

Environmental Impact Assessment

for

the proposed 5x800 MW Supercritical Coal Based

TSGENCO – (5 x 800 MW)

Yadadri Thermal Power Station

at

**Veerlapalem Village, Damarcherla Mandal,
Nalgonda (Dist), Telangana**

FINAL REPORT

Project Proponent:



Telangana State Power Generation Corporation

**Vidyut Soudha, Hyderabad
Telangana**

Environmental Consultants:



Bhagavathi Ana Labs Pvt. Limited

(A Bureau Veritas Group Company)

7-2-C14, Industrial Estate, Sanath Nagar, Hyderabad- 500018

NABET Certificate No NABET/EIA/1316/RA008

June, 2016



**Environmental Impact Assessment Report
for the proposed 5x800 MW Supercritical Coal Based
Yadadri Thermal Power Station**

at Veerlapalem Village, Damarcherla Mandal, District Nalgonda, Telangana

Telangana State Power Generation Corporation

Document Reference : IND.BH.41.15.0019/HSR

Revision : Rev02, dated 24/06/2016

*Copyright Bureau Veritas India Pvt. Ltd.
All rights reserved.*

	BHAGAVATHI ANA LABS PRIVATE LIMITED (a Bureau Veritas Group Company)	Doc No: BALPL/MSF/HSR-03/35
		Issue: 01 dt 24.03.2014
	Title: Proforma for Declaration in EIA Report	Revision: 02 dt 25.01.2016
		Page: 1 of 2

(Annexure-VII- Declaration by Experts contributing to the EIA,
Scheme for Accreditation of EIA Consultant Organizations, Version-3, NABET, QCI, June 2015)

Declaration by Experts Contributing to the EIA - "Environmental Impact Assessment for the proposed 5 x 800 MW Supercritical coal based Yadadri Thermal Power Station at Veerlapalem village, Damarcherla Mandal, Nalgonda district, Telangana by M/s Telangana State Power Generation Corporation Limited"

I, hereby, certify that I was a part of the EIA team in the following capacity that developed the above EIA.

EIA Coordinator:

Name : Bh Hari Babu

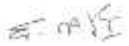
Signature & Date : 

Period of Involvement : Apr 2015-April, 2016

Contact Information : Plot No. 7-2-C14, Industrial Estate, Sanath Nagar, Hyderabad-500018,
Telangana, India

Team Member for EC : P Bhavna (TM)

Functional Area Experts:

S. No.	Functional Areas	Name of the Expert/s	Involvement (Period & Task)	Signature and Date
1	AP (Air Pollution Monitoring, Prevention & Control)	E Shyam Sundar	Air Pollution Monitoring, Prevention & Control (Dec 2015-June, 2016)	
2	WP (Water Pollution Monitoring, Prevention & Control)	E Shyam Sundar G Mallikarjuna Murthy (TM)	Water Pollution Monitoring, Prevention & Control (Dec 2015-June, 2016)	
3	SHW (Solid Waste and Hazardous Waste Management)	E Shyam Sundar	Solid Waste Management (Jan, 2016- Jun, 2016)	
4	SE (Socio-Economics)	Mamta Singh Bodhale	Socioeconomic study (Feb, 2016- June, 2016)	
5	EB (Ecology and Biodiversity)	Dr. Manojkumar Pardeshi M V Raghavacharyulu (TM)	Ecology & Biodiversity (Feb, 2016- June, 2016)	
6	HG (Hydrology, Ground Water & Water Conservation)	M Veeranna	Hydrology (Feb, 2016- June, 2016)	
7	GEO (Geology)	Vinod Kumar Bhatnagar	Geology (Feb, 2016- June, 2016)	
8	SC (Soil Conservation)	B S Lole	Soil Conservation (Feb, 2016- June, 2016)	
9	AQ (Meteorology, Air Quality Modeling & Prediction)	E Shyam Sundar P Bhavna (TM)	Air Quality Modelling (Feb, 2016- June, 2016)	
10	NV (Noise/ Vibration)	B Bhaskara Rao P Bhavna (TM)	Noise/ Vibration (Feb, 2016- June, 2016)	
11	LU (Land Use)	J Rajendra Prasad	Land use studies (Feb, 2016- June, 2016)	
12	RH (Risk Assessment & Hazard Management)	K Sandhya	Risk and Hazard Study (Feb, 2016-June, 2016)	

One TM against each FAE may be shown



	BHAGAVATHI ANA LABS PRIVATE LIMITED (a Bureau Veritas Group Company)	Doc No: BALPL/MSF/HSR-03/35
		Issue: 01 dt 24.03.2014
	Title: Proforma for Declaration in EIA Report	Revision: 02 dt 25.01.2016
		Page: 1 of 2

Declaration by the Head of the Accredited Consultant Organization/Authorized Person

I, **E Shyam Sundar**, hereby, confirm that the above mentioned experts prepared the EIA “Environmental Impact Assessment for the proposed 5 x 800 MW Supercritical coal based Yadadri Thermal Power Station at Veerlapalem village, Damarcherla Mandal, Nalgonda district, Telangana by **M/s Telangana State Power Generation Corporation Limited**“. I also confirm that the consultant organization shall be fully accountable for any mis-leading information mentioned in this statement.

Signature

:



Name

:

E Shyam Sundar

Designation

:

Head-Environment

Name of the EIA Consultant Organization

:

Bhagavathi Ana Labs Private Limited,
(a Bureau Veritas Group Company)

NABET Certificate No. & Issue Date

:

NABET/EIA/1316/RA008, dated March 27, 2015



REVIEW AND REVISION HISTORY

History of revisions of the present report:

Rev	Date	Modifications
Rev. 00	26/04/2016	Draft EIA Report for Customer Review
Rev. 01	28/04/2016	EIA Report for Public Hearing incorporating Customer comments
Rev.02	24/06/2016	1. IUCN of Flora and Fauna updated 2. Stack Diameter was changed to 7.7 3. Public Hearing Minutes included along with action plan 4. Information about FGD and SCR was included 5. Action plan and mitigation plan for Occupational Health was updated 6. Cost of EMP was changed (CSR was removed) 7. Replies to the comments made by various persons 8. MoU for domestic coal and consent letter for imported coal was included

Table I: History of the Revisions

Document No. **IND.BH.41.15.0019/HSR, Rev 2**

Rev. 02	24/06/2016	Final EIA report for Submission to MoEF & CC	G.Mallikarjuna Murthy	P.Bhavna	E.Shyam Sundar
Rev. 01	28/04/2016	EIA Report for Public Hearing	P Bhavna	M V Raghavacharyulu	E Shyam Sundar
Rev. 00	27/04/2016		G Mallikarjuna Murthy	M V Raghavacharyulu	E Shyam Sundar
REV	DATE	DESCRIPTION	REVIEW-1	REVIEW-2	APPROVAL

This Report has been prepared by **M/s Bhagavathi Ana Labs Private Limited** on behalf of and for the use of the Customer with due consideration and skill as per our general terms and conditions of business and terms of agreement with the Customer.



CONTENTS

Section	Page
Review and Revision History.....	5
Executive Summary	
Contents	6
1.0 INTRODUCTION.....	15
1.1 Preamble	15
1.2 Purpose of the Report.....	15
1.3 Identification of Project.....	16
1.4 Brief Description of the Project.....	17
1.4.1 Nature and Size of the Project.....	17
1.4.2 Location of the Project.....	17
1.4.3 Justification of the Project.....	18
1.5 Importance of the Project to the Country & Region	24
1.6 Scope of the Study.....	24
1.6.1 Study Area for EIA.....	24
1.6.2 Methodology of the Study.....	25
2.0 PROJECT DESCRIPTION	27
2.1 Preamble	27
2.2 Type of the Project.....	27
2.3 Need for the Project.....	27
2.4 Location of the Project	29
2.4.1 Present Land use of the Project Area	29
2.4.2 Site Topography Details	29
2.4.3 Layout of the Proposed Project	30
2.5 Plant Size and Operation Details	30
2.6 Proposed Schedule and Approval for Implementation.....	37
2.7 Technology Details	39
2.8 Technical Feature of the Boiler & TG Plant	39
2.8.1 Steam Generator, Design Considerations	41
2.8.2 Coal Feeding and Burning System	44
2.8.3 Auxiliary Boiler.....	44
2.8.4 Steam Turbine and Auxiliaries.....	45
2.8.5 Electrostatic Precipitators	45
2.8.6 Boiler Structures.....	46
2.8.7 Boiler Feed Pumps (BFP).....	46
2.8.8 Typical Design Parameters of Steam Turbine	47
2.8.9 Mechanical Systems	48



