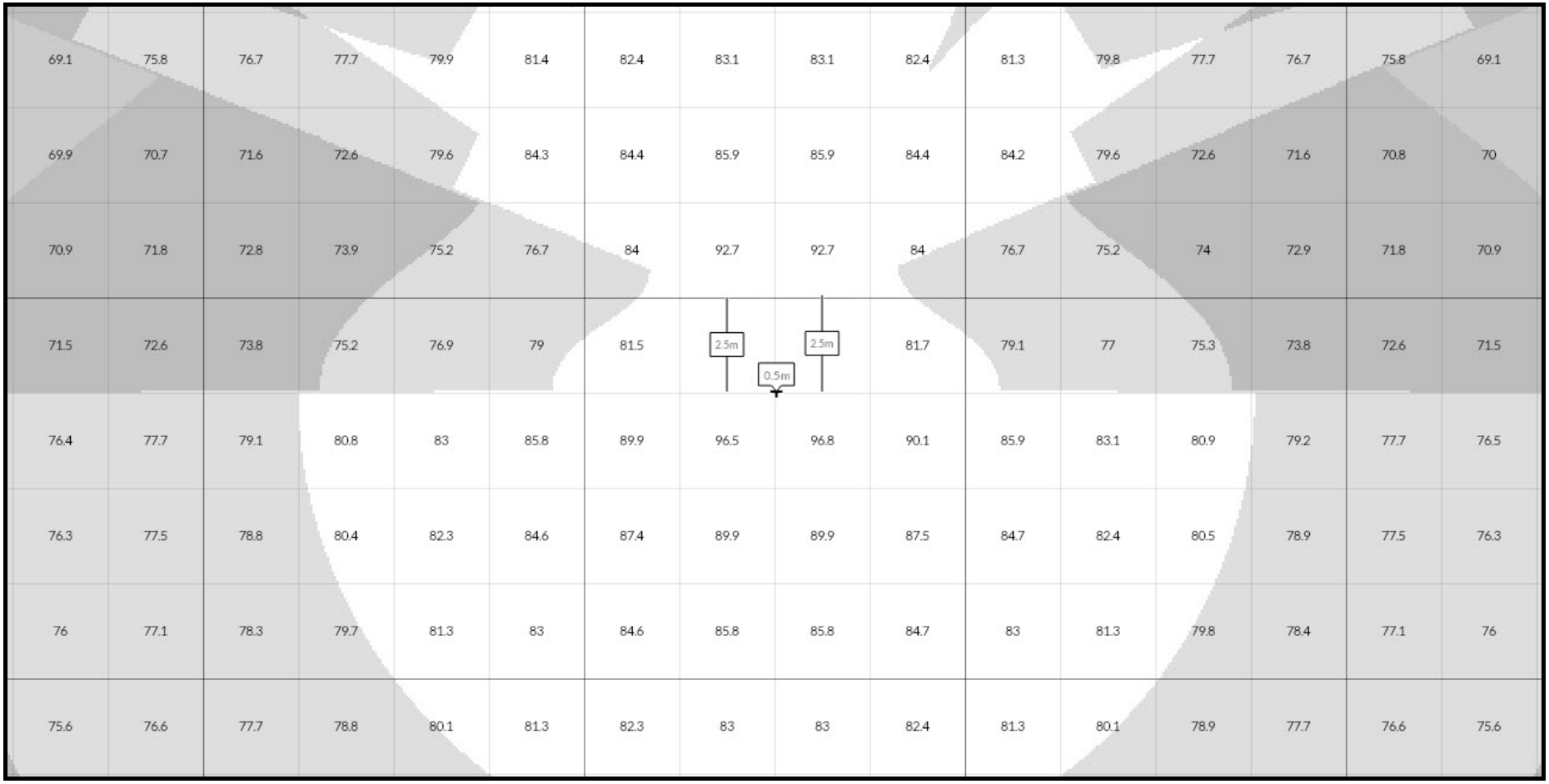
2. Recommended Practices for Recycling of Bituminous Pavements. Indian Roads Congress Publication IRC:120-2015, 2015.

Specifications for cold milling of trench for this project have been developed and are included in Annexure A.

ANNEXURE 3
Noise Level Contour Maps



Scenario 1: Noise Source – Excavator with Barrier height 2m

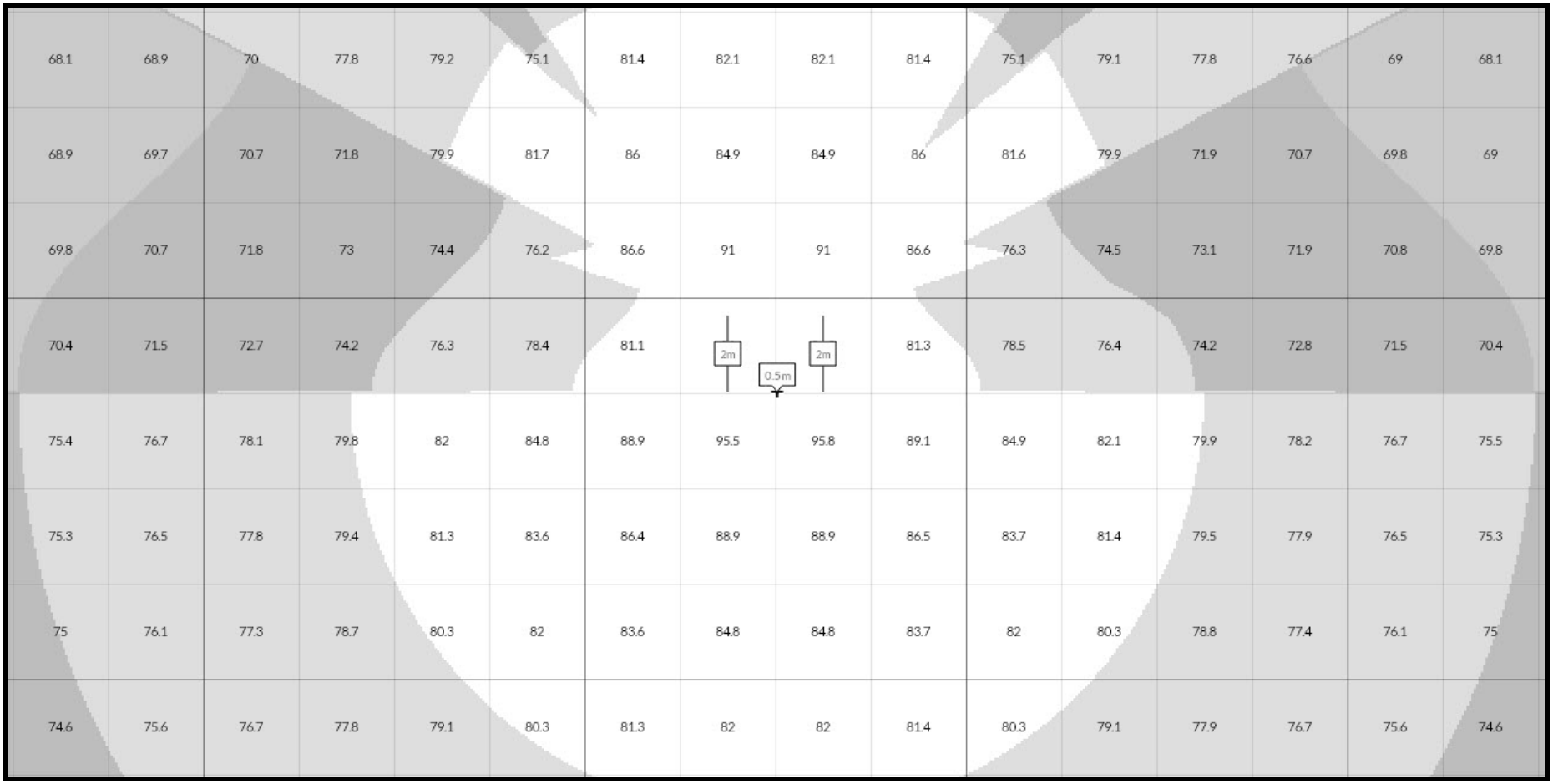


Scenario 1: Noise Source – Excavator with Barrier height 2.5m

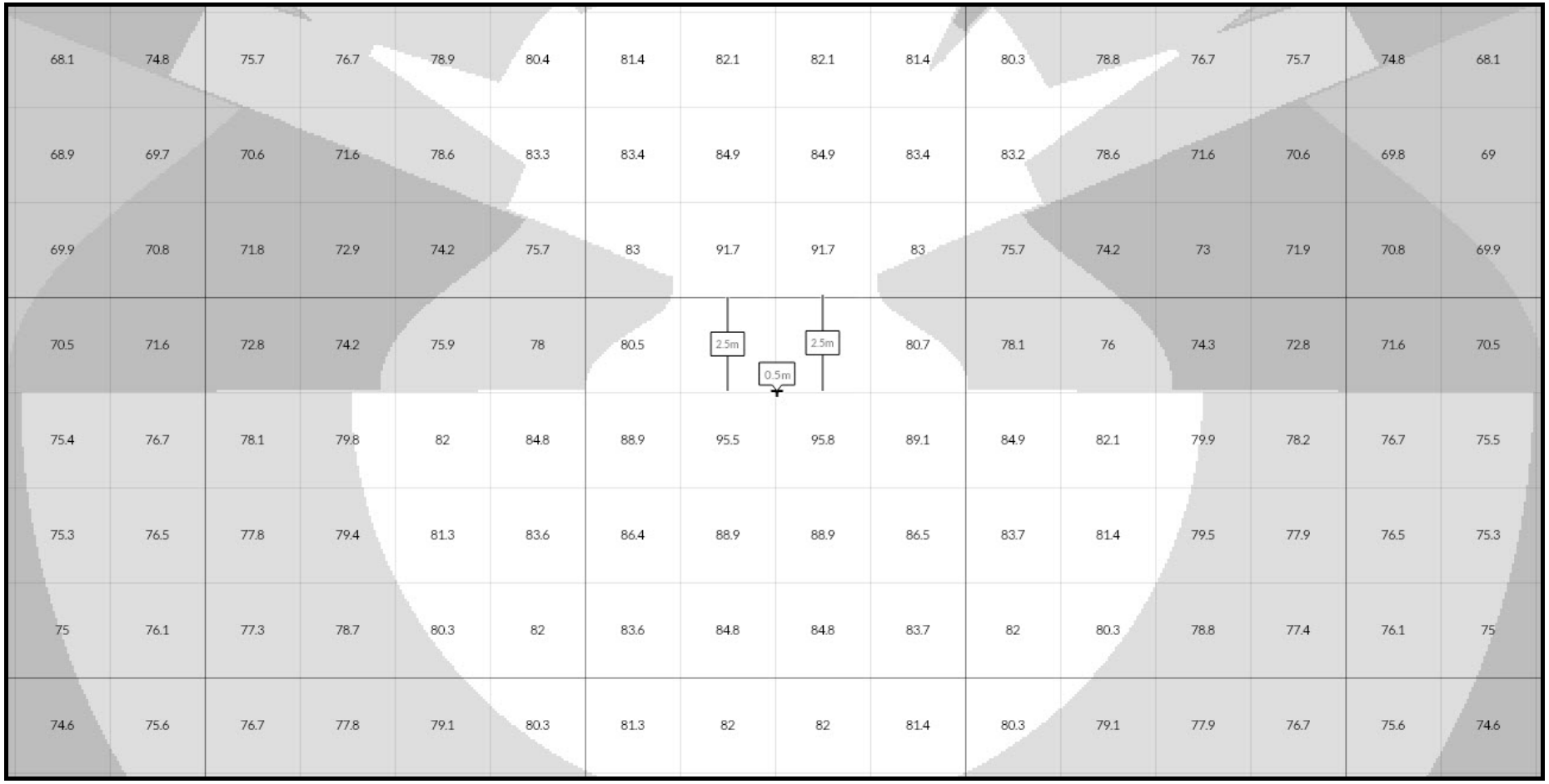
75.6	76.6	77.7	78.9	80.1	81.3	82.4	83.1	83.1	82.4	81.4	80.1	78.9	77.7	76.6	75.6
76	77.1	78.3	79.7	81.3	83	84.7	85.9	85.9	84.8	83.1	81.4	79.8	78.4	77.2	76
76.3	77.5	78.8	80.4	82.4	84.7	87.4	90	90.1	87.5	84.8	82.4	80.5	78.9	77.5	76.3
76.4	77.7	79.1	80.8	83	85.8	89.9	96.6	97	90.1	85.9	83.1	80.9	79.2	77.7	76.5
76.4	77.7	79.1	80.8	83	85.8	89.9	96.5	96.8	90.1	85.9	83.1	80.9	79.2	77.7	76.5
76.3	77.5	78.8	80.4	82.3	84.6	87.4	89.9	89.9	87.5	84.7	82.4	80.5	78.9	77.5	76.3
76	77.1	78.3	79.7	81.3	83	84.6	85.8	85.8	84.7	83	81.3	79.8	78.4	77.1	76
75.6	76.6	77.7	78.8	80.1	81.3	82.3	83	83	82.4	81.3	80.1	78.9	77.7	76.6	75.6

Point (0.5m)