2.8.10	Coal Handling Plant.....	48
2.8.11	System Requirements	49
2.8.12	Ash Handling System	50
2.8.13	Plant Water System.....	52
2.9	Resource and Utility Requirement.....	57
2.9.1	Land Requirement.....	57
2.9.2	Water Requirement and Source	58
2.9.3	Wastewater Generation and Feasibility of Zero Discharge	62
2.9.4	Fuel Requirement and Source.....	62
2.9.5	Infrastructure	64
2.9.6	Manpower	64
2.9.7	Health and Sanitation	64
2.9.8	Residential Colony	64
2.9.9	Community Facilities	65
2.9.10	Infrastructure Facilities for Labour Force	65
2.10	Sources of Pollution and Mitigation Measures.....	65
2.10.1	Air Emissions and Control	66
2.10.2	Wastewater Generation.....	67
2.10.3	Solid Waste Generation.....	68
2.10.4	Noise Pollution	69
3.0	DESCRIPTION OF THE ENVIRONMENT	70
3.1	Preamble	70
3.2	Baseline Environmental Study	70
3.2.1	Study Area	70
3.2.2	Study Period.....	70
3.2.3	Study Components and Methodology.....	70
3.3	Climatology & Meteorology	71
3.3.1	Climatology	71
3.3.2	Meteorology	71
3.3.3	Site-Specific Wind Speed/ Directions	72
3.3.4	Secondary Data Collected from IMD, Nalgonda	73
3.4	Ambient Air Quality	74
3.4.1	Sampling and Analytical Techniques.....	77
3.4.2	Regional Scenario	80
3.5	Noise Level Survey.....	80
3.5.1	Regional Scenario	84
3.6	Water Environment	84
3.6.1	Water Sampling Locations.....	84



3.6.2	Surface Water Quality	91
3.6.3	Ground Water Quality.....	91
3.7	Hydro-geology	91
3.7.1	Regional Geology.....	91
3.7.2	Drainage.....	92
3.7.3	Hydrogeology	92
3.7.4	Watershed.....	93
3.7.5	Drainage.....	93
3.8	Traffic Studies.....	94
3.8.1	Methodology.....	94
3.8.2	Existing Traffic.....	94
3.9	Land Environment.....	94
3.9.1	Soil Characteristics.....	94
3.9.2	Land Use / Land Cover Classification	99
3.10	Ecological Environment	108
3.10.1	Introduction	108
3.10.2	Objectives of Ecological Studies.....	108
3.10.3	Methodology.....	108
3.10.4	Terrestrial Biodiversity Status	109
3.11	Demography and Socio-Economics	120
3.11.1	Methodology adopted for the Study	120
3.11.2	Administrative Set-up of the Study Area	121
4.0	ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES	135
4.1	Preamble	135
4.2	Impacts during Construction Phase	136
4.2.1	Impact on Topography and Land-use	137
4.2.2	Impacts on Ambient Air Quality	138
4.2.3	Impact on Water Environment	138
4.2.4	Noise Impact	139
4.2.5	Topsoil and Ecological Impact	139
4.2.6	Socio-economic Impact	139
4.2.7	Labour Influence.....	139
4.2.8	Traffic Congestion	140
4.2.9	Construction facilities.....	140
4.3	Impacts during Operational Phase	141
4.3.1	Impact on Land Use	142
4.3.2	Impact on Soil	142
4.3.3	Topography and Climate	142



4.3.4	Impact on Air Quality	143
4.3.5	Impact on Water Resources	154
4.3.6	Impact on Noise Levels	160
4.3.7	Impact of Solid Wastes.....	163
4.3.8	Impact on Ecology.....	164
4.3.9	Impact on Socio-Economics	165
4.4	Irreversible & Irretrievable Commitments of Environmental Components.....	166
4.5	Mitigation Measures.....	167
4.6	Summary of Anticipated Environment Impacts and Mitigation	168
4.7	Environment Management Measures during Construction Phase	172
4.7.1	Air Quality Management	172
4.7.2	Water Quality Management	173
4.7.3	Noise Level Management.....	173
4.7.4	Waste and Hazardous Material Handling.....	173
4.7.5	Ecological Management	174
4.7.6	Socio-economic Environment	174
4.7.7	Health and Safety.....	174
4.8	Environment Management Plan during Operation Phase.....	175
4.8.1	Air Pollution Management	175
4.8.2	Water Pollution Management	176
4.8.3	Noise Pollution Management.....	182
4.8.4	Solid Waste Management	182
4.8.5	Greenbelt Development.....	186
4.8.6	Solar Lighting	188
4.9	Environment Management System	191
4.10	Implementation Schedule of Mitigation Measures	192
5.0	ANALYSIS OF ALTERNATIVES	193
5.1	Analysis of Alternative Sites for Location of Power Plant.....	193
5.2	Analysis of Alternative Technologies for the Proposed Power Plant.....	194
6.0	ENVIRONMENTAL MONITORING PROGRAM	195
6.1	Introduction	195
6.2	Environmental Monitoring and Reporting Procedure	195
6.2.1	Objectives of Monitoring	195
6.3	Monitoring Schedule	196
6.3.1	Monitoring Schedule during Constructional Phase	196
6.3.2	Monitoring Schedule during Operational Phase.....	197
6.4	Monitoring Methods and Data Analysis of Environmental Monitoring	199
6.4.1	Air Quality Monitoring and Data Analysis.....	199



6.4.2	Water and Wastewater Quality Monitoring and Data Analysis	199
6.4.3	Monitoring of Groundwater	200
6.4.4	Monitoring of Noise Levels	200
6.5	Reporting Schedules of the Monitoring Data	200
6.6	Infrastructure for Monitoring of Environmental Protection Measures	200
6.6.1	Air Quality and Meteorology	201
6.6.2	Water and Wastewater Quality	201
6.6.3	Noise Levels	201
7.0	ADDITIONAL STUDIES	214
7.1	Preamble	214
7.2	Public Hearing	214
7.3	CSR Studies	250
7.4	R&R Studies	250
7.5	Hydrogeological Studies	250
7.6	Risk Assessment	252
7.6.1	Plant Description	252
7.6.2	Qualitative Risk Assessment	253
7.6.3	HAZID	255
7.7	Disaster Management Plan	260
7.7.1	Disasters	260
7.7.2	Objectives of Disaster Management Plan [DMP]	261
7.7.3	Emergency Organisation	262
7.7.4	Emergency Communication	262
7.7.5	Emergency Responsibilities	262
7.7.6	Emergency Facilities	265
7.7.7	Emergency Actions	266
7.7.8	General	267
7.7.9	Off-Site Emergency Preparedness Plan	268
7.8	Occupational Health and Safety	272
7.8.1	Occupational Health	273
7.8.2	Safety Plan	287
8.0	PROJECT BENEFITS	290
8.1	Preamble	290
8.2	Construction Phase	290
8.2.1	Employment	290
8.2.2	Community Services	291
8.2.3	Transportation	291
8.3	Operational Phase	291



8.3.1	Population	291
8.3.2	Education	291
8.3.3	Employment	292
8.3.4	Physical Infra Structure	292
8.3.5	Community Social Responsibility.....	292
8.3.6	Proposed CSR Activities by TSGENCO	293
9.0	ADMINISTRATIVE ASPECTS OF ENVIRONMENT MANAGEMENT PLAN.....	294
9.1	Institutional Arrangements for Environment Protection and Control	294
9.2		294
9.3	Vision & Mission of TSGENCO	294
9.4	Corporate Environment Policy	295
9.4.1	Environment Policy Statement of TSGENCO	295
9.4.2	Environment Group at Project Level	296
9.4.3	Management Reporting	298
10.0	DISCLOSURE OF CONSULTANTS.....	299
10.1	Preamble	299
10.2	About Bhagavathi Ana Labs Pvt. Ltd.....	299

Annexures

- Annexure 1: Photo-documentation of the site visit by EAC
- Annexure 2: Copy of ToR Letter and its compliance report
- Annexure 3: Forest Clearance Letter
- Annexure 4: Land Acquisition Details from Revenue Department
- Annexure 5: Details of High Flood Level of River Krishna
- Annexure 6: Water Allocation letter from I & CAD Department
- Annexure 7: Coal MoUs and Consent Letters
- Annexure 8: Coal Analysis Report
- Annexure 9: Minutes of the Meeting – South Central Railway and TSGENCO
- Annexure 10: Minutes of Board meeting on latest norms of MoEF&CC by TSGENCO
- Annexure 11: Mineralogical map of the region
- Annexure 12: Hydro-geology Report
- Annexure 13: Copy of Fly ash utilization letters
- Annexure 14: Public Hearing Proceedings
- Annexure 15: Action Plan and Replies for representation received
- Annexure 16: CSR Study Report
- Annexure 17: R&R Report
- Annexure 18: Corporate Environmental Policy



List of Figures

Figure 1.1: General Location Map of the Project Site	20
Figure 1.2: Google Imagery (10 km Radius).....	21
Figure 1.3: Study Area Map (10 km Radius)	22
Figure 2.4: Project Site Photographs.....	34
Figure 2.5: Site Contour Map	35
Figure 2.6: Plant Layout Map	36
Figure 2.7 : Project Schedule	38
Figure 2.8: Typical Process Flow Diagram	40
Figure 2.9: Water Balance Diagram	60
Figure 3.10: Site-Specific Windrose :Winter Season (Dec'15 to Mar'16)	73
Figure 3.11: Ambient Air Quality Monitoring Locations	76
Figure 3.12: Noise Monitoring Locations	82
Figure 3.13: Water Sampling Locations	86
Figure 3.14: Soil Sampling Locations	96
Figure 3.15 : Flowchart of simplified methodology.....	99
Figure 3.16 : IRS Resourcesat-2 LISS3 Image of the Study Area	101
Figure 3.17 Land Use/Land Cover Map of 10 Km Radius Area	106
Figure 3.18: Distribution of Land Use/Cover in 10 Km Radius Area	107
Figure 3.19: Wildlife Boundary Map	116
Figure 4.20: Terrain Map.....	148
Figure 4.21:Cumulative Incremental GLCs of PM	149
Figure 4.22:Cumulative Incremental GLCs of SO ₂	150
Figure 4.23:Cumulative Incremental GLCs of NO _x	151
Figure 4.24: ETP Flow Diagram	159
Figure 4.25: Noise Dispersion Contours.....	162
Figure 4.26: Rainwater Harvesting Scheme.....	181
Figure 4.27: Proposed Greenbelt in Plant Area.....	190
Figure 9.28: Organizational Setup for Environmental Management.....	297
Figure 10.29: NABET Certificate	300
Figure 10.30: NABL Certificate - Chemical Testing	301
Figure 10.31: NABL Certificate - Mechanical Testing	301
Figure 10.32: NABL Certificate - Biological Testing	302
Figure 10.33 : MoEF&CC Certificate	303



List of Tables

Table 1.1: Salient Features of the Project Site	17
Table 1.2: Capacity Addition Envisaged by TSGENCO	19
Table 1.3: Environmental Attributes & Frequency of Monitoring	25
Table 2.4: Peak Load and Energy Requirement/Consumption	28
Table 2.5: Shortfall in Peaking Requirement and Peaking Requirement in Telangana State, Southern Region	28
Table 2.6: Salient Features of Proposed Project	31
Table 2.7: Time Frame for Implementation	37
Table 2.8: Typical Design Parameters of Steam Turbine	47
Table 2.9: Coal Handling Capacity Requirements for CHPs	49
Table 2.10: Landuse Break-up of Proposed Power Station	58
Table 2.11: Water Requirement Details	59
Table 2.12: Intake Water Quality	61
Table 2.13: Fuel Requirement	63
Table 2.14: Expected Coal Quality Details	63
Table 2.15: Stack Emission Details	66
Table 3.16: Environmental Attributes & Frequency of Monitoring	70
Table 3.17: Climatological Data at IMD, Nalgonda Station	73
Table 3.18: Details of Ambient Air Quality Monitoring Locations	74
Table 3.19: Details of sampling methodology for the monitored parameters	77
Table 3.20: Summary of Ambient Air Quality in the Study Area – Winter Season (Dec'15 to Mar'16)	79
Table 3.21: Details of Noise Monitoring Locations	81
Table 3.22: Monitored Noise Levels in Winter Season (Dec'15 to Mar'16)	83
Table 3.23: Details of Water Sampling Locations	85
Table 3.24: Ground Water Quality Data – Winter Season (Dec'15 to Mar'16)	87
Table 3.25: Surface Water Quality Data – Winter Season (Dec'15 to Mar'16)	90
Table 3.26: Geological Succession of Cuddapah Supergroup	92
Table 3.27: Details of Traffic Monitoring Locations	94
Table 3.28: Recorded Traffic Details	94
Table 3.29: Details of Soil and Sediment Sampling Locations	95
Table 3.30: Soil Analysis Results (Winter Season)	97
Table 3.31: Standard Soil Classification	98
Table: 3.32: Details of Satellite Data	100
Table: 3.33: Characteristics of IRS Resourcesat-2 Data	100
Table: 3.34: IRS Resources at-2 LISS3, Satellite Spectral Bands and their Principal Applications	100
Table 3.35: Level-II - Land Use/Land Cover statistics of 10 km Radius Area	104
Table 3.36: Flora Reported from Buffer zone of the Project Area	109
Table 3.37: Fauna Reported from Buffer zone of the Project Area	117
Table 3.38: Aquatic Plants Reported from Buffer zone of the Project Area	118
Table 3.39: Fishes Reported from Buffer zone of the Project Area	119
Table 3.40: Administrative Setup	121
Table 3.41: Village Population Size	122



Table 3.42: Population Details	123
Table 3.43: Population Density in Year 2011	124
Table 3.44: Population Details in Census 2001 & 2011.....	125
Table 3.45: Literacy Details.....	126
Table 3.46: Employment Pattern	127
Table 3.47: Main Worker Employment Pattern	127
Table 3. 48: Education facilities.....	129
Table 3. 49: Medical facilities	129
Table 3.50: Drinking water facilities	130
Table 3.51: Communication Facilities.....	130
Table 3.52: Transportation facilities.....	131
Table 3.53: List of Surveyed Villages	134
Table 4.54: Environment Impact Matrix For Construction Phase.....	137
Table 4.55: Environment Impact Matrix for Operation Phase	141
Table 4.56: Stack Emission Details (Worst Case Scenerio)	146
Table 4.57: Predicted 24-Hourly Short Term Cumulative	147
Table 4.58: Resultant Cumulative Concentrations due to Incremental GLCs	147
Table 4.59: Emission Factors for Vehicular Impact Predictions	153
Table 4.60: Peak Hourly Predicted Incremental Concentrations.....	153
Table 4.61: Recommendations on Traffic Capacity - IRC.....	154
Table 4.62: Water Requirement and Wastewater Generation and Treatment Details.....	157
Table 4.63: Expected Quality of Wastewater.....	160
Table 4.64: Predicted Noise Levels at the Plant Boundaries	161
Table 4.65: Expected Solid Waste From Power Plant (Worst Case Scenerio)	163
Table 4.66: Anticipated Adverse Environmental Impacts and Mitigation.....	169
Table 4.67: Units and Type of Treatment Proposed	177
Table 4.68: Ash Utilization Schedule	184
Table 4.69: Implementation Schedule	192
Table 6.70: Environmental Monitoring During Project Construction Stage.....	196
Table 6.71 : Environmental Monitoring During Operational Phase	197
Table 6.72: List of Parameters along with Equipment Required for Environmental Monitoring – Wet Parameter Analysis.....	202
Table 6.73: List of Parameters along with the Equipment Required for Ambient Air Quality Monitoring	206
Table 6.74: List of Parameters along with the Equipment Required for Stack Monitoring	210
Table 6.75: Equipment Required for Noise Monitoring	212
Table 6.76: Cost Provision for Environmental Measures	213
Table 7.77: Item-wise Estimation for Implementing the CSR Activities.....	251
Table 7. 78: Risk Assessment Methodology.....	254
Table 7.79 :Risk Classification Screening	255
Table 7.80 : Risk Classification	258
Table 7.81: OS&H Lifecycle	272



1.0 INTRODUCTION

1.1 Preamble

Telangana State Power Generation Corporation Limited (TSGENCO) is one of the pivotal organizations of Telangana, engaged in the business of Power Generation. Apart from operation & maintenance of the power stations, it has undertaken the execution of the ongoing & new power projects scheduled under capacity addition programme and is also taking up renovation & modernization works of the old power stations.

TSGENCO has been incorporated as per Companies Act, 2013 on 19.05.2014 and commenced operations from 02.06.2014. This was a sequel to Government's reforms in power sector to un-bundle the activities relating to generation, transmission and distribution of power. All the Generating Stations owned by erstwhile Andhra Pradesh State Electricity Board (APSEB) in Telangana area were transferred under the control of TSGENCO.

TSGENCO has proposed to setup (5 x 800 MW) Supercritical coal based **Yadadri Thermal Power Station (YTPS)** at Veerlapalem village, Damarcherla mandal, Nalgonda district, Telangana state to meet the present and future growing demand in newly formed Telangana state.

This Environment Impact Assessment (EIA) report pertains to the proposed Supercritical coal based Power Station. This chapter presents the details of the purpose of this EIA report, identification of the proposed project, brief description of the project, importance of the project and scope of the study as per Terms of Reference (ToR) conditions issued by Ministry of Environment, Forest and Climate Change (MoEF&CC), Government of India (GoI), New Delhi.

1.2 Purpose of the Report

The purpose of this EIA report is to present the project detail of the proposed 5 x 800 MW supercritical coal based Yadadri thermal power station at Veerlapalem village in Damarcherla Mandal of Nalgonda district in Telangana and to discuss the environmental impacts that may occur during its construction and operational phases, the proposed mitigation measures to reduce the severity of such impacts and the environmental management plan.

The proposed project falls under '**Category A**' of the EIA Notification, 2006 and requires preparation of EIA report to obtain Environmental Clearance (EC) from the MoEF&CC, New Delhi. The project proposal was considered by the Expert Appraisal Committee - Thermal Power (EAC) in its 45th, 48th & 50th Meetings of the EAC



(Thermal Power) held during 29th-30th October, 2015, 18th December, 2015 and 29th January 2016.