Scenario 1: Noise Source – Excavator without Barrier



Scenario 2: Noise Source – Excavator plus Tipper Truck with Barrier height 2m

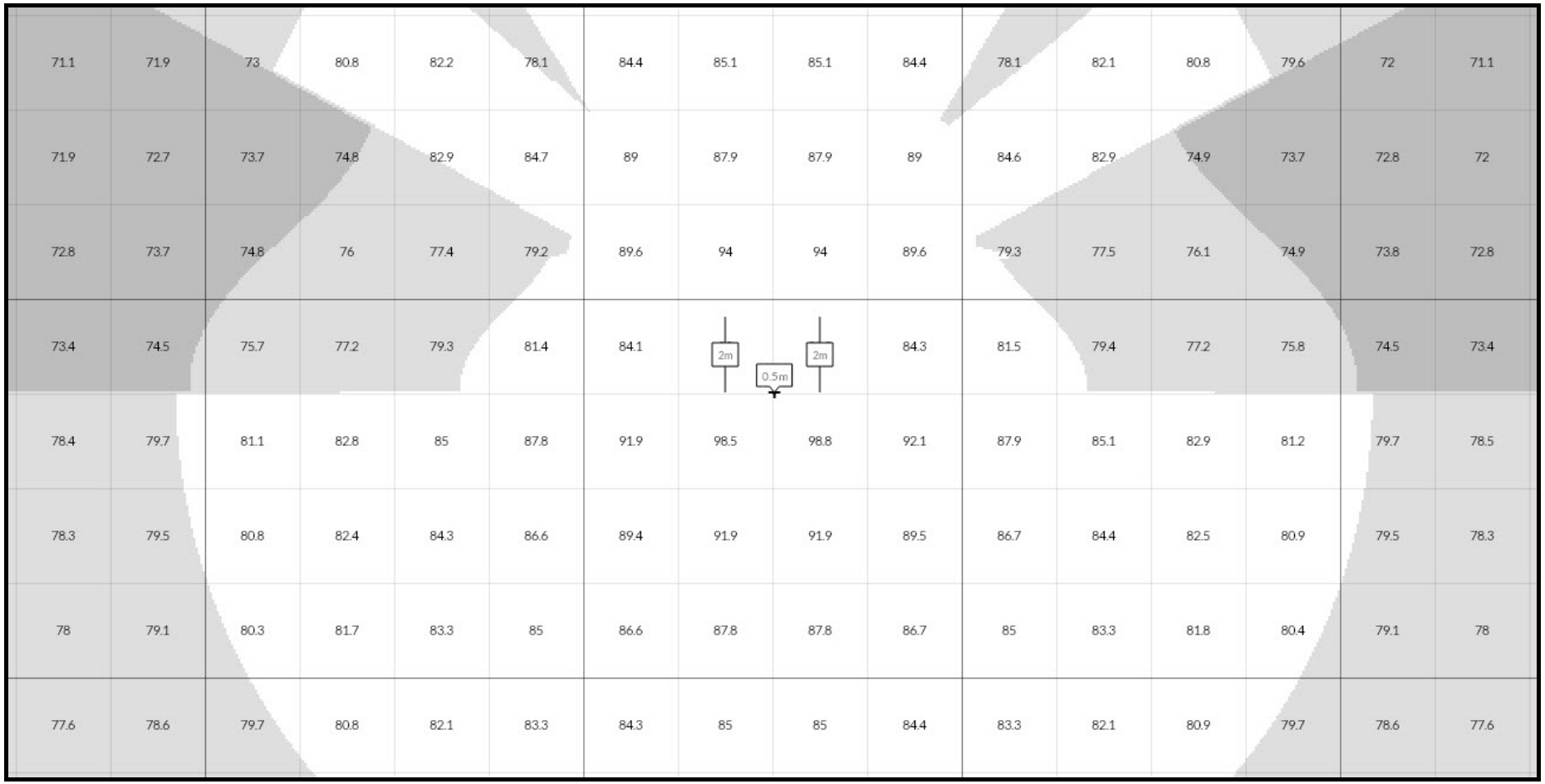


Scenario 2: Noise Source – Excavator plus Tipper Truck with Barrier height 2.5m

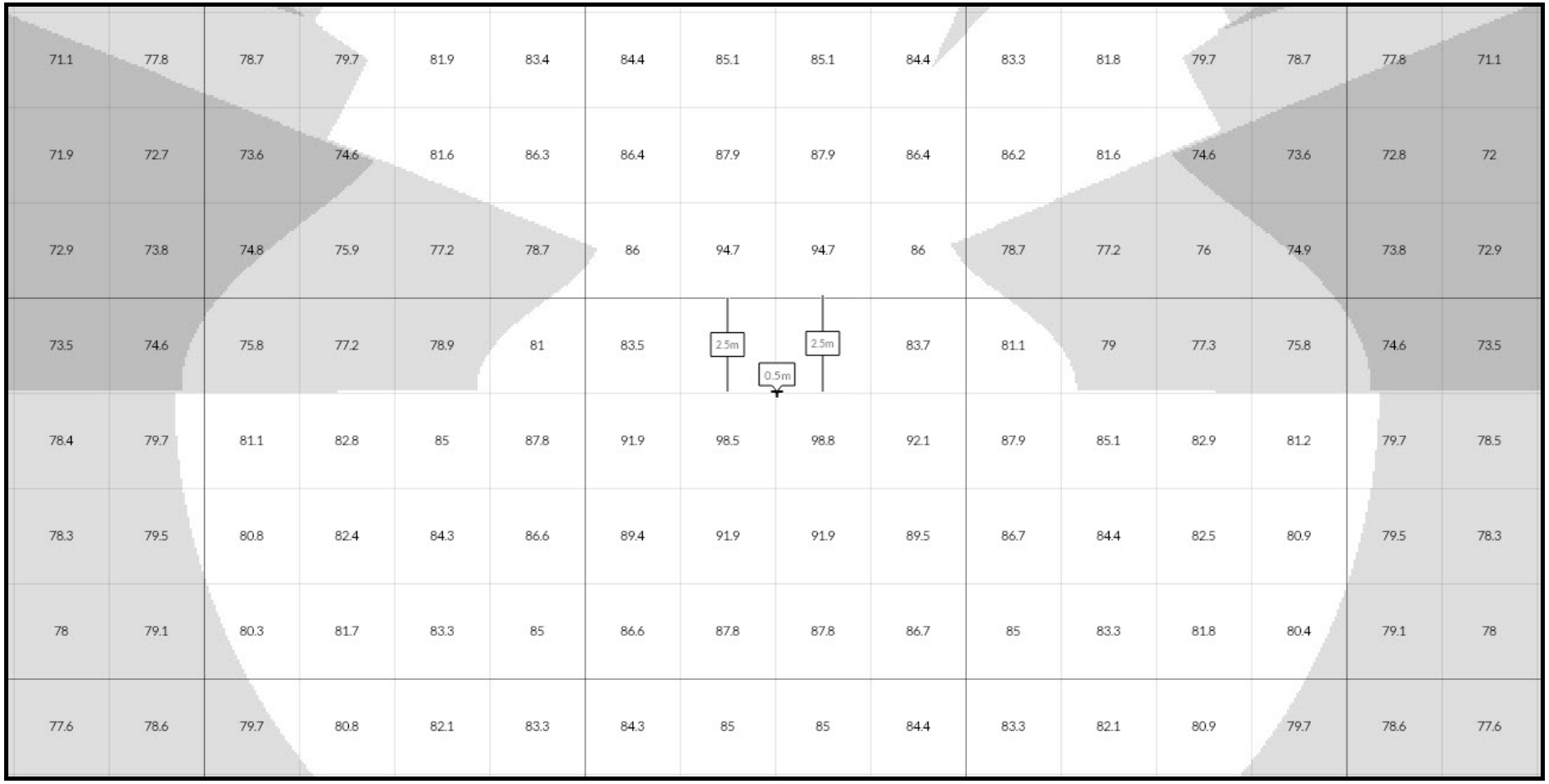
74.6	75.6	76.7	77.9	79.1	80.3	81.4	82.1	82.1	81.4	80.4	79.1	77.9	76.7	75.6	74.6
75	76.1	77.3	78.7	80.3	82	83.7	84.9	84.9	83.8	82.1	80.4	78.8	77.4	76.2	75
75.3	76.5	77.8	79.4	81.4	83.7	86.4	89	89.1	86.5	83.8	81.4	79.5	77.9	76.5	75.3
75.4	76.7	78.1	79.8	82	84.8	88.9	95.6	96	89.1	84.9	82.1	79.9	78.2	76.7	75.5
75.4	76.7	78.1	79.8	82	84.8	88.9	95.5	95.8	89.1	84.9	82.1	79.9	78.2	76.7	75.5
75.3	76.5	77.8	79.4	81.3	83.6	86.4	88.9	88.9	86.5	83.7	81.4	79.5	77.9	76.5	75.3
75	76.1	77.3	78.7	80.3	82	83.6	84.8	84.8	83.7	82	80.3	78.8	77.4	76.1	75
74.6	75.6	76.7	77.8	79.1	80.3	81.3	82	82	81.4	80.3	79.1	77.9	76.7	75.6	74.6

Point (0.5m)

Scenario 2: Noise Source – Excavator plus Tipper Truck without Barrier



Scenario 3: Noise Source – Roller, Paver and Tipper Truck with Barrier height 2m

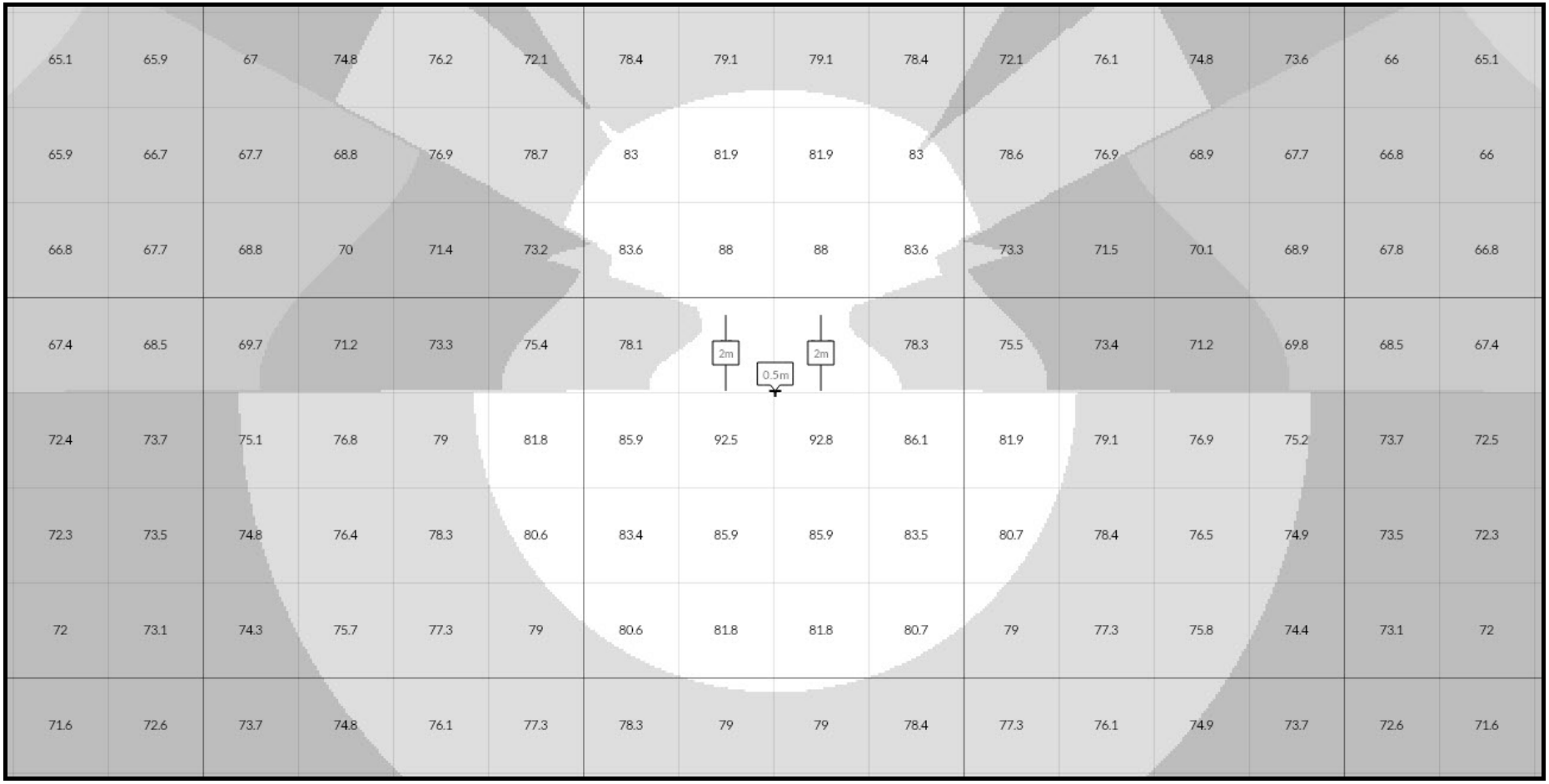


Scenario 3: Noise Source – Roller, Paver and Tipper Truck with Barrier height 2.5m

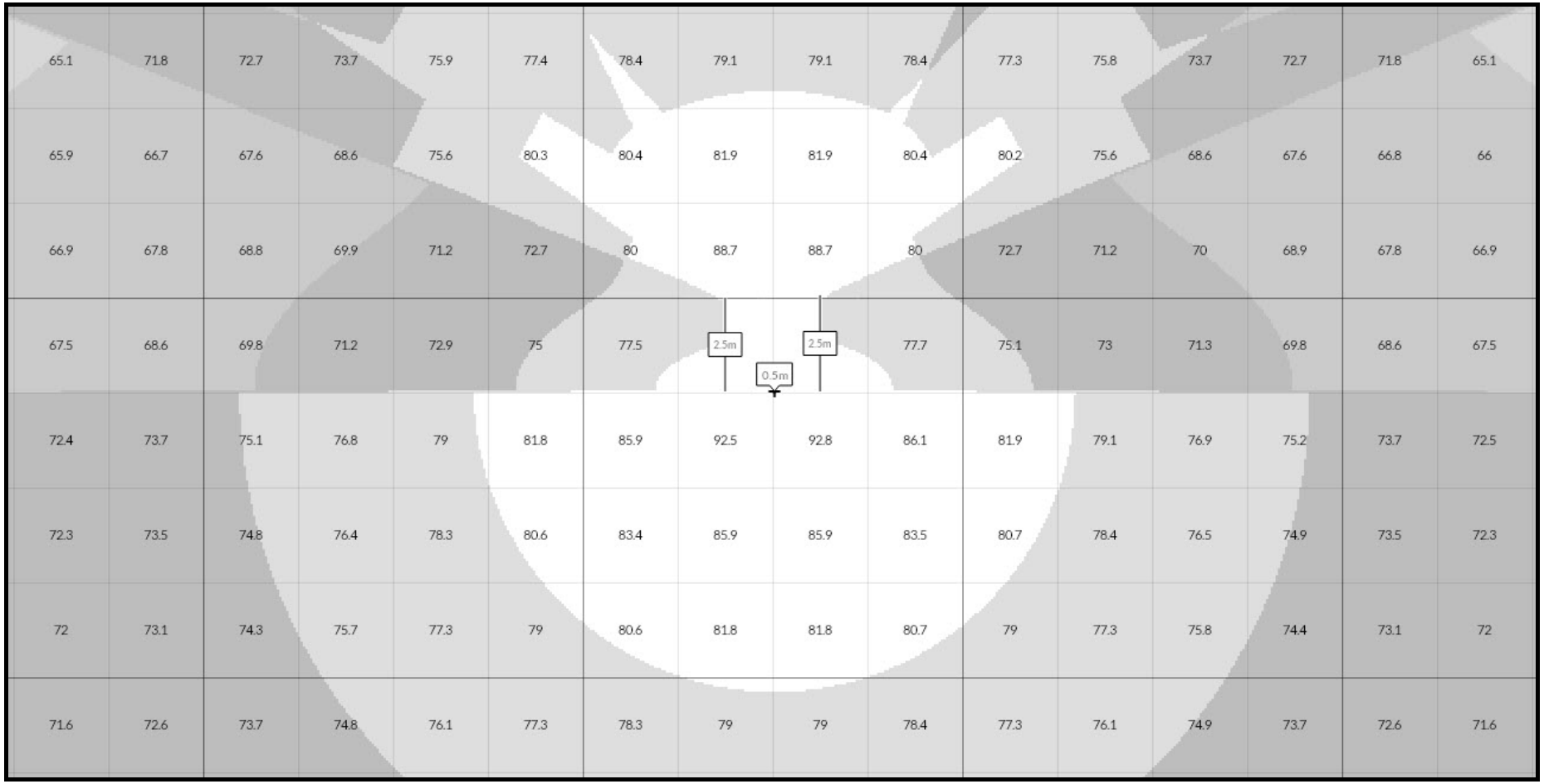
77.6	78.6	79.7	80.9	82.1	83.3	84.4	85.1	85.1	84.4	83.4	82.1	80.9	79.7	78.6	77.6
78	79.1	80.3	81.7	83.3	85	86.7	87.9	87.9	86.8	85.1	83.4	81.8	80.4	79.2	78
78.3	79.5	80.8	82.4	84.4	86.7	89.4	92	92.1	89.5	86.8	84.4	82.5	80.9	79.5	78.3
78.4	79.7	81.1	82.8	85	87.8	91.9	98.6	99	92.1	87.9	85.1	82.9	81.2	79.7	78.5
78.4	79.7	81.1	82.8	85	87.8	91.9	98.5	98.8	92.1	87.9	85.1	82.9	81.2	79.7	78.5
78.3	79.5	80.8	82.4	84.3	86.6	89.4	91.9	91.9	89.5	86.7	84.4	82.5	80.9	79.5	78.3
78	79.1	80.3	81.7	83.3	85	86.6	87.8	87.8	86.7	85	83.3	81.8	80.4	79.1	78
77.6	78.6	79.7	80.8	82.1	83.3	84.3	85	85	84.4	83.3	82.1	80.9	79.7	78.6	77.6

Point (0.5m)

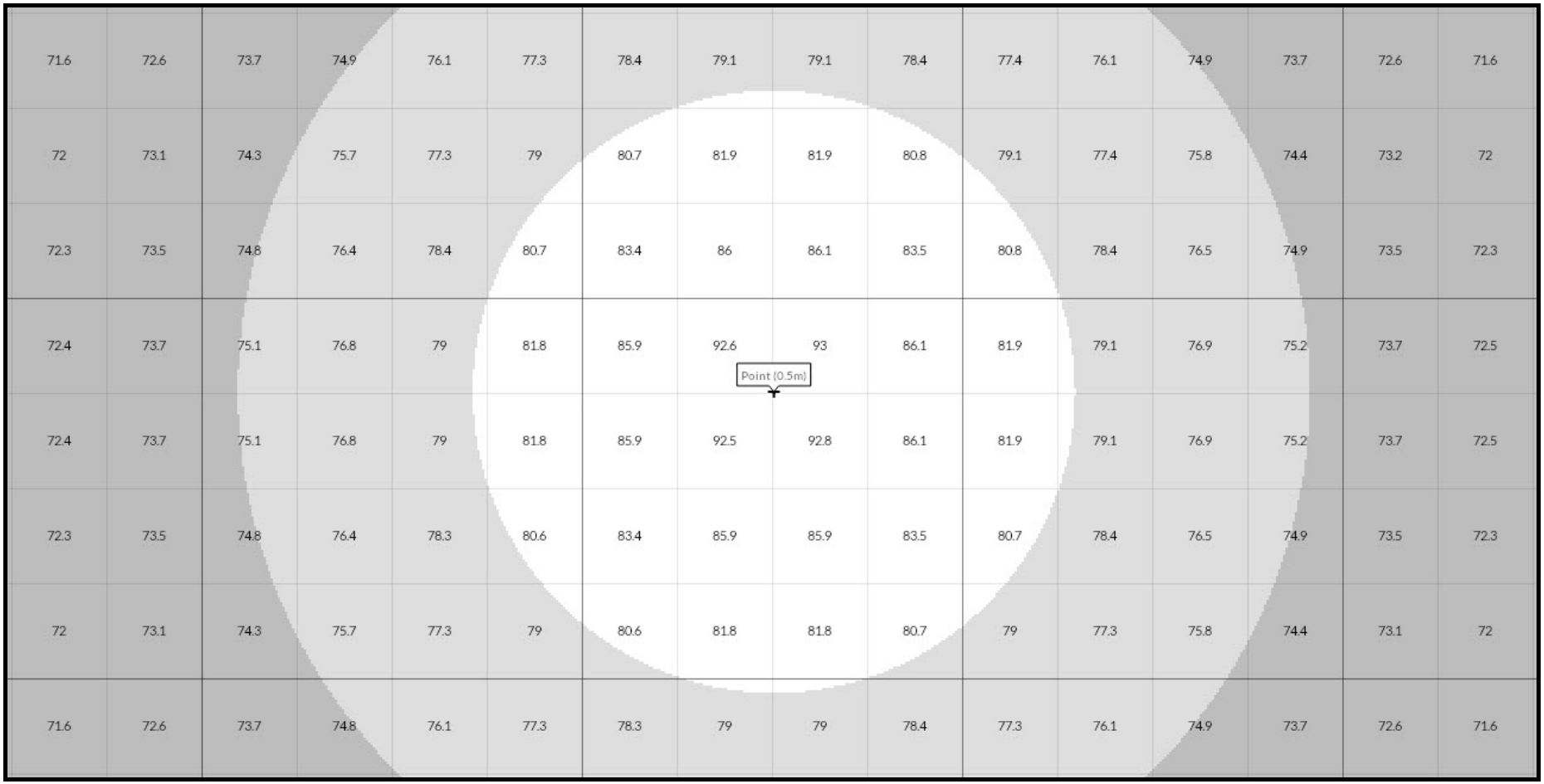
Scenario 3: Noise Source – Roller, Paver and Tipper Truck without Barrier