The Committee had which had visited the site on 5th December, 2015 in order to evaluation the site conditions for Proposed TPP along with its sensitivity in connection with the matters relating to a tributary/channel of River Krishna passing through the proposed site etc. The photographs of the site visit by EAC were provided as **Annexure 1**.

Subsequently the EAC, MoEF&CC issued the ToR vide letter No. J-13012/18/2015 - IA. I (T) dated 16th February, 2016, for the EIA studies. A copy of the letter and its compliance report is given as **Annexure 2**. The EIA studies were carried out as per the Standard ToRs prescribed of MoEF&CC Notification dated 10th April, 2015.

The Draft EIA report was prepared based on the ToR stipulated for submission to Telangana State Pollution Control Board (TSPCB) for conducting public hearing.

The public hearing for the propsed (5 x800 MW) Coal based Yadadri Thermal power Station at Veerlapalem (V),Damaracherla (M),Nalgonda Dist. On 31.05.2016 in the premises of proposed site at Veerlapalem(V),Damaracherla(M),Nalgonda District as per Environment Impact Assessment Notification No.S.O. 1533 (E) dated 14th September 2006 and as per TOR conditions issued by MoEF&CC. The press notification indicating date and venue of the public hearing was issued by Regional officer, Telangana Pollution Control Board (TSPCB), on 30.04.2016 in prominent newspapers Viz. Namaste Telangana Telugu daily newspaper and the Hindu English daily News paper with project details inviting suggestions, views, comments and objections from the public regarding the above mentioned project.

This Final EIA is being submitted to MoEF&CC after incorporation of deliberations of public hearing to obtain the Environmental Clearance.

1.3 Identification of Project

The present proposal is to setup 5 x 800 MW supercritical coal based Yadadri Thermal Power Station at Veerlapalem village, Damarcherla Mandal, Nalgonda district, Telangana. The proposed thermal power project is named as “**TSGENCO - (5 X 800 MW) Yadadri Thermal Power Station (YTPS)**”. The coal requirement for the proposed power project based on Station Heat Rate (SHR) of 2109.40 kcal/kwh, GCV of coal as 4550 kcal/kg and 85% PLF is estimated as 13.81 MTPA. In line with the MoEF&CC guidelines for new Thermal Power Projects, it is proposed to adopt closed circuit cooling water system deploying natural draft cooling towers and draw only make up water requirement from the source. The makeup and consumptive water requirement assessed as 9755 m³/hr and is sourced from Krishna river. The proposed site comprises of 75 % of reserve forest land and remaining land is mostly



non-agricultural, uninhabited, partly agricultural, revenue land with isolated pockets of habitation. There are no historic places in the vicinity. The total area of extent for establishment of power station is 2800 acres, including 100 acres for colony. A thick greenbelt will be developed around the project boundary in an extent of 1225 acres of land.

1.4 Brief Description of the Project

1.4.1 Nature and Size of the Project

The present project proposal of 4000 MW (5 x 800 MW) thermal power plant, falls under activities listed in the EIA Notification 2006, Sr. No. 1(d). The said project is categorized as '**Category A**' project as per the provisions of the EIA Notification, 2006. The overall capital cost of the proposed project is projected to be Rs. 25,099.42 crores (approximately), including cost of pollution control facilities.

1.4.2 Location of the Project

The site is located near Veerlapalem village, Dameracherla mandal, Nalgonda district. The required land is 2800 acres for setting up the power project. This includes ash disposal area and colony for the thermal power project. The nearest town is Miryalaguda which is about 20 km from the site. The nearest railway station is Vishnupuram railway station which is 5 km from the plant. Nearest domestic and international airport is Hyderabad which is about 135 km away from project site.

The site elevation ranges between 72 to 93 m above MSL and the site coordinates range between 16° 40' 19"N to 16° 42' 38"N latitudes and 79° 36' 13"E to 79° 33' 54"E longitudes. **Figure 1.1** shows general location of the project site. The study area map and google imagery of the location of the proposed project are given in **Figure 1.2** and **Figure 1.3** respectively.

The salient features of the project site are given below in **Table 1.1**.

Table 1.1: Salient Features of the Project Site

Item	Description
Type of proposed project	5x800 MW supercritical coal based Yadadri Thermal Power Station
Category of Project	Category A
S.No. in the Schedule as per EIA Notification, 2006	1 (d) Thermal Power Station



Item	Description
Project coordinates	16° 40' 19"N, 79° 35' 18"E 16° 41' 42"N, 79° 36' 13"E 16° 42' 38"N, 79° 35' 46"E 16° 41' 53"N, 79° 33' 15"E 16° 40' 41"N, 79° 33' 54"E
Ash Pond coordinates	16° 41' 20"N, 79° 34' 20"E 16° 40' 52"N, 79° 34' 08"E 16° 40' 40"N, 79° 34' 43"E 16° 41' 17"N, 79° 34' 51"E
Elevation	72 m to 93 m above MSL
Project Land Area	2800 acres
Accessibility	
Nearest Railway station	Vishnupuram (5 km)
Air Port	Hyderabad Airport (135 km)
Sea Port	Kakinada port (328 km)
Nearest habitation	Veerlapalem (1.0 km)
Nearest head quarter	Nalgonda (50 km)
Road to the project site	Site is approachable from Narketpally on NH 65 via Miryalaguda (80 km) or via Addanki on SH 2 (100 km) and State Highway No. 2 connecting Hyderabad and Addanki.
Distance from highway	7 km
Environmental Sensitivity	
Water bodies	Krishna River about 3 km
Forest Area	Plant area falls under forest area and partly in patta lands. Forest Clearance is obtained vide Lr. No. F.No. 8-07/2015-FC, dated: 7 th July 2015.
Sanctuaries / National Parks	None within the study area
Archaeological/ Historically Important Site	None within the study area
Seismic zone	Seismic Zone – III as per IS 1893 (Part 1) 2002
List of Industries in Surroundings	1. India Cements 2. Parasakti Cements 3. Penna Cements 4. Deccan Cements 5. Andhra Cements

Source: EIA Studies

1.4.3 Justification of the Project

The state of Telangana requires substantial addition to its power generating capacity to meet power demand of its rapidly growing industrial, agricultural and other sectors. Presently, the peak demand supply gap in the state of Telangana is amounting approximately to 2000-2700 MW. In view of the proposed Lift irrigation projects, Drinking water scheme declared by Government and due to various proposed projects, the gap between supply and demand escalates. To meet the progressive demand of about 8000 MW in the next few years apart from the increasing



agricultural load, establishing a new Thermal Power Units in next three years in necessitated.

The capacity addition envisaged by TSGENCO in Telangana State is given in **Table 1.2**. The present EIA focuses on the Yadadri TPP (S. No 3), proposed by TSGENCO.

Table 1.2: Capacity Addition Envisaged by TSGENCO

S. No.	Project	MW
1	Kothagudem TPS Unit # 12 (1x800 MW)	800
2	Manuguru TPP (4x270 MW)	1080
3	Yadadri TPP (5x800 MW)	4000
	Capacity Addition Programmed	5880

Source: Project Report, TSGENCO

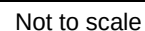
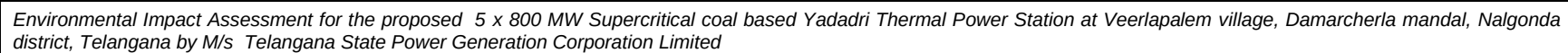