Scenario 4: Noise Source – Concrete Mixer with Barrier height 2m



Scenario 4: Noise Source – Concrete Mixer with Barrier height 2.5m



Scenario 4: Noise Source – Concrete Mixer without Barrier

ANNEXURE 4
Details of Public Consultation along with list of Participants

Annexure -2 Public Consultation (PRIMARY STAKEHOLDERS)

PUBLIC CONSULTATION AT SRI YERUKAMAMBA DEVASTHANAM TEMPLE, AKAYYAPALEM ROAD, INDOOR DONDAPARTY SS

Appendix-

PUBLIC CONSULTATION WITH LOCAL PEOPLE

Date	Road Number / Lane Name	Issue Discussed	Suggestion given by local people	Remarks if any
03/05/2016	R-107.	1. ✓ [illegible]	1. ✓ [illegible]	
	SRI YERUKAMAMBA DEVASTHANAM TEMPLE AKKAYYAPALEM ROAD (INDOOR DONDAPARTY)	2. [illegible]	2. [illegible]	
		3. ✓ [illegible]	3. [illegible]	
		4. [illegible]	4. [illegible]	
		5. [illegible]	5. ✓ [illegible]	
		[illegible]	[illegible]	
		[illegible]	✓ [illegible]	
		[illegible]	[illegible]	

ESIA -Resilient Electrical Network

Andra Pradesh Disaster Recovery Project

ATTENDANCE SHEET OF PUBLIC CONSULTATION

S. No.	Name of person	Sex	Occupation	Phone Number	Signature
(1)	B. Muraliamma.	F	Bussiness	7386105310.	Muraliamma
(2)	N. Rajlakshmi	F	"	9676387933	
(3)	V. Appalaraju	M	"	9502541438.	V. Appalaraju
(4)	M. Atchutrao	M	"	—	Appalaraju
(5)	A. Ramu	F	"	9912289541	M. Atchutrao
(6)	CH. Kondamma	F	"	9396239248	
(7)	B. Viswanadham	M	"	9848773654.	
(8)	N. Yellayamma	F	"	9063786939	
(9)	K. Ramana.	F	"	9848616605	K. Ramana
(10)	K. Kumari	F	"	9573741061	
(11)	R. Santoshi	F	"	9985012868.	R. Santoshi
(12)	J. Lakshmi	F	"	—	Lakesh
(13)	B. Ramanamma	F	"	—	Ramanamma
(14)	P. Krishnaveni	F	"	—	P. Krishna
(15)	S. Narayanamma	F	"	—	Narayanamma
(16)	CH. Ramanamma	F	"	—	Ch. Ramanamma

PUBLIC
OLDER CONSULTATION MEETING
Power

PUBLIC CONSULTATION AT KALABHARATI AUDITORIUM ROAD, RATHY MARKET, MADDILAPALEM SS

Appendix-

PUBLIC CONSULTATION WITH LOCAL PEOPLE

Date	Road Number / Lane Name	Issue Discussed	Suggestion given by local people	Remarks if any
04/05/2016	R-160,91	1. ✓ శ్రీకృష్ణ ప్రస్తుత పరిస్థితిలో వలసినా	1. ✓ నష్టపోయిన వ్యాపారస్తులకు	
	KALABHARATI	2. నాటి కోరత ఈ మార్కెట్ ఇంది.	2. Government ప్రత్యేకముగా	
	AUDITORIUM	3. తవ్వకం జరుగుతే మరింత పెరగబట్టు.	3. పరిష్కారాలు కల్పించండి.	
	ROAD	4. ✓ ఈ తవ్వకాలు వల్ల మా వ్యాపారం	4. ✓ ఈ తవ్వకాలు ఎంత తొందరగా	
	RATHY MARKET	5. తెల్లు తీసుకుంటు. మా జీవనాధారం	5. పూర్తి చేస్తే అంత మంచిది.	
	Maddilapalem	కోల్పోతాము.	~~[illegible]~~ ✓ ఈ తవ్వకాలు మా	
	(CMR Feeder)		వ్యాపారం జరగని కాలంలో అనగా	
			NIGHT TIME WORK చేయవలసిందిగా	
			కోరుతున్నాము.	
			✓ ఈ ప్రాజెక్ట్ ఎలాగు సమ్మతిస్తే.	

ATTENDANCE SHEET OF PUBLIC CONSULTATION

S. No.	Name of person	Sex	Occupation	Phone Number	Signature
(1)	B. pollamani	F			
(2)	ST. Gousaya	F	Bussiness	7794942785	Gousiya
(3)	V. Yellamma	F			
(4)	B. Apparao	M	Bussiness	8886560064.	B. APPARAO
(5)	E. Bangaramma	F	Bussiness.		E. Bangaramma
(6)	S.K. Sellar	M	Bussiness.	9133910782.	S.K. Sellar
(7)	B. Sainu	M	Bussiness.	9581351969.	
(8)	S. Rafi	M	Bussiness	9848817801	S. Rafi
(9)	B. Kasulamma	F	"	8686145992.	
(10)	N. Dhanam	F	"		N. ధనం
(11)	M. Appalakonda	F	"	—	M. Appalakonda
(12)	B. Suryakantha	F	"		
(13)	G. Dasu Babu	M	"		
(14)	SAIDH. ABLLI SALIAM	M	"	8099288571	

Underground Cable Works of Visakhapatnam city
Eastern Power

PUBLIC STAKE HOLDER CONSULTATION MEETING
Underground Cable Works of Visakhapatnam city
Eastern Power

PUBLIC CONSULTATION AT DOBI COLONY, PANDURANGAPURAM SS

Appendix-

PUBLIC CONSULTATION WITH LOCAL PEOPLE

Date	Road Number / Lane Name	Issue Discussed	Suggestion given by local people	Remarks if any
30/04/2016	R.NO,34, 37	1. ఈ ప్రాజెక్టు అందరికి సమ్మతమే	1. ఈ నష్టానికి తగ్గ పరిహారం	
	DOBI COLONY	2. అవ్వకాలు జరగడమన్న వృత్తి ఎప్పటిలా	2. కల్పించండి.	
	Nakkavani-palem	3. నష్టం కలుగుతుందా	3. ఇప్పుడు ఎలాగైతే ఫన్నాయె	
	Pandurangapuram Feeder	4.	4. అవ్వకం జరిగిన తరువాత	
		5.	5. అదే విధంగా వుండటట్లు	
			చుడండి. ఏనా జరగుండ	
			ఆరగా జరిగి విధంగా చుడండి	
			పిల్లలు ఇబ్బందా కలుగకుండ	
			చేస్తలు, ఖాడాండి.	

ESIA -Resilient Electrical Network

Andra Pradesh Disaster Recovery Project

SS

ATTENDANCE SHEET OF PUBLIC CONSULTATION

S. No.	Name of person	Sex	Occupation	Phone Number	Signature
(1)	V. Devudamma	F	DHOBI		V. Devudamma
(2)	C.H. Kanaka.	F	DHOBI	8522978080.	CH. Kanaka.
(3)	K. Rammanamma.	F	HOUSE-WIFE	9652669371	K. [illegible]
(4)	P. Sankar Rao	M	DHOBI	9951918274	P. [illegible]
(5)	G. Lakshmi	F	HOUSE-WIFE		G. Lakshmi
(6)	D Lakshman Rao.	M	DHOBI	9912979005.	D [illegible]
(7)	A. Sai latha.	F	STUDENT	9912840337	Sailatha
(8)	P. Tharani	F	STUDENT		P. Tharani
(9)	R. Appa rao.	M	DHOBI.		R. Appa Rao.
(10)	V. Pentayyaha.	M	DHOBI		V. pentayyaha.
(11)	V. Appa Rao	M	DHOBI		[illegible]
(12)	P. Ramullu.	M	DHOBI	7036427242	P. Ramullu
(13)	N. Appa Rao.	M	DHOBI		N. Appa Rao
(14)	N. PYDHI RAJU	M	DHOBI	9985222103	N. Pydi Raju
(15)	A. SURI-BABU	M	DHOBI		[illegible]

KE HOLDER CONSULTATION MEETING
ks of Visakhapatnam city
rn Power

ప్రజల అభిప్రాయములను సేకరించే సమావేశం
PUBLIC/ STAKE HOLDER C TION MEETING

PUBLIC CONSULTATION AT RAJKA STEET, SREE RANGA PURAM, RK BEACH FEEDER

Appendix-

PUBLIC CONSULTATION WITH LOCAL PEOPLE

Date	Road Number / Lane Name	Issue Discussed	Suggestion given by local people	Remarks if any
01/05/2016	RNO-60,67,71	1. ✓ డ్రైనాజీ సరిగా లేదు.	1. ✓ ఈ ప్రాజెక్టు ఉందురు	
	Sree Ranga Puram	2. చిన్న రోడ్లు ఉండడం వల్ల	2. సమ్మతమే	
		3. డ్రైనాజీ పాడుపడుతున్నది.	3. ✓ చిన్న రోడ్లు కావడం వల్ల	
	Nakkavani palem	4. ✓ నీటి కోరతగా వుండి, తప్పకాలు	4. ప్రత్యేకంగా ఉండవ్	
	RK Beach Feeder.	5. జరిగితే మరి పరుగుతుంది.	5. డ్రైనాజీ కాకుండ ప్రేనుండి	
		✓ చిన్న రోడ్లు వల్ల నడిచే వారికి	ప్రత్యేకంగా వాలు కలిగితే	
		ఇబ్బంది కలుగుతుంది.	ఏ విధంగా జరిగి ఉట్లు చుడుంది.	
			✓ చిన్న రోడ్లు కావడం వల్ల మా	
			మెట్లు, గట్లు, ఉదా విధంగా	
			వుండే ఉట్లు జాగ్రత్తు తీసు	
			కోవాలి.	

ATTENDANCE SHEET OF PUBLIC CONSULTATION

S. No.	Name of person	Sex	Occupation	Phone Number	Signature
(1)	T. Kumar	M	PRIVATE-JOB	9494166673	
(2)	N. MUTYALARAO	M	Government JOB.	9346460734.	N. Mutyalarao
(3)	CH. HEMA	F	HOUSE-WIFE	9948796629	CH. Hema
(4)	M. Appala Konda	F	HOUSE-WIFE.	—	Appalakonda
(5)	N. Simhadri	F	"	—	N. SIMHADRI
(6)	K. Ramyamma	F	"	—	K. RAMYAMMA
(7)	P.B. Lakshmi	F	HOUSE-WIFE.		P.B. Laxmi
(8)	T. Bangaramma	F	HOUSE-WIFE		T. Bangaramma
(9)	D. Mangaveni	F	HOUSE-WIFE	9949129252	D. [illegible]
(10)	S. Rama lakshmi	F	HOUSE-WIFE.	7893338784.	S. Rama Lakshmi
(11)	D. Simahachalam	F	HOUSE-WIFE.		D. Simahachalam
(12)	M. Lakshmi	F	HOUSE-WIFE		M. Lakshmi
(13)	N. Srikanth	M	STUDENT	7793981518.	N. Srikanth
(14)	N. Chandra sekhar	M	PRIVATE-JOB	8096535119.	
(15).	M. Ramachandrarao	M	Retired	9391890971	

PUBLIC STAKE HOLDER CONSULTATION MEETING
Underground Cable Works of Visakhapatnam City
Eastern Power
Distribution Company of A.P. Ltd

Underground Cable Works of Visakhapatnam city
NAME OF THE PROJECT:
Eastern Power
Distribution Company of A.P. Ltd

PUBLIC CONSULTATION AT RAMALAYAM VEEDHI, TSR COMPLEX FEEDER

Appendix-

PUBLIC CONSULTATION WITH LOCAL PEOPLE

Date	Road Number / Lane Name	Issue Discussed	Suggestion given by local people	Remarks if any
03/05/2016	R.No 94,87,95 97, Ramalayam Veedhi Nakkvani palam TSR Complex Feeder	1. ఈ వ్యవస్థలు జరగడం వల్ల కోల్పోతా 2. వెసిన రోడ్లు, డ్రైనేజ్, వాటర్ 3. పైపులైన్ మరాయి. విధి లైట్లు. 4. మెట్లు లింటాయి. 5.	1. ముఖ్యంగా మా డ్రైనేజ్ 2. మరాయి మంచి నిటి 3. పైపులైన్ మెట్లు తన్నుకుంటా 4. జిగ్రత్తగా అవ్వకాలు జరిపించవలెను. 5. అవ్వకాలు జరిగి కాలంలో రోడ్లు పక్కన వున్న చీరు (పరిహారం) వ్యాపారస్థులకు ప్రత్యమ్నయం కలిపించవలెను. ఈ భూగర్భ విద్యుత్తు వ్యవస్థను ఇండర్ గ్రౌండ్ డ్రైనేజ్ అనుకోని వ్యవస్థను ~~[illegible]~~ చాయ్యలని కోరుచున్నాయి. ~~[illegible]~~ ఈ ప్రాజెక్ట్ అందరికీ సమ్మతమే. ప్రస్తుత రోడ్లు మెట్లు, గట్లు, ఎలక్ట్రికల్ వన్నాయి అవ్వకాలు తరువాత అవ్వకాలు ఇంటిటిస్తు చాయ్యంటి.	

ATTENDANCE SHEET OF PUBLIC CONSULTATION

S. No.	Name of person	Sex	Occupation	Phone Number	Signature
(1)	B.V.V. Satyanaryama	F	Bussiness	9704914370.	B.V.V Satyanarayana
(2)	G. parvathi	F	Bussiness	9966102926.	G. Parvathi
(3)	CH. ADHI Lakshmi	F	HOUSE-WIFE	–	[illegible]
(4)	A. Appalakonda	F	Bussiness	–	[illegible]
(5)	T. Lakshmi	F	HOUSE-WIFE		[illegible]
(6)	A. srinivas Rao	M	PLUMBER.	9581018287	A. SRINUVASRAO
(7)	S. Hari	M	ELECTRICIAN	–	S. HARI
(8)	S. Govindh	M	PRIVATE-JOB	9848429861	S. Govind
(9)	A. Venkatesh	M	DRIVER	9553915385	A. Venkatesh
(10)	T. Maheshreddy	M	STUDENT	9014526899	T. Mahesh Reddy
(11)	G. Sujatha	F	HOUSE-WIFE	9394839807	G. [illegible]
(12)	B. Gouriamma	F	PAKODI-CENTRE	–	[illegible]
(13)	T. Mutyalamma	F	HOUSE-WIFE	–	T. Mutyala[illegible]
(14)	S. Manga Raju	M	LIFT-PAINTER.	9912906085	S. Manga Raju
(15)	N. Yellayamma	F	SHOP	8142057850	[illegible]

Eastern Power

PUBLIC CONSULTATION AT JAGDHABBA BACK SIDE VIDYUT SAKHA FEEDER

Appendix-

PUBLIC CONSULTATION WITH LOCAL PEOPLE

Date	Road Number / Lane Name	Issue Discussed	Suggestion given by local people	Remarks if any
30/04/2016	RNo:-200, A9	1. డ్రైనాజీ Problems ఎక్కువగా	1. ✓ మురికి కాలువ లోడ	
	Jagdhabba Back Side (Nakkavani palem Vadyut Sakha Feeder) DobiLine	2. వున్నాయి.	2. పక్కన నుంచి విద్యుత్తు	
		3. డ్రైనాజీ వల్ల పిల్లలు ఇనార్యోగ్యం	3. వైర్యు వెలువలసిందిగా	
		4. పాలు వుతున్నారు.	4. కోరుతున్నాము.	
		5. లక్షకాలు జరిగితే మరుగు దోడ్లు	5. ✓ శా ప్రాజెక్ట్ వారికి సమ్మతమై	
		వెబ్బతిన్నాయి.	✓ మా వ్యక్తి వ్యాపారు నష్టపోతున్నాయి	
			కాబట్టి ప్రత్యామ్నాయంగా పరిష్కారం	
			కల్పించవలెను.	

ATTENDANCE SHEET OF PUBLIC CONSULTATION

S. No.	Name of person	Sex	Occupation	Phone Number	Signature
(1)	V. Kanaka Raju.	M	ELECTRICIAN.		V. Kanaka Raju
(2)	B. RamBabu.	M.	DHOBI	9505941491	B. Rambabu
(3)	P. NookaRathnam	F.	DHOBI	7416186512.	P. నూకరత్నం.
(4)	A. Lakshmi	F	DHOBI	9985092330.	A. [illegible]
(5)	A. Kanaka Raju	M	PRIVATE JOB	9052121638.	A. కనకరాజు
(6)	K. SIVA	M	PRIVATE JOB	9989895219.	K. [illegible]
(7)	P. Ramulu.	M	DHOBI	9440557274.	P. Ramulu.
(8)	K. Pavani	F	STUDENT	9059705433	K. Pavani
(9)	M. Deruduamma	F	HOUSE-WIFE.	9505048990.	M. Deruduamma.
(10).	K. ThriLakshmi	F	DHOBI	9656241416.	K. ThriLakshmi
(11)	CH.V. Lakshmi Narayana	M.	STUDENT	9502065653.	CH.V. Lakshminarayana.
(12)	R. Venkata Lakshmi	F	DHOBI	9052548983	R. వెంకటలక్ష్మి
(13)	D. Ramanamma.	F	HOUSE-WIFE	7799339278.	D. రమణమ్మ
(14)	K. Appalanarsama.	F	DHOBI	8500280354.	
(15)	K. parvathi	F	HOUSE-WIFE	9989896217.	K. పార్వతి

PUBLIC/ STAKE HOLDER CONSULTATION MEETING
Underground Cable Works
akhapatnam city

MULTI-STAKEHOLDER PUBLIC CONSULTATION AT VAISAKHI JALA UDYANAVANAM, SURYABAGH, VISAKHAPATNAM

APEPDCL

THE WORLD BANK

INVITATION

You are cordially requested to attend the Public Consultation Workshop conducted by APEPDCL on 21.10.2016 by 10:00 AM at Vaisakhi Jala Udyanavanam, Suryabagh, Visakhapatnam on the "Environmental and Social concerns/impacts during the proposed implementation of underground cabling (UG) project in Visakhapatnam city under the Andhra Pradesh Disaster Recovery Project (APDRP) financed by World Bank."

M.M.NAYAK, I.A.S.
Chairman & Managing Director
APEPDCL:: VISAKHAPATNAM

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Underground Power Cable Works of Visakhapatnam city

NAME OF THE PROJECT:
Andhra Pradesh Disaster Recovery Project (APDRP)
Component-1: Resilient Electrical Network

విశాఖనగర భూగర్భ విద్యుత్ కేబుల్ వ్యవస్థ

పథకం పేరు : ఆంధ్రప్రదేశ్ విపత్తు స్వస్థత పథకం (ఎ.పి.డి.ఆర్.పి)
మొదటి విభాగం : సమర్థ విద్యుత్ వ్యవస్థ.

Eastern Power Distribution Company of A.P. Ltd
ఆంధ్ర ప్రదేశ్ తూర్పు ప్రాంత విద్యుత్ పంపిణీ సంస్థ

About the Project:

- Government of Andhra Pradesh has formulated Andhra Pradesh Disaster Recovery Project (APDRP) with an estimated cost of US$ 370 Million (₹2,220 Crores) and the World Bank (IDA) has agreed to finance 68% of the Project Cost i.e. US$ 250 Million (₹1,500 Crores).
- The aim of the project is to restore the damages caused due to cyclone "HudHud" and to improve the resilience of the State's infrastructure and its communities from impacts of future disasters and climate change.

ప్రాజెక్టు గురించి :

- ఆంధ్రప్రదేశ్ విపత్తు స్వస్థత పథకాన్ని రూ.2,220 కోట్ల (370 మిలియన్ అమెరికా డాలర్లు) అంచనాతో ఆంధ్రప్రదేశ్ ప్రభుత్వం రూపొందించడం జరిగింది. ఈ అంచనాలో 68శాతం అంటే రూ.1500 కోట్లు (250 మిలియన్ అమెరికా డాలర్లు) భరించడానికి ప్రపంచ బ్యాంకు అంగీకారం తెలిపింది.
- ఈ పథకం ముఖ్యోద్దేశ్యం ఏమిటంటే 'హుద్‌హుద్' తుఫాను వలన దెబ్బతిన్న వ్యవస్థలను పూర్వస్థితికి తీసుకురావడం మరియు రాష్ట్ర మౌలిక వసతుల ప్రమాణాన్ని మెరుగుపరచడం మరియు భవిష్యత్ విపత్తులు లేదా వాతావరణ మార్పులనుండి సమాజాన్ని రక్షించడం.

About Component-1:

- Resilient Electrical Network is included under Component-1 of APDRP and it is proposed to replace the overhead power distribution network with underground cabling system in Visakhapatnam city.
- The amount provided for Resilient Electrical Network in Visakhapatnam city under APDRP is US$ 120 Million (₹720 Crores) and APEPDCL is the Project Implementing Unit (PIU).

మొదటి విభాగం గురించి :

- సమర్థ విద్యుత్ వ్యవస్థను ఎ.పి.డి.ఆర్.పి. మొదటి విభాగంలో చేర్చడం జరిగింది. విశాఖనగరంలోని భూ ఉపరితల విద్యుత్ వ్యవస్థను భూగర్భవిద్యుత్ కేబుల్ వ్యవస్థగా మార్చుచేయు ప్రతిపాదనలను ఈ విభాగంలో చేర్చడం జరిగింది.
- విశాఖనగరంలోని సమర్థ విద్యుత్ వ్యవస్థ నెలకొల్పడానికి రూ.720 కోట్లు (120 మిలియన్ అమెరికా డాలర్లు) కేటాయించడం జరిగింది. తూర్పుప్రాంత విద్యుత్ పంపిణీ సంస్థ (ఏ.పి.ఈ.పి.డి.సి.ఎల్.) కు ఈ పథకం మొదటి విభాగం అమలు పరిచే బాధ్యతను అప్పగించడం జరిగింది.

Advantages of Underground Cabling:

- In case of overhead distribution power network, the following problems are faced during natural disasters like cyclones, heavy rains, earth quakes etc.
  - Falling of poles, transformer structures etc.
  - Snapping of conductors due to trees falling on lines and falling of poles
  - Restoration of damaged network needs longer time and heavy investment
  - Power supply interruption for longer periods affecting all other sectors
- In case of underground cabling, the above problems will not be there since the cables will be below the ground and they will not be affected even by cyclonic winds. Further the aesthetics of the city will be improved, accidents will be minimized and greenery of the city will be protected as there is no need to cut the tree branches.
- Visakhapatnam is major city of Andhra Pradesh state and is the hub for Industrial and IT sectors. During cyclone "HudHud", the power distribution network in Visakhapatnam city was completely damaged. Being selected as a smart city, it is highly essential to provide reliable and uninterrupted power to all areas of the city.

భూగర్భ విద్యుత్ కేబుల్ వ్యవస్థ ప్రయోజనాలు :

- తుఫానులు, భారీవర్షాలు, భూకంపాలు వంటి ప్రకృతి విపత్తులు ఏర్పడినపుడు భూ ఉపరితల విద్యుత్ వ్యవస్థపై క్రిందనష్టాలు ఉంటాయి.
  - స్థంభాలు పడిపోవడం, ట్రాన్స్‌ఫార్మర్ నిర్మాణాలు పడిపోవడం
  - విద్యుత్ తీగలపై చెట్లు, స్థంభాలు పడిపోవడం వలన తెగిపోవడం
  - దెబ్బతిన్న విద్యుత్ వ్యవస్థను పూర్వస్థితికి తీసుకురావడానికి అధిక కాలహరణం మరియు భారీ వ్యయం అవసరం.
  - అధిక కాలం విద్యుత్ అందుబాటులో లేకపోవడం వలన విద్యుత్‌పై ఆధారపడిన ఇతర రంగాలపై తీవ్ర ప్రభావం

- భూగర్భ విద్యుత్ వ్యవస్థను ఏర్పాటు చేయడం వల్ల పైన పేర్కొన్న సమస్యలను నివారించగలుగుతాము. ఎందుకంటే ఈ వ్యవస్థలో విద్యుత్ స్థంభాల అవసరంలేదు.మరియు విద్యుత్ కేబుళ్ళు భూగర్భంలో వేయడం వలన పెనుగాలుల ప్రభావం వాటిపై ఉండదు.అంతేకాకుండా నగరసౌందర్యం ఇనుమడిస్తుంది. విద్యుత్ సంబంధిత ప్రమాదాలు నివారించగలుగుతాము. మరియు చెట్టుకొమ్మలు తొలగించవలసిన అవసరం లేకపోవడం వలన నగరంలో పచ్చదనం పరిరక్షించబడుతుంది.
- ఆంధ్రప్రదేశ్ రాష్ట్రంలో విశాఖపట్నం అతి పెద్ద నగరం మరియు పారిశ్రామిక, ఐ.టి.రంగాలకు కీలక ప్రదేశం హుడ్‌హుడ్ తుఫాను కారణంగా విశాఖ నగరంలోని విద్యుత్ వ్యవస్థ తీవ్రంగా దెబ్బతింది. అంతేకాకుండా విశాఖనగరం ఆకర్షణీయ నగరం(స్మార్ట్‌సిటి)గా తొలిజాబితాలో ఎంపికైనా సందర్భంగా, ఈ నగరంలోని అన్ని ప్రాంతాలకు నిరంతరమైన మరియు నమ్మకమైన విద్యుత్ సరఫరా చేయడం అత్యావశ్యము.

Extent of UG Cable Project coverage:

- In the first phase, it was decided by the Government to take up underground cabling works in the areas near the sea coast and then move towards land side in the subsequent phases.
- As per the decision of the Government, it was proposed to lay underground cables replacing the overhead distribution network under 23 Nos. 33/11 KV Sub-stations which are near to sea coast.

భూగర్భ విద్యుత్ కేబుల్ వ్యవస్థ పరిధి :

- ఈ పథకం మొదటి దశలో సముద్ర తీరానికి దగ్గరగా ఉన్న ప్రాంతాలలో భూగర్భ విద్యుత్ వ్యవస్థ ఏర్పాటు చేయుటకు ప్రభుత్వం నిర్ణయించింది. తరువాత దశల వారీగా సముద్ర తీర ప్రాంతంనుండి భూభాగం వైపుగా ఇతర ప్రాంతాలకు విస్తరిస్తాడు.
- ప్రభుత్వ నిర్ణయానుసారము, సముద్ర తీరానికి దగ్గరలో ఉన్న ఇరవై మూడు 33/11 కె.వి. సబ్‌స్టేషన్‌ల పరిధిలోని విద్యుత్ సరఫరా వ్యవస్థను భూగర్భ విద్యుత్ వ్యవస్థగా మార్చుటకు ప్రతిపాదించడమైనది.

Corridor of Impact:

- Corridor of impact for UG cable laying : 2 m from edge of footpath or line of sight along poles in roads without footpaths.

ప్రభావిత ప్రాంతం :

- భూగర్భ విద్యుత్ వ్యవస్థ ఏర్పాటు చేయ ప్రాంతం రహదారి ప్రక్కన కాలిబాట (ఫుట్ పాత్) ఉన్నట్లయితే దాని నుండి రెండు మీటర్ల వెడల్పున, రహదారి ప్రక్కన కాలిబాట లేనట్లయితే, ప్రస్తుతం ఉన్న భూఉపరితల విద్యుత్ సరఫరా లైను నుండి రెండుమీటర్ల వెడల్పున ప్రభావితం అవుతుంది.

Environmental & Social Impact Assessment (ESIA):

- As per the World Bank guidelines, APEPDCL has decided to assess the Environmental & Social Impacts due to Underground Cabling Project and prepare mitigation measures so as to minimize the impacts.
- The work was awarded to M/s Deccan Consulting Engineers Pvt. Ltd., New Delhi.
- ESIA study for Packages-I, II, III & IV has been completed
- This Formal Public Consultation will further enable APEPDCL to include any missing concerns/issues, which still remain un addressed, if any, and can be included in ESIA report.
- APDRP has an environmental and management framework, which also provides provision to manage environmental and social impacts for UG cable project
- APEPDCL is committed to implement all provisions to mitigate impacts as suggested in both ESIA as well as ESMF under APDRP.
- Some of the major and notable provisions suggested are
  - Only 500 meter long corridors will be opened up for cable laying operations at a time
  - This 500m meter long and0.50 to 1.00 Meter wide trench [redacted] as per the requirement will be barricaded on both sides to minimize disturbance to pedestrian and vehicular traffic and also as a safety requirement
  - All utilities disrupted during trench excavation works for UG cable laying works will be restored to normal condition with least downtime
  - Mini excavators and compactors will be deployed, which can work in limited areas for trench excavation thereby minimizing disturbance to pedestrian and vehicular traffic.
  - All ramps, steps which gets damaged during trench excavation will be restored to match its original condition
  - Minor repairs to affected footpaths will be carried out along 500 metre long segments, to ensure pedestrian safety and movement during cable laying operations.
  - Regular water sprinkling will be carried out to control dust levels at work areas
  - Wardens will be deployed at junction, to ensure smooth traffic movement and avoid traffic jams.
  - All drain chutes along work areas will be cleaned before and after works, so that drainage pattern is not altered.
  - All roads, which will be dug up for cable laying will be restored to its previous condition.
  - Road side vendors who are likely to be affected directly or indirectly will also be suitably compensated as per provisions of APDRP.
  - A grievance redressal mechanism(GRM) will be established to receive and resolve all types of complaints / disruptions as a result of UG cable laying operations
  - APEPDCL will also be appointing an authority specially to redress all social concerns of the affected street side vendors to resolve their issues and ensure proper compensation as per APDRP rules is disbursed to the affected vendors.

Note: ESMF is available at APEPDCL website "www.apeasternpower.com".