Figure 1.1: General Location Map of the Project Site



Figure 1.2: Google Imagery





Chapter-1: Introduction

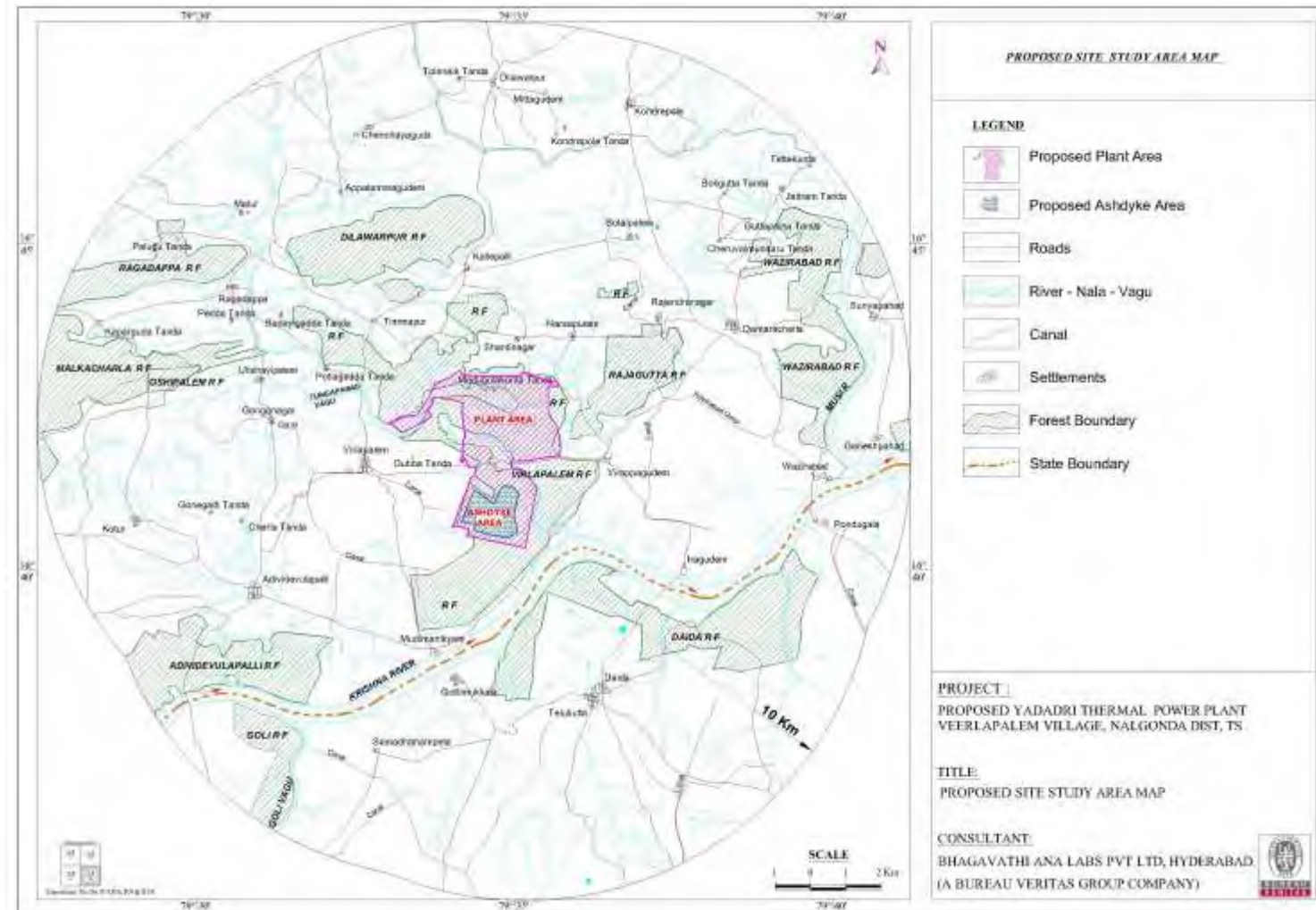
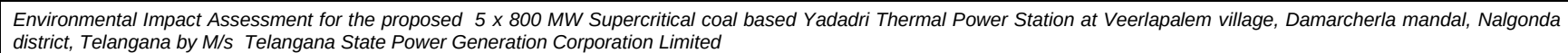


Figure 1.3: Study Area Map (10 km Radius)



Chapter-1: Introduction



Figure 1.4 (A): List of Cement Industries in the Surroundings (50 km Radius)

1.5 Importance of the Project to the Country & Region

The State of Telangana requires substantial addition to its power generating capacity to meet power demand of its rapidly growing industrial, agricultural and other sectors. A number of projects, including Yadadri Thermal Power Station (5x800 MW), have been identified by TSGENCO for augmentation of generating capacity.

1.6 Scope of the Study

EIA is carried out to decide and quantify the adverse environmental effects of the proposed project activities. The boundary limits and framework need to be ascertained to establish the baseline environmental status to effectively utilize the data in impact assessment.

The EIA studies for the proposed project have been carried out by **M/s Bhagavathi Ana Labs Pvt Ltd (BALPL), Hyderabad**. The environmental attributes like ambient air quality, meteorological parameters, water quality, soil characteristics, noise levels and ecology have been monitored from 1st December 2015 to 5th March, 2016 covering winter season.as per Standard ToRs published by MoEF&CC, GoI, New Delhi.The scope of study broadly includes:

- Understanding of the basic project activities;
- To study and analyze the anticipated impacts of the proposed project on overall baseline environmental and socioeconomic conditions in its surrounding study area;
- To identify environmental sensitive features within the study area and places of architectural and cultural importance, if any, and their safe guarding;
- To recommend project specific appropriate preventive and mitigative measures to minimize pollution, environmental and social disturbances during entire life-cycle period of the project; and
- To adopt suitable environmental action plans and management systems, so as to implement and monitor the appropriate mitigative measures

The scope of the present EIA study is in line with the Terms of Reference (ToR) issued by MoEF & CC vide letter No. J-13012/18/2015 - IA. I (T) dated 16th February 2016.

1.6.1 Study Area for EIA

As per the ToR, 10 km around the project site is considered as study area to carry out baseline environmental monitoring. The study area is shown in **Figure-1.2**.



1.6.2 Methodology of the Study

Reconnaissance survey of the study area was conducted and sampling locations were identified on the basis of:

- Predominant wind direction expected during the period of baseline monitoring in the study area as collected from 30 years climatological data India Meteorological Department (IMD) at Nalgonda;
- Topography and location of surface water bodies like ponds, canals and rivers;
- Location of villages/towns/sensitive areas;
- Probable impact areas, if any, within the study area;
- Accessibility of monitoring equipment;
- Areas which represent baseline conditions; and
- Collection, collation and analysis of baseline data for various environmental attributes.

The monitoring details are outlined in **Table-1.3**.

Table 1.3: Environmental Attributes & Frequency of Monitoring

S. No	Environmental Attribute	Parameters, Frequency of Monitoring/Sources and Remarks
1	Monitoring of Climate & Meteorology	Monitoring of climatology and meteorology including wind speed, wind direction, temperature, relative humidity, atmospheric pressure, rainfall and cloud cover through continuous monitoring station for entire study period on hourly basis and also data collection from secondary sources.
2	Monitoring of Air Pollution, Air Quality Modelling & Prediction and Prevention & Control	Monitoring of ambient air quality for PM ₁₀ , PM _{2.5} , SO ₂ , NO _x , CO, HC(Me), HC(nMe), VOCs, O ₃ - 8 hourly samples twice a week during study period for O ₃ and CO and 24 hourly samples twice a week during study period for rest of the parameters.
3	Geology	Geological history, based on data collected from secondary sources.
4	Land Use studies	Land usage for different categories in the study area based on satellite imagery, data from various Government agencies.
5	Soil Characteristics and conservation	Study of soil profile, parameters related to agricultural and afforestation potential, once during the study season.



S. No	Environmental Attribute	Parameters, Frequency of Monitoring/Sources and Remarks
6	Solid Waste and Hazardous Waste Management	Quantification of existing and proposed generation of hazardous and non-hazardous solid waste and mode of its handling, treatment, storage and disposal.
7	Hydrology (Surface and Ground) and Water Conservation	Drainage area and pattern, nature of streams, aquifer characteristics, recharge and discharge areas, based on data collected from secondary sources.
8	Water Pollution Monitoring, Prevention & Control	Monitoring of water quality, including physical, chemical and bacteriological parameters have been monitored once during the study season; detailed study of existing and proposed water balance, sea water intake, wastewater generation, treatment and discharge has been undertaken.
9	Noise Levels	Monitoring of noise levels in dB(A), hourly observations for 24 hours per location; prediction of proposed project on ambient noise levels and proposal of mitigation measures.
10	Ecology and Biodiversity	Existing flora and fauna through field visit during the study period and substantiated through secondary sources.
11	Socio-economic aspects	Socio-economic characteristics, labour force characteristics, population statistics and existing amenities in the study area; Industrial profile of the study area; Identification of places of archaeological and tourist attraction through primary survey and secondary data from Census 2011, district handbooks, etc.
12	Traffic studies	Category-wise traffic count on major roads near to the project site, once during the study season.
13	Risk assessment and Hazard Management, Disaster Management Plan and Occupational Health and Safety	Identify areas where disaster can occur and identify areas of occupational hazards, based on risk assessment studies.

Source: EIA Studies



2.0 PROJECT DESCRIPTION

2.1 Preamble

This chapter presents salient details of the proposed Yadadri Thermal Power Station (5 x 800 MW supercritical coal based thermal power project), project implementation schedule, process description, raw material requirement, details of infrastructure and handling and likely environmental effects due to the proposed project and proposed measures to control pollution.

2.2 Type of the Project

TSGENCO proposes to setup a Yadadri Thermal Power Station (5 x 800 MW Supercritical Coal based TPP) at Veerlapalem village, Damarcherla mandal, Nalgonda district, Telangana.

The coal requirement for the proposed power project based on station heat rate of 2109.4 kcal/kwh, Gross Calorific Value (GCV) of coal as 4550 kcal/kg and 85% Plant Load Factor (PLF) is estimated as 13.81 Million Tonnes Per Annum (MTPA). The makeup and consumptive water requirement assessed as 9,755 m³/hr and is sourced from Krishna river. The proposed site is mostly reserved forest, semi-agricultural and partly revenue land with isolated pockets of habitation. The total area of extent for establishment of power station is 2800 acres, including 100 acres for colony and 1300 acres for greenbelt development.