పర్యావరణ మరియు సామాజిక ప్రభావం అంచనా :

- ప్రపంచ బ్యాంకు మార్గ దర్శకాల ప్రకారం భూగర్భ విద్యుత్ ప్రాజెక్ట్ వలన ఎదురయ్యే పర్యావరణ మరియు సామాజిక ప్రభావాన్ని అంచనా వేయుటకు మరియు ఆ ప్రభావాన్ని కనిష్ట స్థాయిలో ఉంచేందుకు అవసరమైన ఉపశమన చర్యలను రూపొందించేందుకు తూర్పుప్రాంత విద్యుత్ పంపిణీ సంస్థ నిర్ణయించింది.
- ఈ బాధ్యతను ఢిల్లీకి చెందిన డెక్కన్ కన్సల్టింగ్ ఇంజినీర్స్ ప్రైవేట్ లిమిటెడ్ అనే సంస్థకు అప్పగించడమైనది. ఈ ప్రాజెక్ట్ తాలుకా ఒకటి నుండి నాలుగు ప్యాకేజీల ప్రాంతానికి సంబంధించిన పర్యావరణ మరియు సామాజిక ప్రభావ అంచనా నివేదిక రూపొందించడం పూర్తయింది.
- ఈ నివేదికలో భాగంగా ప్రభావిత ప్రాంత ప్రజలు మరియు భాగస్వాములతో అధికారిక సంప్రదింపుల సమావేశం ఏర్పాటుచేయడం జరిగింది. ఈ సమావేశ ముఖ్యోద్దేశం ఏమిటంటే, మేము గుర్తించని ప్రభావాలు ఇంకేమైన మిగిలి ఉన్నట్లయితే వాటి గురించి తెలుసుకొని, వాటి గురించి తీసుకోవలసిన ఉపశమన చర్యలను నివేదికలో పొందుపరచడం
- ఎ.పి.డి.ఆర్.పి.లో పర్యావరణ మరియు సామాజిక నిర్వహణ ముసాయిదా పొందుపరచడం జరిగింది. దీని వలన భూగర్భ విద్యుత్ కేబుల్ వ్యవస్థకు సంబంధించి ఎదురయ్యే పర్యావరణ మరియు సామాజిక ప్రభావాల నిర్వహణకు అవకాశం.
- ఎ.పి.డి.ఆర్.పి.పర్యావరణ మరియు సామాజిక ప్రభావం అంచనా, ఇంకా పర్యావరణ మరియు సామాజిక నిర్వహణ ముసాయిదా నిబంధనలను అన్నింటిని పూర్తిగా అమలుపరచుటకు తూర్పు ప్రాంత విద్యుత్ పంపిణీ సంస్థ కట్టుబడి ఉంది.
- ఈ నిబంధనలు ప్రకారం చేపట్టుటకు నిర్ణయించిన కొన్ని ముఖ్యమైన ప్రతిపాదనలు దిగువన వివరించడమైనది.
  - ఒక విడతలో **500** మీటర్ల పొడవు, **0.50** నుండి **1.00** మీటరు వెడల్పున అవసరం మేరకు కందకాలు తవ్వడానికి నిర్ణయించడమైనది.
  - ఈ కందకానికి ఇరువైపుల బారీకేడ్లు ఏర్పాటు చేయడం ద్వారా ఆ రహదారిలో నడిచేవారికి మరియు వాహనాలకు ఇబ్బందులు తొలగించడమే కాకుండా ప్రమాదాలు జరగకుండా రక్షణగా కూడా ఉపయోగపడుతుంది.
  - ఈ పథకం ద్వారా ప్రభావితమయ్యే అన్ని ప్రజా వినియోగ వ్యవస్థలను అంటే, మంచి నీటి సరఫరా, మురుగునీటి వ్యవస్థ, టెలికమ్యూనికేషన్ మొదలైన వాటిని వీలైనంత తక్కువ సమయంలో పూర్వస్థితికి పునరుద్ధరించడానికి చర్యలు తీసుకోబడతాయి.
  - కందకాలు తవ్వడానికి మిని ఎక్స్కవేటర్లు, కంపాక్టర్లు వాడడం ద్వారా పాదచారులకు మరియు వాహన దారులకు ఎదురయ్యే ఆటంకాలు తగ్గించబడతాయి తద్వారా పరిమిత ప్రాంతాలలో పనులు చేయడానికి అవకాశం కలుగుతుంది.
  - కందకాలు త్రవ్వి నప్పుడు సష్టమైన మెట్లు ర్యాంపులు మొదలగు వాటిని యధాపూర్వస్థితికి తీసుకురావడం జరుగుతుంది.
  - కందకాలు తవ్వినపుడు వాటి ప్రక్కనున్న కాలిబాట(ఫుట్ పాత్) లకు అవసరమైన కనీస మరమ్మత్తులు చేపట్టడం ద్వారా కేబుల్ పనులు జరుగునపుడు పాదచారుల కదలికలకు మరియు రక్షణకు అవసరమైన చర్యలు చేపట్టబడతాయి.
  - ధూళి సంబంధిత ఇబ్బందులను నివారించుటకు నిర్ణీత వేళల్లో నీటి తుంపరలను మరిపించుటకు చర్యలు తీసుకోబడతాయి.
  - కేబుల్ పనులు జరుగుతున్న జంక్షన్‌లలో ట్రాఫిక్ సాఫీగా సాగడం మరియు ట్రాఫిక్ జామ్‌లను నివారించడానికిసేవకులను నియమించడం జరుగుతుంది.
  - మురుగునీటి పారుదలలో ఇబ్బందులు ఏర్పడినట్లయితే కేబుల్ పనులు జరుగుటకు ముందు మరియు తరువాత వాటిని శుభ్రపరచడం ద్వారా మురుగునీటి పారుదలకు సాఫీగా జరుగుటకు చర్యలు తీసుకోబడతాయి.
  - కందకాలు త్రవ్విన రహదారులను మళ్ళీ మునుపటి స్థితికి తీసుకురావడం జరుగుతుంది.
  - రహదారి ప్రక్కన చిరు వ్యాపారాలు చేసుకునేవారు ప్రత్యక్షంగా గానీ, పరోక్షంగా కానీ ప్రభావితమైనట్లయితే నిబంధనల ప్రకారం వారికి తగిన పరిహారం అందించబడుతుంది.
  - భూగర్భ విద్యుత్ కేబుల్ వ్యవస్థ పనులకు సంబంధించి అన్ని రకాల ఫిర్యాదులు మరియు సమస్యలను పరిష్కరించడానికి ఫిర్యాదు పరిష్కార విధానం నెలకొల్పబడింది.
  - భూగర్భ విద్యుత్ ప్రభావిత ప్రాంతాలలోని రహదారి ప్రక్కన ఉపాధిపొందేవారు మరియు వర్తకుల సమస్యలు మరియు సామాజిక ఆందోళనలు పరిష్కరించడానికి మరియు వారికి నిబంధనల ప్రకారం తగిన పరిహారం అందించేందుకు ఒక అధికారిని నియమించేందుకు తూర్పు ప్రాంత విద్యుత్ సంస్థ చర్యలు తీసుకుంటుంది.

సూచన : ఈ పథకానికి సంబంధించిన పర్యావరణ మరియు సామాజిక నిర్వహణ ముసాయిదా "www.apeasternpower.com" వెబ్‌సైట్‌లో అందుబాటులో ఉంచబడింది.

20 OCT 2016

VAARTHA
VSP CITY

భూగర్భ విద్యుత్ తీగల పథకానికి పచ్చజెండా

మూడు విభాగాల్లో పనులకు శ్రీకారం

- 21న ప్రజాభిప్రాయసేకరణ

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- 21న ప్రజాభిప్రాయసేకరణ

విశాఖపట్నం, ప్రభాతవార్త

భూగర్భ తీగల విద్యుత్ సరఫరా (అండర్ గ్రౌండ్ కేబుల్) ప్రాజెక్టుకు పచ్చజెండా పడింది. ఇటీవల తూర్పు నియోజక వర్గంలోని కొన్ని ప్రాంతాల్లో చేపట్టిన పైలెట్ ప్రాజెక్టు చక్కని ఫలితాలను ఇవ్వడంతో ప్రపంచ బ్యాంకు ప్రత్యేక నిధులు సుమారు 720 కోట్ల రూపాయల వ్యయంతో చేపట్టే ఈ ప్రాజెక్టు కోసం రూపొందించిన ప్రణాళికలను పూర్తిస్థాయిలో అమలుచేయడానికి ఓ కార్యచరణను సిద్ధం చేశారు. ఇందులో భాగంగా విశాఖ స్మార్ట్ సిటీలోని కొన్ని ప్రధాన ప్రాంతాలను గుర్తించి పీటిని జోన్లు(హ్యాకేబిలుగా విభజించి తొలిదశలో ఇక్కడ భూగర్భ తీగల ద్వారా వినియోగదారులకు విద్యుత్ సరఫరాను చేసేందుకు సన్నద్ధమవుతున్నారు. సుమారు 225 కోట్ల వ్యయంతో ఎం.వి.పి.కాలనీ, పెద్దవాల్తేరు, సిరిపురం, కె.జి.హెచ్, కలెక్టరేట్ వంటి ప్రాంతాల్లో సుమారు ఆరు సబ్‌స్టేషన్ల పరిధిలో ఈ పనులను చేపట్టేందుకు కార్యాచరణ సిద్ధం చేశారు. మరికొద్ది రోజుల్లో ఇక్కడ పనులను ఆరంభించే చర్యలు తీసుకోవాలని సంస్థ చైర్మన్, మేనేజింగ్ డైరెక్టర్ ఎం.ఎం.నాయక్ సంబంధిత అధికారులకు ఆదేశాలివ్వడం జరిగింది. రెండవ దశలో సుమారు 229 కోట్ల వ్యయంతో కిర్లంపూడి లేఅవుట్, పాండురంగాపురం, ఆర్కేబీచ్, రామనగర్, సిఎంఆర్, మూడవ దశలో మూడవ ప్యాకేజీగా దొండపర్తి, రాజేంద్రనగర్, సరస్వతి పార్క్, సూర్యాబాగ్, పోర్టు ఏరియా, కొత్తరోడ్డు, అవుట్ హార్బర్ వంటి ప్రాంతాల్లో సుమారు 149 కోట్ల రూపాయల వ్యయంతో ఈ ప్రాజెక్టు పనులు పూర్తిచేయనున్నారు. ఈ పనుల్లో పారదర్శకత వుండాలనే ఉద్దేశంతో రాష్ట్ర విద్యుత్ ఉన్నతాధికారుతో పాటు ఈపీడీసీఎల్ చైర్మన్,మేనేజింగ్ డైరెక్టర్ ఎం.ఎం.నాయక్ సారధ్యంలో అండర్‌గ్రౌండ్ కేబుల్ ప్రాజెక్టు పనులపై అధికారులకు ఎప్పటికప్పుడు సమీక్షా సమావేశాలను నిర్వహించారు. ఈ ప్రాజెక్టు నిర్వహిస్తున్న ప్రాంతాలను తరహా ప్రపంచబ్యాంకు ప్రతినిధులు సందర్శించి ఈపీడీసీఎల్ ఇంజనీర్లకు అవసరమైన సలహాలను, సూచనలను ఇస్తున్నారు. ఆంధ్రప్రదేశ్ డిసాస్టర్ రికవరీ ప్రాజెక్టు క్రింద కేంద్ర రాష్ట్ర ప్రభుత్వాల చేయూతతో ఈ ప్రాజెక్టును అమలు చేస్తున్నారు. ప్రకృతి ప్రళయాన్ని సృష్టించిన హుద్‌హుద్ నేపథ్యంలో విద్యుత్ వ్యవస్థకు ఎదురైన తీవ్రస్థాయి నష్టాలను దృష్టిలో పెట్టుకుని కేంద్ర, రాష్ట్ర ప్రభుత్వాలు ఈ ప్రాజెక్టుకు శ్రీకారం చుట్టాయి. ప్రత్యేక పథకాలు, ఆపరేషన్స్, కమర్షియల్ విభాగాల్లో అపారమైన అనుభవం గల విద్యుత్ ఇంజనీర్లును ఈపీడీసీఎల్ ఎంపిక చేసి ప్రాజెక్టు అమలు బాధ్యతలను అప్పగించింది. ఎగ్జిక్యుటివ్ డైరెక్టర్ బి.రమేష్‌ప్రసాద్ ఈ ప్రాజెక్టు పనులను పర్యవేక్షిస్తున్నారు. రెండేళ్లలో ఈ ప్రాజెక్టు పనులను పూర్తిచేయడానికి ప్రయత్నిస్తున్నామన్నారు. ఈ ప్రాజెక్టు అమలు ద్వారా సౌమాజిక పరిస్థితులకు, పర్యావరణానికి ఎటువంటి భంగం వాటిల్లకూడాదనే ఉద్దేశంతో ఈనెల 21వ తేదీన ఉదయం పదిగంటల నుంచి పోలీస్ బ్యారెక్స్ ప్రాంతంలోని వైశాఖి జల ఉద్యాన వనంలో ప్రజాభిప్రాయ సేకరణ కార్యక్రమాన్ని ఏర్పాటు చేసినట్లు ఈడి రమేష్‌ప్రసాద్ పేర్కొన్నారు. ఇక్కడకు వచ్చిన ప్రజాభిప్రాయాలను పరిగణలోకి తీసుకుని పనులను చకాచకా ఆరంభించడానికి అన్ని ఏర్పాట్లు చేశామని ఆయన తెలిపారు.

PRAJASAKTHI
VSP CITY

భూగర్భ విద్యుత్ పై ప్రజా సలహాల స్వీకరణ

ప్రజాశక్తి- జిల్లావలిషన్

ఇపిడిసిఎల్ ఆధ్వర్యంలో భూగర్భ కేబుల్ వ్యవస్థపై సలహాలు స్వీకరిస్తున్నట్లు సంస్థ సిఎండి ఎంఎం నాయక్ ఒక ప్రకటనలో తెలిపారు. ప్రపంచబ్యాంకు, ఆంధ్రప్రదేశ్ డిజాస్టర్ రికవరీ ప్రాజెక్టు సహకారంతో విశాఖపట్నం పరిధిలో దీనిని నిర్మిస్తున్నట్లు తెలిపారు. భూగర్భ కేబుల్ వ్యవస్థపై ప్రజల్లో అవగాహన కలిగించేందుకు, సలహాలు స్వీకరించేందుకు విశాఖపట్నం వైశాఖి జల ఉద్యానవనంలో సమావేశం నిర్వహిస్తున్నట్లు తెలిపారు.

HAN S INDIA

EPDCL consultation workshop

Visakhapatnam: APEPDCL is organising public consultation workshop at Vaisakhi Jala Udyanavanam on October 21 from 10 am onwards to invite opinions and suggestions about environmental and social concerns or impacts on the proposed implementation of Under Ground Cable Project within Visakhapatnam city limits.

21 OCT 2016

ANDHRA JYOTHI
VSP CITY

నేడు భూగర్భ కేబుల్ ప్రాజెక్టులపై ప్రజాభిప్రాయ సేకరణ

విశాఖపట్నం, అక్టోబర్ 20, (ఆంధ్రజ్యోతి) : ఈపీడీసీఎల్ ఆధ్వర్యంలో నగరంలో ఏర్పాటు కాబోతున్న భూగర్భ విద్యుత్ కేబుల్ వ్యవస్థపై ప్రజల నుంచి అభిప్రాయాలు, సలహాలు స్వీకరిస్తున్నట్లు సంస్థ సీఎండీ ఎంఎం నాయక్ ఒక ప్రకటనలో తెలిపారు. ప్రపంచ బ్యాంకు నిధులతో ఆంధ్రప్రదేశ్ డిజాస్టర్ రికవరీ ప్రాజెక్టు సహకారంతో ఈ ప్రాజెక్టు చేపడుతున్నట్లు చెప్పారు. వైశాఖి ఉద్యానవనంలో శుక్రవారం ఉదయం 10 గంటలకు నిర్వహించనున్నట్లు పేర్కొన్నారు. పలువురు ప్రజాప్రతినిధులు, అధికారులు పాల్గొనే ఈ కార్యక్రమంలో ప్రజలు తమ అభిప్రాయాలను వెల్లడించాలని కోరారు.

ANDHRA BHOOMI
VSP CITY

భూగర్భ విద్యుత్ కేబుల్ ప్రాజెక్టుపై పబ్లిక్ కన్సల్టేషన్ వర్క్‌షాపు

ఆంధ్రభూమి బ్యూరో

విశాఖపట్నం, అక్టోబర్ 20: తూర్పు ప్రాంత విద్యుత్ పంపిణీ సంస్థ ఆధ్వర్యంలో విశాఖపట్నంలో ఏర్పాటు చేయనున్న భూగర్భ విద్యుత్ కేబుల్ వ్యవస్థపై ప్రజల అభిప్రాయాలు, సలహాలు స్వీకరిస్తున్నట్లు సంస్థ డైరక్టర్ అండ్ మేనేజింగ్ డైరెక్టర్ ఎంఎం నాయక్ తెలిపారు. ఈ మేరకు గురువారం ఆయన ఓ ప్రకటన విడుదల చేశారు. ప్రపంచ బ్యాంక్ నిధులతో ఆంధ్రప్రదేశ్ డిజాస్టర్ రికవరీ ప్రాజెక్టు (ఎపిడిఆర్‌పి) సహకారంతో విశాఖపట్నంలో చేపట్టబోయే భూగర్భ విద్యుత్ కేబుల్ ప్రాజెక్ట్ వలన పర్యావరణ, సామాజిక పరిస్థితులపై ప్రభావం గురించి పబ్లిక్ కన్సల్టేషన్ వర్క్‌షాపు నిర్వహిస్తున్నామన్నారు. శుక్రవారం ఉదయం 10 గంటలకు విశాఖపట్నం, సూర్యాభాగ్ వద్దనున్న వైశాఖి జల ఉద్యానవనంలో జరిగే ఈ వర్క్‌షాపులో ప్రజాప్రతినిధులు, ఏపీఈపీడీసీఎల్ అధికారులు పాల్గొంటారన్నారు. ఈ సమావేశంలో విశాఖ నగర పౌరులు తమ అభిప్రాయాలు, సలహాలు, సూచనలు తెలియజేయవచ్చని సంస్థ ఎగ్జిక్యూటివ్ డైరెక్టర్ (పవర్డ్ బ్యాంక్ ప్రాజెక్టు) బి.రమేష్‌ప్రసాద్ తెలిపారు.

ANDHRA PRABH
VSP CITY

భూగర్భ విద్యుత్ కేబుల్ ప్రాజెక్టుపై నేడు వర్క్‌షాపు

విశాఖపట్నం, అక్టోబర్ 20 (ఎఎన్ఎన్ ప్రతినిధి) : ఏపీ తూర్పు ప్రాంత విద్యుత్ పంపిణీ సంస్థ ఆధ్వర్యం లో విశాఖ నగరంలో ఏర్పాటుచేయనున్న భూగర్భ విద్యుత్ కేబుల్ వ్యవస్థ పై ప్రజల నుంచి అభిప్రాయాలు, సలహాలు స్వీకరించనున్నట్లు సీఎండీ ఎం.ఎం.నాయక్ తెలిపారు. ప్రపంచ బ్యాంకు నిధులతో ఆంధ్రప్రదేశ్ డిజాస్టర్ రికవరీ ప్రాజెక్టు సహకారంతో చేపట్టనున్న ఈ ప్రాజెక్టు వల్ల పర్యావరణ, సామాజిక పరిస్థితులపై ప్రభావం గురించి శుక్రవారం ఉదయం 10 గంటలకు పోలీస్ కమిషనర్ కార్యాలయానికి సమీపంలోని వైశాఖీ జల ఉద్యానవనంలో వర్క్‌షాప్‌ని ఏర్పాటుచేసినట్లు తెలిపారు. దీనికి వచ్చి సలహాలు, సూచనలు తెలియజేయాలని నగర ప్రజలను ఆయన కోరారు.

INDIA N EXPRESS

EPDCL public consultation workshop

APEPDCL is organising a "Public Consultation Workshop" to elicit the opinion and suggestions about the environmental and social concerns/impacts on the proposed implementation of Underground (UG) cable project on Friday at Vaisakhi Jala Udyanavanam from 10 am.

VIJAYA BHANU

ఏపీఈపీడీసీఎల్ ఆధ్వర్యంలో

భూగర్భ విద్యుత్ కేబుల్ ప్రాజెక్టుపై పబ్లిక్ కన్సల్టేషన్ వర్క్‌షాపు

విశాఖసిటీ: తూర్పు ప్రాంత విద్యుత్ పంపిణీ సంస్థ ఆధ్వర్యంలో విశాఖపట్నం సిటీలో ఏర్పాటు చేయబోతున్న భూగర్భ విద్యుత్ కేబుల్ వ్యవస్థపై ప్రజల అభిప్రాయాలు, సలహాలు స్వీకరిస్తున్నట్లు సంస్థ ఛైర్మన్ మరియు మేనేజింగ్ డైరక్టర్ ఎం.ఎం.నాయక్ తెలిపారు.

ప్రపంచ బ్యాంకు నిధులలో ఆంధ్రప్రదేశ్ డిజాస్టర్ రికవరీ ప్రాజెక్టు సహకారంతో విశాఖసిటీలో చేపట్టబోయే భూగర్భ విద్యుత్ కేబుల్ ప్రాజెక్టు వలన పర్యావరణ, సామాజిక పరిస్థితులపై ప్రభావం గురించి పబ్లిక్ కన్సల్టేషన్ వర్క్‌షాపు నిర్వహిస్తున్నామని పేర్కొన్నారు. నేడు శుక్రవారం సూర్యాబాగ్ వద్దనున్న వైశాఖి జల ఉద్యానవనంలో జరగబోవు ఈ వర్క్‌షాపుకు ప్రజా ప్రతినిధులు, ఏపీఈపీడీసీఎల్ అధికారులు పాల్గొంటారని ఈ సమావేశంలో విశాఖ నగర పౌరులు తమ అభిప్రాయాలు, సలహాలు, సూచనలు తెలుపవచ్చని ఏపీఈపీడీసీఎల్ ఎగ్జిక్యూటివ్ డైరక్టర్ బి.రమేష్ ప్రసాద్ తెలిపారు.

ANDHRA JYOTHI 22 OCT 2016 VSP CITY

భూగర్భ కేబుళ్లు పర్యావరణ హితం

ఏపీఈపీడీసీఎల్ సదస్సులో ఎంపీ కంభంపాటి హరిబాబు

విశాఖపట్నం, అక్టోబర్ 21, (ఆంధ్రజ్యోతి): అండర్‌గ్రౌండ్ కేబుల్ వ్యవస్థ చాలా అడ్వాన్స్‌డ్ టెక్నాలజీ అని విశాఖపార్లమెంటు సభ్యులు కంభంపాటి హరిబాబు అన్నారు. శుక్రవారం నగరంలోని వైశాఖి జల ఉద్యానవనంలో ఏపీఈపీడీసీఎల్ ఆధ్వర్యంలో భూగర్భ విద్యుత్ కేబుల్ వ్యవస్థ ఏర్పాటుకు సంబంధించి పర్యావరణ, సామాజిక అంశాలపై ప్రభావంపై భాగస్వాములు, ప్రజల సలహాలు, సూచనల కోసం ప్రత్యేక సదస్సును నిర్వహించారు. ఈ కార్యక్రమానికి ముఖ్యఅతిథిగా విచ్చేసిన ఎంపీ మాట్లాడుతూ.. హుద్‌హుద్ తరువాత ఉపయోగకరమైన అత్యంత ఆధునికమైన ఈ వ్యవస్థను మొదటి

సదస్సులో మాట్లాడుతున్న ఎంపీ కంభంపాటి హరిబాబు

సారిగా విశాఖలోనే ఏర్పాటుచేయడం సంతోషమన్నారు. ఇది పూర్తిగా పర్యావరణ హితమేనని కాకపోతే నెలల కొద్ది గోతులు తవ్వి విడిచిపెట్టేయకూడదని ఒక చోట పని ముగించుకుని మరోచోట పనులు ప్రారంభించడం ఉత్తమమని సూచించారు. ప్రస్తుతం ఉన్న కేబుల్ వైర్లు చాలా వరకూ విద్యుత్ పోల్స్‌పై నుంచి వున్నాయని, వాటికి ప్రత్యామ్నాం చూపుతారా? అలాగే ఉంచుతారా? నిర్ధారించాలని కోరారు. ఎమ్మెల్యే వాసుపల్లి గణేశ్‌కుమార్ మాట్లాడుతూ భూగర్భ కేబుల్ వ్యవస్థ ఏర్పాటుపై అవగాహన లేని ప్రతిపక్షాలవారు కొంతమంది ఎనియోగదారుల్లో ఆందోళన రేకెత్తిస్తున్నారన్నారు. ఆ చార్జీలు వినియోగదారులనుంచి వసూలు చేస్తారనే అపోహ కల్గిస్తున్నారని వాస్తవానికి అటువంటిదేమీ లేదని స్పష్టం చేశారు. దేశంలో దాదాపు 35శాతం గ్రామాలు విద్యుత్‌సరఫరా లేనివి కాగా.. కానీ మన రాష్ట్రంలోనే నూటికి నూరుశాతం నిరంతర విద్యుత్ కనెక్షన్లున్న గ్రామాలున్నాయన్నారు.

మాకూ అవకాశమివ్వాలి: బీఎస్ఎన్ఎల్

విశాఖపట్నం, అక్టోబర్ 21, (ఆంధ్రజ్యోతి): ఆంధ్రప్రదేశ్ ఈస్ట్రన్ పవర్ డిస్ట్రిబ్యూషన్ కంపెనీ లిమిటెడ్ ఆధ్వర్యంలో భూగర్భ విద్యుత్ కేబుల్ వ్యవస్థ ఏర్పాటుకు సంబంధించి శుక్రవారం నిర్వహించిన ప్రత్యేక సదస్సులో.. బీఎస్ఎన్ఎల్, ఈపీడీసీఎల్ మధ్య ఆసక్తికర అంశాలు ప్రస్తావనకు వచ్చాయి. సదస్సుకు హాజరైన బీఎస్ఎన్ఎల్ అసిస్టెంట్ జీఎం రవీంద్రకుమార్ మాట్లాడుతూ నగరంలో ఉన్న తమ కేబుల్స్ కు ఎటువంటి అంతరాయం లేకుండా చూడాలని కోరారు. అయితే రెండో అంశంగా విద్యుత్ తీగల తోపాటు తమ శాఖకు చెందిన పైబర్ లైన్ కూడా వేసేందుకు అవకాశమివ్వాలని కోరారు. అది కూడా

బీఎస్ఎన్ఎల్ ఏజీఎం రవీంద్రకుమార్

కొన్ని ప్రాంతాల్లో మాత్రమే. ఈ సందర్భంగా ఏపీఈపీడీసీఎల్ ఈడీ రమేశ్‌ప్రసాద్ మాట్లాడుతూ తాము కలెక్టర్ యువరాజ్ సమక్షంలో ఎన్నో పర్యాయాలు సమావేశమై పిలిచినా కూడా బీఎస్ఎన్ఎల్‌శాఖ వారు స్పందించ లేదని, ఇప్పుడు టెండర్ దశకు చేరుకున్నామన్నారు.అయితే ఇప్పటికైనా వారు ముందుకొచ్చి బాగస్వాములవుతామంటే అభ్యంతరం చెప్పబోమని, అయితే వారు అవసరమైన కొంత మొత్తాన్ని భరించాలన్నారు.

భూగర్భ కేబుల్ వ్యవస్థపై సందేహాలు

ఏపీఈపీడీసీఎల్ ఈడీ రమేశ్‌ప్రసాద్ సమాధానాలు

సదస్సుకు హాజరైన పలువురు ప్రజలు, ప్రజాప్రతినిధులు ఈ సందర్భంగా భూగర్భ కేబుల్ వ్యవస్థలపై పలు సందేహాలును అడిగి నివృత్తి చేసుకున్నారు. వీరికి ఏపీఈపీడీసీఎల్ ఈడీ రమేశ్‌ప్రసాద్ వివరణ ఇచ్చారు.

● తవ్వకాలు, నిర్వహణ ఎలా?

తవ్వకాలు ఎలా చేపడతారు.. మెయింటెనెన్స్ పనులు ఎలా నిర్వహిస్తారు. ఐదారు అడుగుల రోడ్డులో పనులు ఎలా చేపడతారు.

- రామానంద్, స్మార్ట్‌సిటీ పార్టనర్

● ఒక మీటరు వెడల్పు, 1.2 మీటర్ల లోతు రోడ్డు ఎడ్జ్‌లో తవ్వుతాం.. 33 కేవీ కింద ఆపైన 11 కేవీ, ఆపైన ఎల్‌టీ వైర్లు వేస్తాం.. ఇది మూడు లేయర్లుగా ఉంటుంది. 50 మీటర్లకు ఒక ఒక మ్యాన్‌హోల్ పెడతాం.. అలాగే సమస్యలు గుర్తించేందుకు పాల్ట్ లోకేటెడ్ వెహికల్స్ కొనుగోలు చేస్తున్నాం. ఐదారు అడుగుల రోడ్డులలో అండర్‌గ్రౌండ్ వైరింగ్ సాధ్యం కాదు కనుక ఆక్కడ ఎప్పటిలాగే స్తంభాలను ఉంచుతాం. ఆక్కడ ఇన్సులేటెడ్ వైర్స్‌ను వేస్తాం.

● ప్రమాదాల ముప్పు ఉందదా?

ఇప్పటికే నగరంలో అండర్‌గ్రౌండ్ డ్రైనేజీ వ్యవస్థ ఉంది. అలాగే వాటర్‌పైప్ లైన్‌లు భూమిలో నుంచే ఉన్నాయి. ఇవి విద్యుత్ తీగలతో కలిస్తే ప్రమాదం కదా?

- సీహెచ్ అమ్మోరు, 22వ వార్డు నాయకుడు

● యుజీడీ, ఇతర పైప్‌లైన్‌లు లేని ప్రాంతంలోనే ఈ వైరింగ్ ఏర్పాటుచేస్తాం. ఎక్కడా వాటిపై ఓవర్‌లేప్‌కాదు.. అందుకు తగిన సర్వే ఇప్పటికే చేశాం.

● వర్షపునీరు కిందికి దిగితే?

తవ్వకాలు చేసిన తరువాత వైరింగ్ కేవలం ఇసుకలోనే వేస్తారు వర్షం నీరు కిందకు దిగితే ప్రమాదాలకు అస్కారం లేదా?

సూకరాజు, 21 వ వార్డు నాయకుడు

● తవ్వకాలు చేపట్టిన తరువాత లేయర్స్ వారీగావైరింగ్ ఉంటుంది. ఒకదానితో ఒకటి సంబంధం ఉండదు. వర్షపు నీరు చేరకుండా జాగ్రత్తలు తీసుకుంటాం.. ప్రమాదాలు జరగకుండా ఆధునిక సాంకేతిక పరిజ్ఞానం ద్వారా పూర్తిగా రక్షణ చర్యలు చేపడుతున్నాం.

● విద్యుత్ కేబుల్ కోసం మళ్లీ తవ్వకాలా?

రోడ్డు మధ్యలో యుజీడీ ఉంది. మరో వైపు పైప్‌లైన్‌కోసం తవ్వారు. మరి విద్యుత్ కేబుల్ కోసం ఎక్కడ తవ్వకాలు జరుపుతారు. దీనివల్ల ప్రజల రాకపోకలకు ఇబ్బందులు ఏర్పడతాయి.

- బండారు శ్రీనివాస్ మాజీ కార్పొరేటర్

● ఇది పూర్తిగా జీపీఎస్ కు అనుసంధానం చేశాం. ముందుగానే ఏఏ ప్రాంతాల్లో ఎక్కడ తవ్వకాలు చేయాలనేది సర్వే చేశాం. అనుకూలమైన వైపు మాత్రమే తవ్వకాలు చేపడతాం. అందువల్ల ఆయా మార్గాలలో రాకపోకలు సాగించే ప్రజలకు ఎటువంటి ఇబ్బందులు ఉండవు.

EENADU VSP CITY

భూగర్భ కేబుల్ వ్యవస్థతో నిరంతరాయంగా విద్యుత్ సరఫరా

జగదాంబకూడలి, న్యూస్‌టుడే: భూగర్భ కేబుల్ వ్యవస్థ ద్వారా నగరంలో 24 గంటలూ నిరంతరాయంగా విద్యుత్‌ను సరఫరా చేయవచ్చని ఎంపీ కంభపాటి హరిబాబు అన్నారు. శుక్రవారం వైశాఖీజల ఉద్యానవనంలో ఆంధ్రప్రదేశ్ తూర్పు విద్యుత్ పంపిణీ సంస్థ ఆధ్వర్యంలో విశాఖ నగర భూగర్భ విద్యుత్ కేబుల్ వ్యవస్థ ఏర్పాటుపై ప్రజాభిప్రాయ సేకరణ కార్యక్రమాన్ని చేపట్టారు. ఈ సందర్భంగా ఎంపీ హరిబాబు మాట్లాడుతూ భూగర్భ విద్యుత్ కేబుల్ వ్యవస్థ వల్ల అనేక ఉపయోగాలు ఉన్నాయన్నారు. ముఖ్యంగా హుద్‌హుద్ తుపాను లాంటి విపత్కర సమయంలో విద్యుత్ అంతరాయం, ప్రమాదాలు జరగకుండా ప్రజలకు మెరుగైన, అంతరాయం లేని సరఫరా అందుతుందన్నారు. విశాఖ నగరంలోని సమర్థ విద్యుత్ వ్యవస్థ ఏర్పాటుకు అవసరమైన రూ.720 కోట్లను ప్రపంచ బ్యాంకు అందిస్తుందన్నారు. కార్యక్రమంలో ఎమ్మెల్యే వాసుపల్లి గణేష్‌కుమార్, ఏపీఈపీడీసీఎల్ ఈడీ బి.రమేష్‌ప్రసాద్ తదితరలు పాల్గొన్నారు.

22 OCT 2016

ANDHRA PRABHA VSP CITY

భూగర్భ విద్యుత్ కేబుల్ ప్రాజెక్టుపై ప్రత్యేక దృష్టి

ఎంపీ కె. హరిబాబు

విశాఖపట్నం, అక్టోబర్ 21 (కెఎన్ఎన్ ప్రతినిధి)

భూగర్భ విద్యుత్ కేబుల్ వ్యవస్థ పనులను సకాలంలో పూర్తిచేయాలని విశాఖపట్నం ఎంపీ కె.హరిబాబు కోరారు. ప్రపంచ బ్యాంకు నిధులతో ఏపీ డిజాస్టర్ రికవరీ ప్రాజెక్టు (ఏపీడీఆర్‌పీ) కింద నగరంలో చేపట్టనున్న భూగర్భ విద్యుత్ కేబుల్ వ్యవస్థపై వైశాఖీ జల ఉద్యానవనంలో ప్రజల నుంచి ఏపీఈపీడీసీఎల్ అభిప్రాయాలు సేకరించింది. ఈ సందర్భంగా ఆయన మాట్లాడుతూ ఈ ప్రాజెక్టులో భాగంగా విద్యుత్ కేబుళ్లను వేసేందుకు తవ్వే గోతులను ఎక్కువకాలం అలాగే ఉంచితే ప్రజలకు అసౌకర్యం కలుగుతుందని అన్నారు. విశాఖ దక్షిణ నియోజకవర్గం శాసనసభ్యుడు వాసుపల్లి గణేష్‌కుమార్ మాట్లాడుతూ భూగర్భ కేబుల్ వ్యవస్థ కోసం పక్కా ప్రణాళిక అవసరమని అన్నారు. ఈ ప్రాజెక్టు వివరాలను ప్రజా ప్రతినిధులందరికీ అందివ్వాలని కోరారు. ప్రాజెక్టు షెడ్యూల్‌ని ప్రజలకు ముందుగా తెలియజేస్తే దాని వల్ల కలిగే అసౌకర్యానికి ప్రజలు మానసికంగా సిద్ధంగా ఉంటారని అన్నారు. ఈ సందర్భంగా ఇరుకు రహదారుల్లో కేబుల్‌ని ఎలా వేస్తారు?