2.3 Need for the Project

The Peak load (MW) and Energy requirement (MU) at the end of 11th, 12th, 13th, 14th and 15th Plan period as per the 18th Electric Power Survey (EPS) are given in **Table-2.4**.

The peak load in Telangana State (including Andhra Pradesh) at the end of 11th Plan will be 14,122 MW, 22,445 MW by end of 12th Plan, 33,194 MW by the end of 13th plan, 51,601 MW by the end of 14th Plan and 74,818 MW by the end of 15th Plan.

Considering the utilization factor of 70%, Telangana State (including Andhra Pradesh) will require about 9886 MW by the end of 11th Plan, 15712 MW by the end of 12th plan, 23236 MW by the end of 13th Plan, 36122 MW by the end of 14th Plan and 52373 MW by the end of 15th Plan. During the above periods, Southern Region will require 36,175 MW, 57,221 MW, 82,199 MW, 1,18,764 MW and 1,65,336 MW respectively.

Table-2.5 indicates the extent of shortfall in peaking requirement and peaking requirement in the state of Telangana, Southern Region.



Table 2.4: Peak Load and Energy Requirement/Consumption

Year	State of Telangana (including Andhra Pradesh)		Southern Region		Western Region		Northern Region	
	Peak Load (MW)	Energy Requirement	Peak Load (MW)	Energy Requirement	Peak Load (MW)	Energy Requirement (MUs)	Peak Load (MW)	Energy Requirement
2011-12	14122	85358	36175	243912	39351	271453	37265	271301
2016-17	22445	129767	57221	357826	62015	394188	60934	422498
2021-22	33194	191912	82199	510786	86054	539310	86461	594000
2026-27	51601	284776	118764	727913	120620	75318	121979	840670
2031-32	74818	412903	165336	1017526	163222	1028974	164236	1135543

Source: 18th Electric Power Survey

Table 2.5: Shortfall in Peaking Requirement and Peaking Requirement in Telangana State, Southern Region

Demand	Units	By the end of 12 th Plan, i.e., 2016-17	By the end of two years in 13 th Plan i.e., 2018-19
Anticipated Peak Demand	MW	11210	13108
Anticipated Base Demand (80% of peak demand)	MW	8968	10487
Installed capacity as on 31.03.2015	MW	8871	8871
Deficit against anticipated Peak Demand	MW	(-) 2339	(-) 4237
Deficit against anticipated Peak Demand	%	(-) 20.86	(-) 32.32

Source: 18th Electric Power Survey

According to **Table 2.5**, the State of Telangana will have the peaking shortage of 2339 MW (20.86%) by the end of 12th Plan i.e., 31.03.2017 and 4237 MW (32.32%) by the end of first two years of 13th Plan i.e., 31.03.2019 indicating the extent of shortfall in peaking requirement and peaking requirement in the state of Telangana, Southern Region.

2.4 Location of the Project

The site is located near Veerlapalem village, Dameracherla Mandal, Nalgonda district. The required land is 2800 acres for setting up the power project. This includes ash disposal area and colony for the thermal power project. The nearest town is Miryalaguda which is about 20 km from the site. The nearest railway station is Vishnupuram railway station which is 5 km from the plant. Nearest domestic and international airport is Hyderabad which is about 135 km away from project site.

2.4.1 Present Land use of the Project Area

The total extent of land for establishment of proposed power project is 2800 Acres (Forest land is Ac. 2095.28 Gts, Patta Land, Government Land, Udfa patta Land and D-Patta Land etc is Ac. 704.12 Gts). The proposed site comprises of 75 % of reserve forest land and remaining land is mostly non-agricultural, uninhabited, partly agricultural, revenue land with isolated pockets of habitation. There are no historic places in the vicinity.

Forest Clearance is obtained vide Lr. No. F.No. 8-07/2015-FC, dated 7th July 2015. The Forest Clearance letter from MoEF&CC dated 7 July, 2015 is provided in **Annexure 3**.

An amount of Rs. 198.59164 Crores was paid towards cost of NPV of forest land and cost of compensatory afforestation to an extent of 4676 Acres was deposited with Principal Chief Conservator of Forest, Hyderabad. The letter in this regard is included in **Annexure 3**.

The details of acquisition of Patta/Government/UDAFa etc land fallen within the forest boundaries vide letter No E/1698/2015 dated 10-06-2015 from the Revenue Department, Telangana State are provided as **Annexure 4**.

2.4.2 Site Topography Details

The site coordinates range between 16° 40' 19"N to 16° 42' 38"N latitudes and 79° 36' 13"E to 79° 33' 54"E longitudes. The photographs of the site are provided below in **Figure 2.4**.

The site elevation ranges between 72 to 93 m above Mean Sea Level (MSL). Based on the detail contour survey and safe grade/storm water drainage studies, the



general grade level of the built up area is selected. The project area is having certain hillocks, certain amount of cutting and filling will be required. Land grading will be done for erecting the proposed plant units. The contour map of the proposed project region is given below in **Figure 2.5**. The quantity of cutting is about 80,00,000 m³ and the quantity of filling required in the plant area is about 66,00,000 m³. The site preparation for the project will not require any filling material from outside. The top soil excavated during the plant erection will be utilized for green belt development within the project site.

River Krishna flows at a distance of about 3 km from the proposed project site. The elevation of plant site is 22 m above and ash pond is 20 m above with respect to the High Flood Level (HFL) (El + 60.93 m) of river Krishna. The highest HFL monitored at Pondugala Station on River Krishna under Lower Krishna Division, Hyderabad is 60.334 m on 15-10-1998 over the past 32 year data provided by Central Water Commission, Government of India. The details of High Flood Level of River Krishna observed are provided as **Annexure 6**.

2.4.3 Layout of the Proposed Project

Layout of the proposed power plant units has been optimised in line with the specifications by Central Electricity Authority (CEA).

The space requirements for all the equipment, systems, buildings, structures, fuel storage area including, raw water storage tank, water treatment plant etc., are as specified by CEA. In laying out various facilities following general aspects have been taken into consideration.

- Availability of adequate land for erecting proposed units;
- Provision to install proposed power plant units;
- Predominant wind directions to minimise pollution, fire risk etc.;
- Raw water supply and storage facilities; and
- Availability of adequate space for fabrication / construction equipment.

All facilities of the plant area will be laid out in close proximity to each other to the extent practicable so as to minimize the land requirement. The layout is planned to facilitate smooth movement of men and materials between the various facilities both during construction and operation. Necessary plant drainage system would be constructed at the proposed project site.

Adequate plant facilities will be erected for the smooth and efficient functioning of the proposed project. The plant layout showing proposed units is presented in **Figure-2.6**.

2.5 Plant Size and Operation Details



The proposed 4000 MW coal based thermal power project is comprising of:

- a steam generator which will be of single shaft, two/three cylinders, tandem compound, reheat, regenerative, condensing unit directly coupled to AC Generator giving a continuous output at generator terminal of 800, 000 KW at 22~27 KV.
- semi outdoor type two pass single re-heat balanced draft, drumless unit designed for firing pulverized coal as main fuel, and
- Distributed Digital Control and Management Information System (DDCMIS) with integrated, CRT/ Key Board operation for Steam Generator, Turbine, Generator and auxiliaries from Central Control room.

The salient features of proposed 4000 MW plant are given in **Table 2.6**.

Table 2.6: Salient Features of Proposed Project

S. No	Particulars	Details		
1	Proposed Project	5x800 MW supercritical coal based Yadadri Thermal Power Station		
2	Plant Capacity	4000 MW		
3	Plant Configuration	5x800 MW		
4	Location	Veerlapalem village, Dameracherla mandal, Nalgonda District , Telangana State, India Latitude : 16.694138 N Longitude : 79.583531 E		
5	Nearest Town	Miryalaguda	:	30 km
6	State Highway	SH-2 Narketpally - Addanki section)	:	7 km
7	Nearest Railway Station	Vishnupuram	:	5 km
8	Nearest City	Hyderabad	:	170 km
9	Nearest Airport	Hyderabad	:	200 km
10	Site elevation	72 – 93 meter above MSL		
11	Seismic Zone	Zone – III		
12	Land Requirement (acres)	2800.00 acres		
13	Source of Water	River Krishna		
14	Water Requirement	9755 m ³ /hr		
15	Distance from water source	10 km (Approx.)		
16	Cooling System	Closed cycle cooling system with Natural Draft Cooling Towers		
17	Primary Fuel & Source	Domestic Coal: SCCL mines and Imported Coal from Indonesia		
18	Distance from Coal Source	Domestic : 300 kms Imported : 328 kms from Kakinada port		
19	Support Fuel & Source	HFO/LDO from nearest refinery/oil depots		
20	Fuel Requirement			



S. No	Particulars	Details
a)	50% domestic coal + 50% imported coal of GCV 4550 kcal/ kg and heat rate 2109.4 kcal/ kwh	1854.42 tph 13.81 mtpa
	100% imported coal) of GCV 5700 kcal/kg and heat rate 2109.4 kcal/kwh	1480.28 tph 11.02 mtpa
b)	Support fuel (HFO/LDO) 0.5 ml/kwh	17520 KL/Year (Average)
21	Transportation:	
22	i. Main Fuel Coal	By Rail network system
23	ii. Support fuel (HFO/LDO)	By Rail tankers
24	Steam Turbine Generator	The steam turbine generator will be single shaft, two/ three cylinders, tandem compound, reheat, regenerative, condensing unit directly coupled to AC Generator giving a continuous output at generator terminal of 8,00,000 KW at 22~27 KV.
25	Steam Generator	Semi outdoor type two pass single re-heat balanced draft, drumless unit designed for firing pulverized coal as main fuel.
26	Control System	Distributed Digital Control and Management Information System (DDCMIS) with integrated, CRT/ Key Board operation for Steam Generator, Turbine, Generator and auxiliaries from Central Control room.
27	Station Operation Philosophy	Base Load
28	Chimney	Two(2) twin flue and One(1) single flue chimney of 275 m high
29	Power Evacuation plan	400 KV transmission system
30	Project Commissioning Schedule	Unit – I & III : 36 Months from Zero date Unit – II, IV & V : 48 Months from Zero date
31	Life of the Plant	25 years
32	Total Project Cost incl. IDC	Rs 25099.42 Crores

Source: Project Report, TSGENCO





Figure 2.5: Project Site Photographs

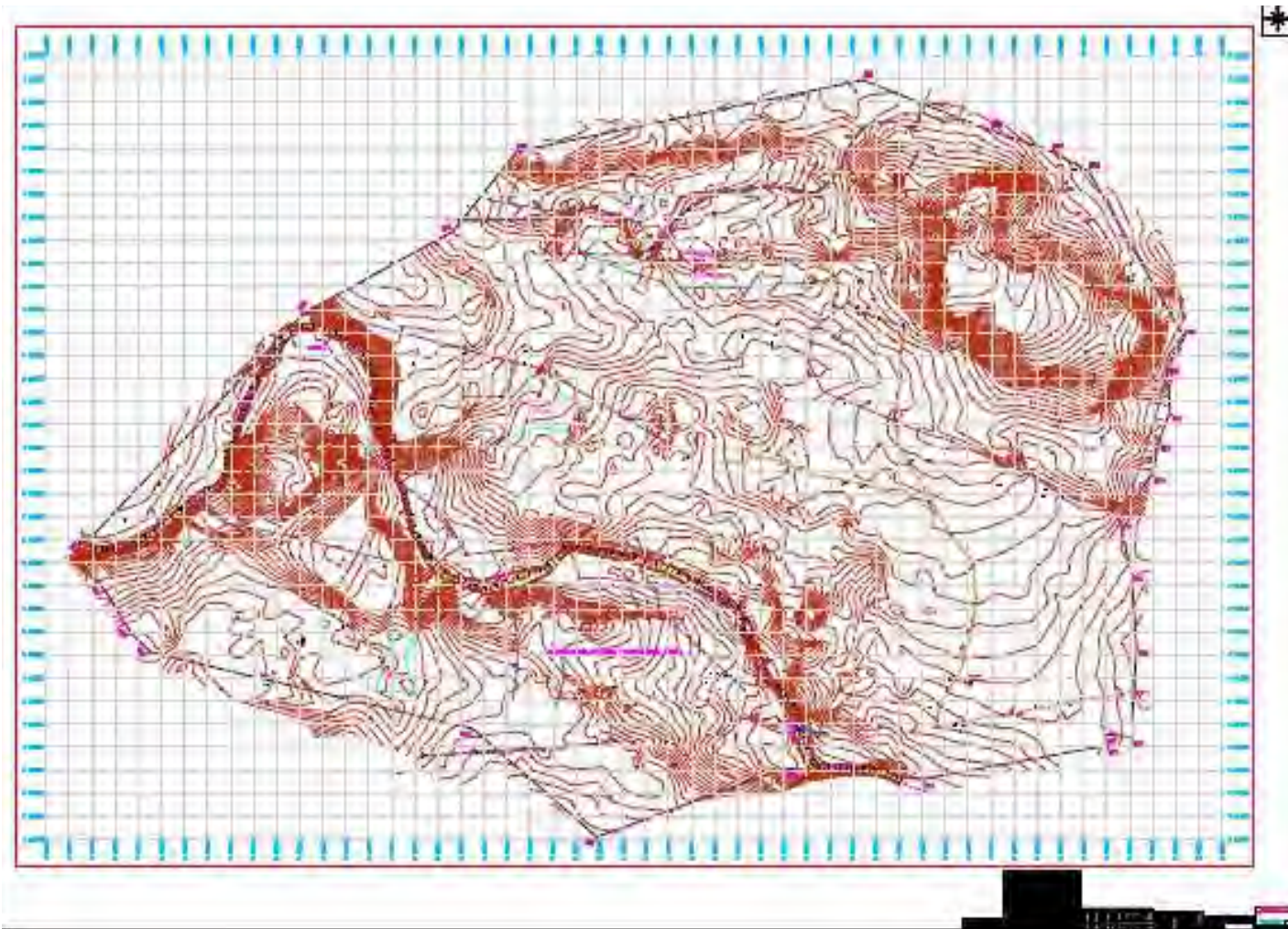


Figure 2.6: Site Contour Map



Chapter-2: Project Description

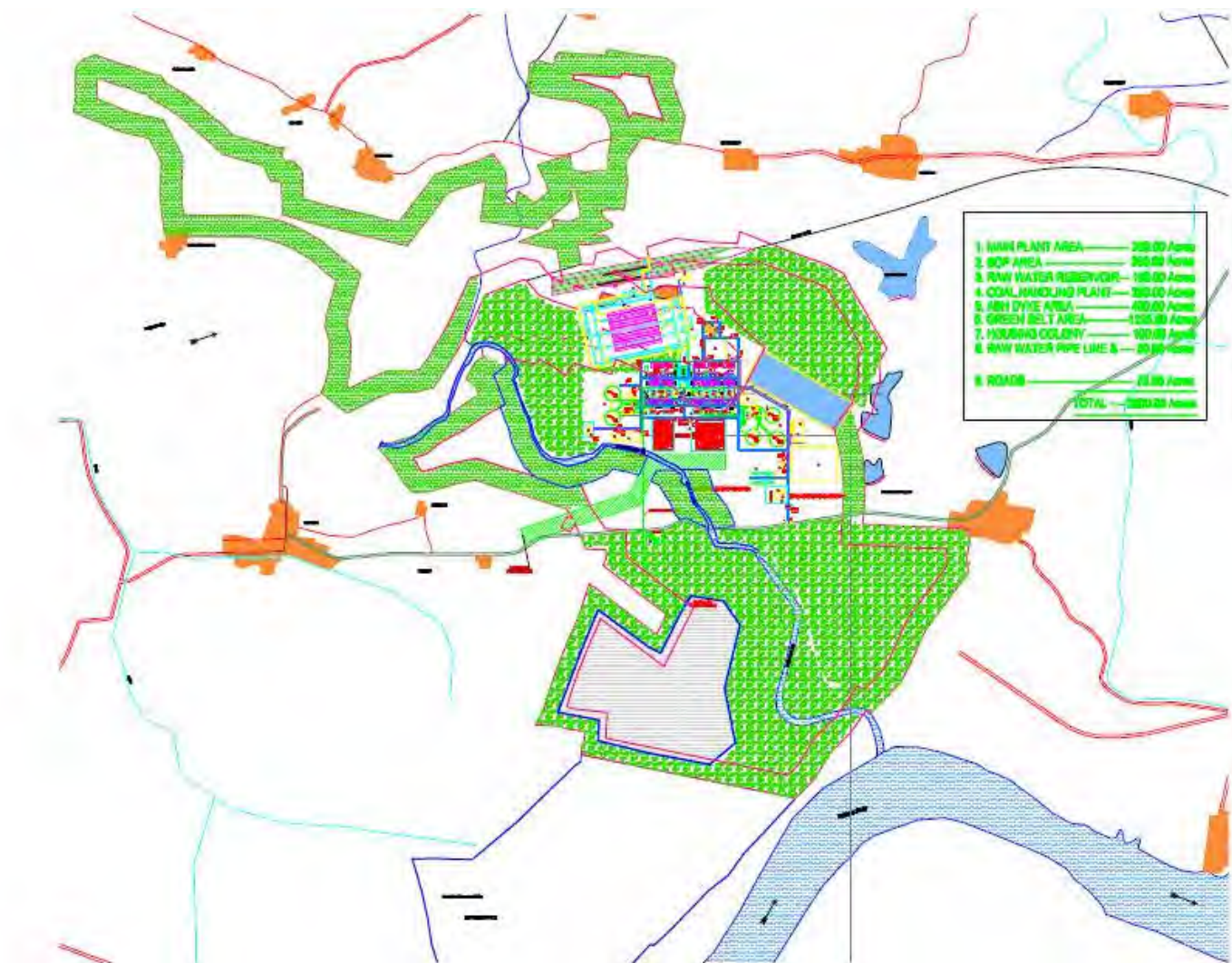


Figure 2.7: Plant Layout Map



2.6 Proposed Schedule and Approval for Implementation

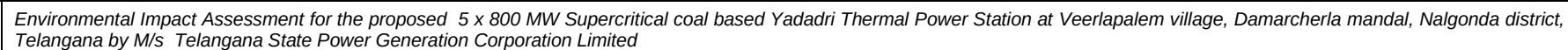
Successful execution of the project largely depends on the co-ordinated approach of the project implementing agencies. Proper co-ordination between the various project execution agencies, monitoring of project schedules, appropriate mobilization of manpower and other resources can achieve effective cost control and timely completion of the project.