సమావేశంలో మాట్లాడుతున్న ఎంపీ హరిబాబు

కేబుల్ వేసేందుకు తవ్వే గోతుల వల్ల ప్రమాదాలు జరగకుండా ఎలా నివారిస్తారు? కేబుల్ విఫలమైతే ఎలా గుర్తిస్తారు? వెంటనే సరిదిద్దేందుకు అవకాశం ఉందా? కేబుల్ కోసం తవ్వే గోతుల వల్ల ఇతర కేబుళ్లు ధ్వంసం కాకుండా ఎటువంటి జాగ్రత్తలు తీసుకుంటున్నారు? అన్న ప్రశ్నలకు ఏపీ ఈపీడీసీఎల్ ఈడీ బి.రమేష్‌ప్రసాద్ సమాధానాలు చెప్పారు. ఈ కార్యక్రమంలో బీఎస్ఎన్ఎల్, ట్రాఫిక్ పోలీసులు పాల్గొన్నారు.

ANDHRA BHOOMI VSP CITY

భూగర్భ కేబుల్ వ్యవస్థతో విస్తృత ప్రయోజనాలు

ఆంధ్రభూమి బ్యూరో

విశాఖపట్నం, అక్టోబర్ 21:భూగర్భ కేబుల్ వ్యవస్థతో విస్తృత ప్రయోజనాలు ఉన్నాయని విశాఖ ఎంపీ కంభంపాటి హరిబాబు అన్నారు. తూర్పుప్రాంత విద్యుత్ పంపిణీ సంస్థ (ఇపిడిసిఎల్) ఆధ్వర్యంలో భూగర్భ కేబుల్ వ్యవస్థ పర్యావరణ సామాజిక ప్రభావంపై శుక్రవారం నాడిక్కడ ప్రజాభిప్రాయ సేకరణ జరిగింది. ఈ సందర్భంగా ఆయన మాట్లాడుతూ తీర ప్రాంతంలో సంభవించే విపత్తులను దృష్టిలో ఉంచుకుని ప్రపంచ బ్యాంకు భూగర్భ కేబుల్ వ్యవస్థ రూపకల్పనకు ఆర్థిక సాయం అందిస్తోందన్నారు. ప్రకృతి వైపరీత్యాల సందర్భంగా విద్యుత్ కేబుళ్ల వ్యవస్థకు నష్టం వాటిల్లకుండా, సరఫరా అంతరాయాలను నిరోధించేందుకు ఉపకరిస్తుందన్నారు. గతంలో హుదూద్

భూగర్భ కేబుల్ వ్యవస్థపై జరిగిన ప్రజాభిప్రాయ సేకరణలో మాట్లాడుతున్న ఎంపి హరిబాబు

తుపాను విధ్వంసాన్ని దృష్టిలో ఉంచుకుని, విశాఖను తొలి ప్రాధాన్యంలో ఎంపిక చేసినట్టు వెల్లడించారు. ఎమ్మెల్యే వాసుపల్లి గణేష్‌కుమార్ మాట్లాడుతూ ముఖ్యమంత్రి చంద్రబాబు చొరవతోనే విశాఖకు ఈ ప్రాజెక్టు లభించిందన్నారు. ఎపిఇపిడిసిఎల్ భూగర్భ విద్యుత్ ప్రాజెక్టు ఇడి రమేష్ ప్రసాద్ మాట్లాడుతూ ఈ వ్యవస్థ రూపకల్పన ద్వారా ప్రభావితమయ్యే మంచినీటి సరఫరా, మురుగునీటి పారుదల వ్యవస్థ, టెలికమ్యూనికేషన్ వ్యవస్థలు తక్కువ ప్రభావితమయ్యే విధంగా చర్యలు తీసుకుంటున్నామన్నారు. గోతులు వల్ల ఎవరికీ ఇబ్బందులు ఎదురుకాకుండా చూస్తామన్నారు. సమావేశంలో పలువురు ప్రజా ప్రతినిధులు, అధికారులు, స్వచ్ఛంధ సంస్థల ప్రతినిధులు, ప్రజా సంఘాల నాయకులు పాల్గొన్నారు.

22 OCT 2016

INDIAN EXPRESS

APEPDCL PUBLIC CONSULTATION

Don't leave open trenches dug for power cables: MP Haribabu

EXPRESS NEWS SERVICE @ Visakhapatnam

ANDHRA Pradesh Eastern Power Distribution Company Limited (APEPDCL) on Friday organised a 'Public Consultation Workshop' here to elicit opinions and suggestions on the environmental and social concerns and impacts on the proposed implementation of underground (UG) cable project within the city limits.

The project was taken up by the Andhra Pradesh Disaster Recovery Project (APDRP) and financed by World Bank.

Visakhapatnam MP K Haribabu suggested that the cable trenches should not be kept open for longer periods and complete the cable laying works at the earliest.

Visakhapatnam South MLA Vasupalli Ganesh Kumar suggested that the area-wise detailed plan of execution of the underground cable works along with time schedules should be shared with the local public representatives of that area in advance so that they could take necessary precautions to educate public of the area.

The participants discussed the issues, including how the cables will be laid in the narrow streets and slum areas mostly in the one town. The participants asked the officials of the APEPDCL to take precautions while marking the cable route on the road and ground so that public can avoid any accident while digging ground at select areas.

The speakers also informed the APEPDCL to create some mechanism for finding faults and disturbances in the cable system immediately and also ensure little or no damage to the public and private properties during emergency times.

Officials of the BSNL, Traffic Police and senior citizens were present.

SUGGESTIONS FROM CITIZENS

- Take precautions while marking cable route to avoid accidents while digging ground
- Create mechanism for finding faults in the cable system immediately
- Ensure little or no damage to the public and private properties during emergencies
- Ensure no other utility service like cable services are damaged.

THE HINDU

EPDCL holds workshop on UG cable project

SPECIAL CORRESPONDENT

VISAKHAPATNAM: Andhra Pradesh Eastern Power Distribution Company Limited (APEPDCL) organised a public consultation workshop on Friday to invite opinion and suggestions on environmental and social impact on the proposed implementation of underground (UG) cable project in the city.

The project is part of Andhra Pradesh Disaster Recovery Project (APDRP), financed by the World Bank.

Speaking at the workshop, MP K. Haribabu suggested that the Discom should ensure that the cable trenches shall not be kept open for longer periods.

MLA Vasupalli Ganesh Kumar suggested that the area wise detailed plan of execution should be shared with local public in advance, so that they can take necessary precautions.

Assistant General Manager B. Ravindra Kumar, who spoke on behalf of BSNL, said the public sector telecom network had established its cable network across the city in a phased manner. He called for greater coordination between the various stakeholders to prevent damage to cables.

> The underground cable project is part of APDRP and financed by the World Bank

Recalling that the World Bank had suggested inclusion of telecom network in the project, he sought that BSNL should be allowed to lay fibre network in the same duct. B. Ramesh Prasad, Executive Director of APEPDCL, gave a detailed report on how the cables will be laid in narrow streets and slum areas, what type of precaution will be taken to mark the cable route, mechanism to identify cable faults and assured that care will be taken to cause no damage to other utility services during the execution of the work.

22 OCT 2016

LEADER

భూగర్భ విద్యుత్ కేబుల్ వ్యవస్థతో విస్తృత ప్రయోజనాలు

నిరంతర విద్యుత్ సరఫరాకు దోహదం
విశాఖలో ఏర్పాటుచేయడం గర్వకారణం
పార్లమెంట్ సభ్యుడు హరిబాబు

విశాఖపట్నం, న్యూస్‌టిడే: భూగర్భ విద్యుత్ కేబుల్ వ్యవస్థను విశాఖలో ఏర్పాటుచేయడం మనకెంతో గర్వకారణమని పార్లమెంట్ సభ్యులు కంభంపాటి హరిబాబు అన్నారు. విశాఖ నగర భూగర్భ కేబుల్ వ్యవస్థ ప్రాజెక్ట్ పర్యావరణ, సామాజిక ప్రభావం అంచనాపై అభిప్రాయ సేకరణకు ప్రభావిత ప్రాంత ప్రజలు, భాగస్వామ్యులతో ఆంధ్రప్రదేశ్ తూర్పుప్రాంత విద్యుత్ పంపిణీ సంస్థ ఆధ్వర్యంలో శుక్రవారం నగరంలోని వైశాఖి జలఉద్యానవనంలో అధికారిక సంప్రదింపుల సమావేశం ఏర్పాటుచేశారు. ఈ కార్యక్రమంలో పాల్గొన్న ఎంపీ హరిబాబు మాట్లాడుతూ ఆంధ్రప్రదేశ్ విభజన స్వస్థత పథకంలో భాగంగా సమర్థ విద్యుత్ వ్యవస్థను మొదటి విభాగంలో చేర్చడం జరిగిందన్నారు. విశాఖనగరంలో సమర్థ విద్యుత్ వ్యవస్థ నెలకొల్పడానికి రూ.720 కోట్ల కేటాయించడం జరిగిందన్నారు. అందులో 68 శాతం నిధులను ప్రపంచ బ్యాంకు అందజేస్తుందన్నారు. తూర్పుప్రాంత విద్యుత్ పంపిణీ సంస్థ (ఈపీడీసీఎల్)లోని ఈ పథకం మొదటి విభాగం అమలు చరిచే బాధ్యతను అప్పగించడం జరిగిందన్నారు. భూగర్భ విద్యుత్ కేబుల్ వ్యవస్థ వల్ల ఎన్నో ప్రయోజనాలు ఉన్నాయని హరిబాబు తెలిపారు. ముఖ్యంగా ప్రకృతి విపత్తులు సంభవించేటప్పుడు ఎటువంటి అంతరాయం లేకుండా విద్యుత్‌ను సరఫరా చేయవచ్చునన్నారు. అమెరికా వంటి అభివృద్ధి చెందిన దేశాల్లో భూగర్భ విద్యుత్ కేబుల్ వ్యవస్థ అమల్లో ఉందన్నారు. ఈ పథకం మొదటి దశలో సముద్ర తీరానికి దగ్గరగా ఉన్న ప్రాంతాల్లో భూగర్భ విద్యుత్ వ్యవస్థ ఏర్పాటు చేయడానికి ప్రభుత్వం నిర్ణయించిందన్నారు. రాష్ట్రంలో అతి పెద్ద నగరం, పారిశ్రామిక, ఐటీ రంగాలకు కీలక ప్రవేశమైన విశాఖలో హుదూద్ వల్ల నగరంలోని విద్యుత్ వ్యవస్థ దెబ్బతిన్నదన్నారు. అంతేకాకుండా విశాఖ ఆకర్షణీయ నగరంగా కొరియాలో ఎంపికైన సందర్భంగా, నగరంలోని అన్ని ప్రాంతాలకు నిరంతర, నమ్మకమైన విద్యుత్ సరఫరా చేయడం అత్యావశ్యకమని అన్నారు.. అయితే ప్రజలకు ఎటువంటి ఇబ్బంది కలగకుండా అధికారులు నిర్దిష్ట సమయంలో పనులను పూర్తిచేయాలన్నారు. ఎప్పుడు ప్రమాద గంటలను వెనువెంటనే పూడ్చేలా తగు చర్యలు చేపట్టాలని అధికారులకు సూచించారు. దక్షిణ నియోజకవర్గ శాసనసభ్యులు వాసుపల్లి గణేష్‌కుమార్ మాట్లాడుతూ హుదూద్‌లో ఎదురైన అనుభవాల దృష్ట్యా భూగర్భ విద్యుత్ కేబుల్ వ్యవస్థను ఏర్పాటుచేయాలని ముఖ్యమంత్రి చంద్రబాబు సంకల్పించారని అన్నారు. భూగర్భ విద్యుత్ కేబుల్ వ్యవస్థ వల్ల విస్తృత ప్రయోజనాలు ఉన్నాయని వాసుపల్లి చెప్పారు. భారతదేశంలో సుమారు 35 శాతం గ్రామీణ ప్రాంతాల్లో నిరంతర విద్యుత్ సరఫరా జరగడం లేదన్నారు. అయితే మన రాష్ట్రంలో అన్ని గ్రామీణ ప్రాంతాలకు నిరంతర విద్యుత్ సరఫరా జరుగుతోందన్నారు. ఏపీఈపీడీసీఎల్ భూగర్భ విద్యుత్ కేబుల్ వ్యవస్థ ప్రాజెక్ట్ ఎగ్జిక్యూటివ్ డైరెక్టర్ రమేష్ ప్రసాద్ మాట్లాడుతూ ఈ పథకం ద్వారా ప్రభావితమయ్యే అన్ని ప్రజా వినియోగ వ్యవస్థలను అంటే మంచినీటి సరఫరా, మురుగునీటి వ్యవస్థ, టెలికమ్యూనికేషన్ మొదలైన వాటిని వీలైనంత తక్కువ సమయంలో పూర్వస్థితికి పునరుద్ధరించడానికి తగు

సమావేశంలో మాట్లాడుతున్న ఎంపీ హరిబాబు

చర్యలు తీసుకుంటామన్నారు. కందకాలను తవ్వడానికి మినీ ఎక్స్‌కేటర్లు, కంప్రెస్టర్లు వినియోగించడం ద్వారా పాదచారులకు, వాహనదారులకు ఎదురయ్యే ఆటంకాలు తగ్గించడానికి కృషిచేస్తామన్నారు. అదేవిధంగా కందకానికి ఇరువైపులా బారికేడ్లు ఏర్పాటుచేయడం ప్రమాదాలను నివారిస్తామన్నారు. రహదారి ప్రక్కన చిరువ్యాపారాలు చేసుకునేవారు ప్రత్యక్షంగా, పరోక్షంగా ప్రభావితం అయితే నిబంధనల ప్రకారం వారికి తగిన పరిహారం అందిస్తామన్నారు. ఈ కార్యక్రమంలో విద్యుత్ శాఖ అధికారులు, టీడీపీ నాయకులు, భాగస్వామ్యులు, ప్రజలు పాల్గొన్నారు.

22 OCT 2016

VAARTHA
VSP CITY

భూగర్భ విద్యుత్ సరఫరా బహుబాగు

ప్రజావగాహన సదస్సులో ఎం.పి.హరిబాబు

విశాఖపట్నం, ప్రభాతవార

సువిశాల సాగరతీర ప్రాంతమైన విశాఖలో భూగర్భ విద్యుత్ సరఫరా విధానం చాలా బాగుంటుందని విశాఖ పార్లమెంట్ సభ్యుడు డాక్టర్.కంభంపాటి హరిబాబు పేర్కొన్నారు. ప్రపంచ బ్యాంకు నిధులతో విశాఖలో చేపట్టనున్న భూగర్భ విద్యుత్ సరఫరా విధానంపై ప్రజల్లో అవగాహన కల్పిస్తూ వారి ఆలోచనలను స్వీకరించడానికి శుక్రవారం తూర్పు ప్రాంత విద్యుత్ పంపిణీ సంస్థ ఏర్పాటు చేసిన సదస్సుకు ఆయన ముఖ్యఅతిథిగా హాజరయ్యారు. ఈ సందర్భంగా హరిబాబు మాట్లాడుతూ సహజ సిద్ధమైన అందాలతో పర్యా టకలను ఇట్టే ఆకట్టుకునే మన విశాఖ నగరం హుడ్‌హుడ్ కారణంగా అతలా కుతలమైన సంగతి మనం ఎన్నడూ మరవిపోలేం.విద్యుత్ వ్యవస్థకు ఈ సందర్భంగా ఎదురైన నష్టం విద్యుత్ సరఫరా పునరుద్ధరణకు ఎదురైన కష్టాలను దృష్టిలో పెట్టుకుని ఈ భూగర్భ తీగల విద్యుత్ సరఫరా పథకాన్ని రూపొందించడం జరిగిందన్నారు. ఈపీడీసిఎల్ ఈ పథకాన్ని ఇక్కడ ప్రవేశపెట్టడానికి ఎంతో శ్రద్ధతీసుకుంది.కేంద్ర,రాష్ట్ర ప్రభుత్వాల సహాయం తోడుకావడంతో సుమారు 720 కోట్ల రూపాయల నిధులను ప్రపంచబ్యాంకు మంజూరుచేసిందన్నారు. ఈ వ్యవస్థ ఈ నగరానికి అవసరం తుఫానులు వరదలు వచ్చినప్పుడు ప్రజలకు,విద్యుత్ వ్యవస్థకు ఎంతో రక్షణ కల్గుతుందన్నారు. దక్షిణ నియోజక వర్గం ఎమ్మెల్యే వాసుపల్లి గణేష్‌కుమార్ మాట్లాడుతూ గత అనుభవాలను దృష్టిలో పెట్టుకుని రాష్ట్ర ప్రభుత్వం ఈ ప్రాజెక్టును విశాఖలో నిర్వహించడానికి ఆసక్తిని కనబరిచిందన్నారు. ఈపీడీసిఎల్ ఎగ్జిక్యుటీవ్ డైరెక్టర్ బి.రమేష్‌ప్రసాద్ మాట్లాడుతూ హుడ్‌హుడ్,వరున తుఫాన్లు సందర్భంగా విద్యుత్ వ్యవస్థకు ఎదురైన కష్టాన్ని చూసి ప్రతి విద్యుత్ ఇంజనీర్ ఎంతో చలించిపోయారన్నారు. ఊహించని తీరులో అతలాకుతలమైపోయిన విద్యుత్ వ్యవస్థను మళ్లీ పునరుద్ధరించుకోవడానికి ఎంతోమంది విద్యుత్ ఇంజనీర్లు,కార్మికులు ఎంతో శ్రమించాల్సి వచ్చిందన్నారు. సంస్థ చైర్మన్, మేనేజింగ్ డైరెక్టర్ ఎం.ఎం.నాయక్ కూడా దీనిని త్వరితగతిన అమలు చేసేందుకు అవసరమైన చర్యలను చేపడుతున్నారన్నారు. ప్రత్యేకంగా సమావేశాలను కూడా ఏర్పాటు చేస్తున్నారన్నారు. భూగర్భ విద్యుత్ తీగల ఏర్పాటు పనులు చేస్తున్నప్పుడు ప్రజలు తమ వంతు సహాయాన్ని అందించినట్లయితే త్వరితగతిన పనులు పూర్తవుతాయనే అభిప్రాయాన్ని వ్యక్తం చేశారు. ట్రాఫిక్,జివిఎంసి అధికారులు కూడా తమ వంతు సహా యాన్ని అందించేందుకు ముందుకు వచ్చారని ఈ సందర్భంగా రమేష్‌ప్రసాద్ వారికి కృతజ్ఞతలు తెలియజేశారు. అనంతరం ఈ సమావేశానికి హాజరైన స్థానిక నాయకులు,ప్రజలు కోసం పవర్‌పాయింట్ ప్రెజెంటేషన్‌ను ఈపీడీసి ఎల్ ఏర్పాటు చేసింది. ఎమ్మెల్యే వాసుపల్లి గణేష్‌కుమార్ పూర్తివరకు ఉండి ఈ వివరాలను తెలుసుకున్నారు.పనులు జరిగే తీరును తెలుసుకుని సలహాలు సూచనలు ఇచ్చారు. ఈ కార్యక్రమంలో ఈపీడిసిఎల్ అధికారులు డాక్టర్ సూర్యప్రతాప్.రామకష్ణ పాల్గొన్నారు.

PRAJASAKTHI
VSP CITY

భూగర్భ విద్యుత్ కేబుల్ వ్యవస్థతో ప్రయోజనం

ఎంపి కంభంపాటి హరిబాబు

మాట్లాడుతున్న ఎంపీ హరిబాబు

ప్రజాశక్తి-కలెక్టరేట్

భూగర్భ విద్యుత్ కేబుల్ వ్యవస్థ ఏర్పాటు ద్వారా విశాఖ నగర ప్రజలకు మంచే జరుగుతుందని ఎంపీ డాక్టర్ కంభంపాటి హరిబాబు అన్నారు. శుక్రవారం విశాఖ నగర భూగర్భ కేబుల్ వ్యవస్థ ప్రాజెక్ట్ పర్యావరణ, సామాజిక ప్రభావం అంచనాపై అభిప్రాయసేకరణ వైశాఖి జలఉద్యానవనంలో జరిగింది. ఇదే సందర్భంగా ప్రభావిత ప్రాంత ప్రజలు, భాగస్వాముయలతో ఆంధ్రప్రదేశ్ తూర్పుప్రాంత విద్యుత్ పంపిణీ సంస్థ ఆధ్వర్యంలో అధికారిక సంప్రదింపుల సమావేశం నిర్వహించారు. కార్యక్రమంలో పాల్గొన్న ఎంపి హరిబాబు మాట్లాడుతూ ఆంధ్రప్రదేశ్ విపత్తు స్పష్టత పథకంలో భాగంగా సమర్ధ విద్యుత్ వ్యవస్థను మొదటి విభాగంలో విశాఖను చేర్చడం జరిగిందన్నారు. నగరంలో సమర్ధ విద్యుత్ వ్యవస్థ నెలకొల్ప డానికి రూ.720 కోట్లు కేటాయించడం జరిగిందన్నారు. ఇందులో 68 శాతం నిధులను ప్రపంచ బ్యాంకు అందజేస్తుందన్నారు. ఎపిఈపిడిసిఎల్‌కు ఈ పథకం మొదటి విభాగం అమలు పరిచే బాధ్యతను అప్పగించారన్నారు. భూగర్భ కేబుల్ వ్యవస్థ వల్ల ప్రకృతి విపత్తులు సంభవించేటప్పుడు ఎటువంటి అంతరాయం లేకుండా విద్యుత్‌ను సరఫరా చేయవచ్చునన్నారు. అమెరికా వంటి అభివృద్ధి చెందిన దేశాల్లో భూగర్భ విద్యుత్ కేబుల్ వ్యవస్థ అమల్లో ఉందన్నారు.

దక్షిణ నియోజకవర్గ ఎమ్మెల్యే వాసుపల్లి గణేష్‌కుమార్ మాట్లాడుతూ హుదూద్‌లో ఎదురైన అనుభవాల దృష్ట్యా భూగర్భ విద్యుత్ కేబుల్ వ్యవస్థను ఏర్పాటుచేయాలని ముఖ్యమంత్రి చంద్రబాబు సంకల్పించారన్నారు. ఎపిఈపిడిసిఎల్ భూగర్భ విద్యుత్ కేబుల్ వ్యవస్థ ప్రాజెక్ట్ ఎగ్జిక్యూటివ్ డైరెక్టర్ రమేష్ ప్రసాద్ మాట్లాడుతూ ఈ పథకం ద్వారా ప్రభావితమయ్యే అన్ని సమస్యలను పరిష్కరిస్తామన్నారు.

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VISALANDHRA MAIN EDITION

రూ. 721 కోట్లతో భూగర్భ విద్యుత్ కేబుల్

విశాలాంధ్ర - విశాఖపట్నం: ప్రకృతి విపత్తుల నుండి విద్యుత్ అంతరాయం లేకుండా భూగర్భ విద్యుత్ కేబుల్ వ్యవస్థను ఏర్పాటు చేసేందుకు నగరంలో తొలిదశలో 24 సబ్‌స్టేషన్ల పరిధిలో నిర్మాణాలు చేపట్టనున్నామని ఏపీఈపీడీసీఎల్ ఈడీ బి.రమేష్‌ప్రసాద్ తెలిపారు. శుక్రవారం వైశాఖి జల ఉద్యానవనంలో ప్రజల నుండి సలహాలు, సూచనలు, ఆక్షేపణలను స్వీకరించేందుకు ఏర్పాటు చేసిన కార్యక్రమానికి ముఖ్య అతిథులుగా విశాఖ ఎంపీ హరిబాబు, దక్షిణ నియోజకవర్గం ఎమ్మెల్యే వాసుపల్లి గణేష్‌కుమార్, అతిథులుగా బీఎస్ఎన్ఎల్ ట్రాఫిక్ అధికారులు పాల్గొన్నారు. తొలిదశలో రూ. 721 కోట్లతో ప్రపంచ బ్యాంక్ నిధులతో విపత్తులను ఎదుర్కొనేందుకు భూగర్భ విద్యుత్ కేబుల్ వ్యవస్థను ఏర్పాటు చేస్తున్నామని ఈడీ తెలిపారు. ఫేజ్ -1లో ఎంవీపీ కాలనీ, పెదవాల్తేరు, కేజీహెచ్, ఆర్‌సీడీ హాస్పిటల్, సిరిపురం, శివాజీపార్కు, ఫేజ్ -2లో పాండురంగాపురం, ఆర్‌కేబీచ్, రామ్‌నగర్, విద్యుత్ శాఖ, టీఎస్ఆర్ కాంప్లెక్స్, దొండపర్తి, సీఎంఆర్ సెంట్రల్, మర్రిలపాలెం, ఫేజ్ -3 లో కొత్తరోడ్డు, పోర్టుఏరియా, పోలీసు బ్యారెక్స్, టౌటర్ హార్బర్, వెంకటేశ్వర మెట్ట, చిత్రాలయ, సరస్వతి పార్కు జంక్షన్, ఫేజ్ -4 ఎండాడ, అభిడ్‌నగర్, రుషికొండ ప్రాంతాల్లో భూగర్భ విద్యుత్ కేబుల్ వ్యవస్థను 33 కేవీ, 11 కేవీ పనులు చపట్టనున్నామన్నారు. ఈ సందర్భంగా ఎంపీ హరిబాబు మాట్లాడుతూ రాష్ట్రంలో తొలిసారిగా విశాఖలో ప్రయోగాత్మకంగా భూగర్భ విద్యుత్ కేబుల్ వ్యవస్థను ఏర్పాటు చేస్తున్నామని, హుధుద్ వంటి విపత్తులు వచ్చినా విద్యుత్‌కు అంతరాయం లేకుండా, నష్టం వాటిల్లకుండా ఎంతగానో ప్రజలకు ఉపయోగపడుతుందన్నారు. విద్యుత్ అధికారులు కేబుల్ నిర్మాణం కోసం రోడ్లు తవ్వే సందర్భంలో ప్రజలు సహకరించాలని విజ్ఞప్తి చేశారు. తొలివిదత 500 మీటర్ల పొడవున ఏర్పాటు చేయడానికి త్వరలో టెండర్లు పిలుస్తామని, ఈ నేపథ్యంలో ప్రజాభి ప్రాయ సేకరణ అభినందనీయమని అన్నారు. ఈ కార్యక్రమంలో ఏపీఈపీడీసీఎల్ అధికారులతో పాటు పలువురు మాజీ కార్పొరేటర్లు, ప్రజలు పాల్గొన్నారు.

ప్రజాభిప్రాయ సేకరణలో మాట్లాడుతున్న ఏపీఈపీడీసీఎల్ ఈడీ రమేష్ ప్రసాద్. చిత్రంలో ఎంపీ కంభంపాటి హరిబాబు, ఎమ్మెల్యే వాసుపల్లి గణేష్‌కుమార్ తదితరులు

SAAKSHI VSP CITY

తూతూ మంత్రం

- పసలేని ప్రజాభిప్రాయ సేకరణ
- భూగర్భ విద్యుత్తుపై మొక్కుబడి కార్యక్రమం
- టీడీపీ కార్యకర్తలే పాత్రధారులు

పాతపోస్టాఫీసు: విశాఖ నగర భూగర్భ కేబుల్ వ్యవస్థ ప్రాజెక్ట్ పర్యావరణ, సామాజిక ప్రభావం అంచనాపై అభిప్రాయ సేకరణకు ప్రభావిత ప్రాంత ప్రజలు, భాగస్వాముములతో ఆంధ్రప్రదేశ్ తూర్పు ప్రాంత విద్యుత్ పంపిణీ సంస్థ ఆధ్వర్యంలో శుక్రవారం నగరంలోని వైశాఖి జల ఉద్యానవనంలో అధికారిక సంప్రదింపుల సమావేశం ఏర్పాటు చేశారు. ఉదయం 10 గంటలకు ప్రారంభం కావల్సిన సమావేశాన్ని అధికార ప్రతినిధులు రాక ఆలస్యం కావడంతో మరో రెండు గంటలకు ప్రారంభించారు. మధ్యాహ్నం 12 గంటలైనా హాలులో వేసిన కుర్చీలు నగం కూడా నిండలేదు. పైగా అభిప్రాయ సేకరణలో పాల్గొన్న వారందరూ టీడీపీకి చెందిన మాజీ కార్పొరేటర్లు, వార్డు అధ్యక్షులు, కార్యకర్తలు. ప్రభావిత ప్రాంతాలకు చెందిన ప్రజలు ఎవ్వరూ సమావేశంలో పాల్గొనలేదు. అసలు విద్యుత్ సంస్థ తగిన రీతిలో ప్రచారం చేయని కారణంగానే ప్రజలు రాలేదని తెలుస్తోంది. ఈపీడీసీఎల్ ఎగ్జిక్యూటివ్ డైరెక్టర్ బి.రమేష్ ప్రసాద్ ప్రజా ప్రతినిధులు వచ్చే లోగా ప్రాజెక్ట్ వివరాలు వెల్లడించడంతో పాటు టీడీపీ శ్రేణులు అడిగిన ప్రశ్నలకు సమాధానాలు చెప్పారు. తర్వాత ఎంపీ కంభంపాటి హరిబాబు, దక్షిణ నియోజకవర్గం ఎమ్మెల్యే వాసుపల్లి గణేష్ కుమార్ వచ్చారు. ఎంపీ మాట్లాడుతూ భూగర్భ విద్యుత్ కేబుల్ వ్యవస్థను విశాఖలో ఏర్పాటు చేయడం గర్వకారణమన్నారు. భూగర్భ విద్యుత్ వ్యవస్థను నెలకొల్పడానికి రూ.720 కోట్లు కేటాయించినట్లు తెలిపారు. ప్రకృతి విపత్తులు సంభవించినపుడు నిరంతరాయంగా విద్యుత్‌ను సరఫరా చేయగల అవకాశం ఉంటుందన్నారు. ప్రజలకు ఏ విధమైన ఇబ్బందులు కలుగకుండా అధికారులు నిర్దిష్ట సమయంలో పనులు పూర్తి చేయాలని సూచించారు. ఎమ్మెల్యే మాట్లాడుతూ హుడ్‌హుడ్‌లో ఎదురైన అనుభవాల దృష్ట్యా భూగర్భ విద్యుత్ కేబుల్ వ్యవస్థను ఏర్పాటు చేస్తున్నారని తెలిపారు. ఎగ్జిక్యూటివ్ డైరెక్టర్ రమేష్ ప్రసాద్ మాట్లాడుతూ ఈ పథకం ద్వారా ప్రభావితమయ్యే అన్ని వ్యవస్థలను తక్కువ సమయంలో పునరుద్ధరించడానికి చర్యలు తీసుకుంటామన్నారు. రహదారి పక్కన చిరువ్యాపారాలు చేసుకునేవారు ప్రభావితం అయితే నిబంధనల ప్రకారం నష్టపరిహారం అందిస్తామన్నారు. ప్యాకేజి 1లో ఎంవీపీ కాలనీ, పెదవాల్తేరు, కేజీహెచ్, ఆర్‌సీడీ ఆసుపత్రి, సిరిపురం, శివాజి పార్క్, ప్యాకేజ్ 2లో పాండురంగాపురం, ఆర్కేబీచ్, రాంనగర్, విద్యుత్ శాఖ, టీఎస్ఆర్ కాంప్లెక్స్, దొండపర్తి ఇండోర్, సీఎంఆర్ ఇండోర్, ప్యాకేజ్ 3లో కొత్తరోడ్డు, పోర్ట్, పోలీస్ బ్యారెక్స్, టౌటర్ హార్బర్, వెంకటేశ్వరమెట్ట, చిత్రాలయ, సరస్వతి పార్క్, ప్యాకేజ్ 4లో యండాడ, అదిభట్లనగర్, రుషికొండ ప్రాంతాలుంటాయని తెలిపారు. టెండర్ ఖరారైన తర్వాత 18 నెలల కాలంలో పని పూర్తయ్యేలా ఏర్పాటు చేస్తామని అన్నారు.

ANDHRA PRADESH DISASTER RECOVERY PROJECT
(Financial assistance from IDA)
RESILIENT ELECTRICAL NETWORK IN VISAKHAPATNAM CITY
PUBLIC/STAKE HOLDERS CONSULTATION WORKSHOP
On
ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT
APEPDCL
E/D
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