The broad time-frame required for implementation and completion of the project would be 48 months from the zero date, unit-wise details of which are given below in **Table 2.7.**

Table 2.7: Time Frame for Implementation

Unit	Time frame from zero date
I & III	36 months
II, IV & V	48 months

A bar chart giving the schedule for the major activities is shown in Project Schedule as **Figure 2.7.**



PROJECT IMPLEMENTATION SCHEDULE

ACTIVITY	1 YEAR				2 YEAR				3 YEAR				4 YEAR				5 YEAR			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
A. CIVIL STRUCTURAL & ARCH.																				
1. SOIL INVESTIGATION & LENDING																				
2. CONSTRUCTION FACILITIES																				
3. WAREHOUSE BUILDING																				
4. EQUIPMENT FOUNDATIONS																				
5. COOLING TOWER																				
6. CHIMNEY																				
7. ROADS																				
B. MECHANICAL																				
1. STEAM GENERATOR & AUXILIARIES																				
2. TURBO GENERATOR & AUXILIARIES																				
3. COAL HANDLING SYSTEM																				
4. AIR HANDLING SYSTEM																				
5. WATER SUPPLY & TREATMENT SYSTEM																				
6. COMPRESSED AIR SYSTEM																				
7. WIND-HEAT-EXCHANGER																				
8. ELEVATOR																				
C. ELECTRICAL																				
1. TRANSFORMERS																				
2. BATTERY CHARGE & MISC.																				
3. BUS BUSES																				
4. CABLES																				
5. LIGHTING & INTERCOM SYSTEM																				
6. INSTRUMENTATION & CONTROL																				
7. BATTERY																				

ENGINE UNIT 1P UNIT-1&2
 CONDENSER UNIT-1&2

1. COMMISSIONING OF UNIT- 1 & 2 : 52 MONTHS
 2. COMMISSIONING OF UNIT- 2 & 4 : 58 MONTHS
 3. COMMISSIONING OF UNIT- 3 : 64 MONTHS

E-ENGINEERING
 S-SUPPLY
 C-CONSTRUCTION
 DI-DEMOLITION
 CC-COMMISSIONING

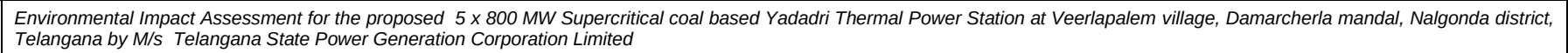


2.7 Technology Details

“Supercritical ” is a thermodynamic expression describing the state of a substance where there is no clear distinction between the liquid and the gaseous phase. Super Critical Thermal Power Plant employs higher temperature and pressure resulting in better efficiency, reduced fuel and less greenhouse gas (GHG) emissions. A supercritical steam generator operates at pressures above the critical pressure (3,200 psi or 22 MPa) in which bubbles can form. Instead, liquid water immediately becomes steam. Water passes below the critical point as it does work in a high pressure turbine and enters the generator's condenser, resulting in slightly less fuel use and therefore less greenhouse gas production.

2.8 Technical Feature of the Boiler & TG Plant

The technical details of the proposed unit are given in the following sections. The process flow diagram is shown in **Figure 2.8**.



Chapter-2: Project Description

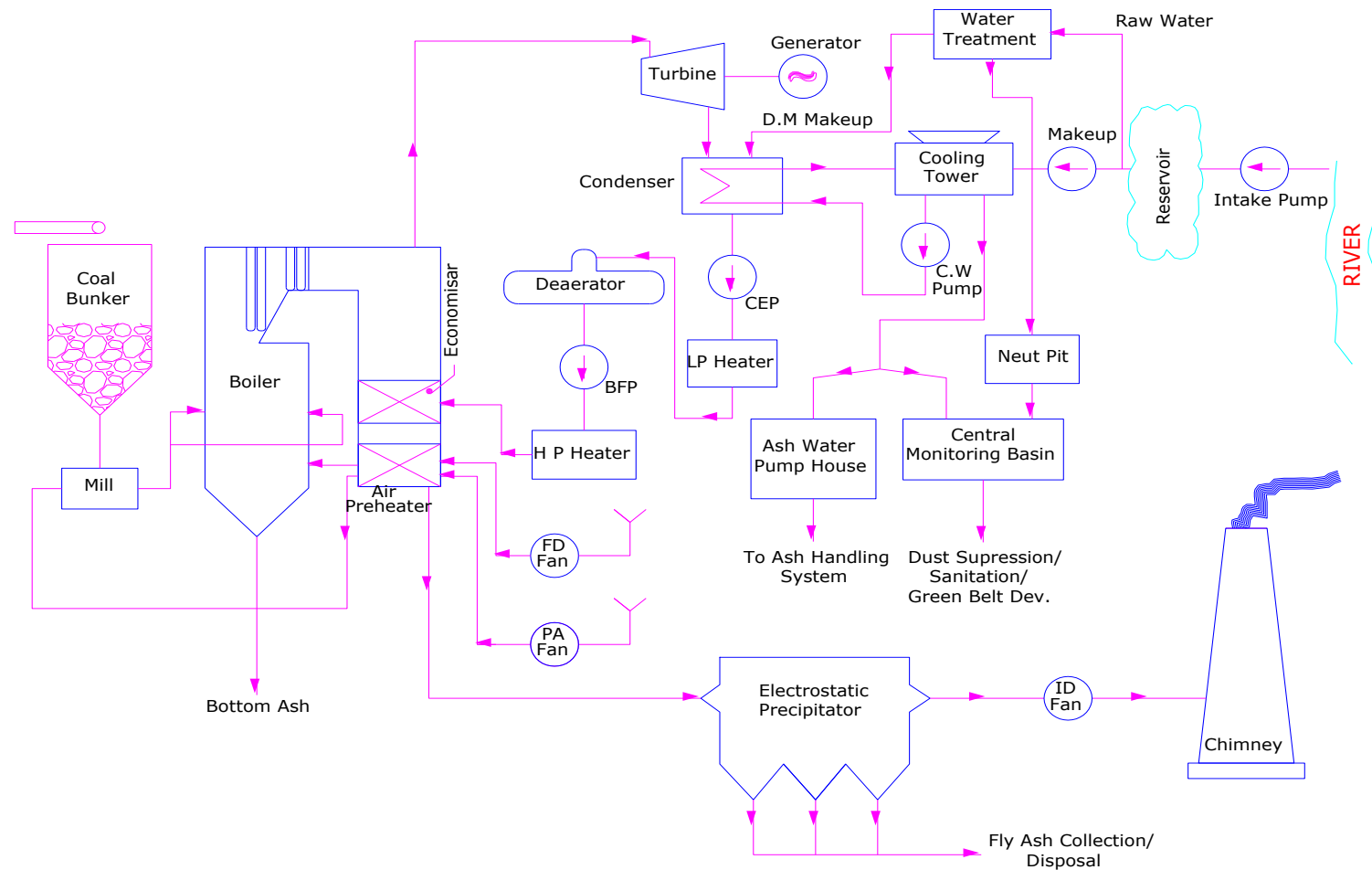


Figure 2.9: Typical Process Flow Diagram

2.8.1 Steam Generator, Design Considerations

- **Furnace Type**

(i) Two Path / Tower Type

Furnace configuration is derived from each equipment manufacturer's specialty. Two path types is mainly adopted in Japan and tower type is typical in Europe. No significant difference is observed in the applicability to kind of coal. It is because boiler design can be adjusted in accordance with coal characteristics such as abrasion of ash.

(ii) Spiral (plain/bare tube) Wall and Vertical (rifled/ribbed tube) Wall Type

The principal concern with a variable-pressure super critical-pressure design is the requirement for once-through operation. The mass flow in the furnace-wall tubes must be sufficiently high to avoid overheating or Departure from Nucleate Boiling (DNB) while generating steam at sub-critical pressures and to avoid excessive metal temperatures and uneven steam outlet temperatures when operating at super critical pressure at higher boiler loads.

To accomplish these objectives, the spiral-wall design is used for the unit. The principle of the spiral or helical-wall furnace is to increase the mass flow per tube by reducing the number of tubes needed to envelope the furnace without increasing the spacing between the tubes. This is done by arranging the tubes at an angle and spiraling them around the furnace. For instance, the number of tubes required to cover the furnace wall can be reduced to one half by putting the tubes at a 30 degree angle. The centerline spacing or pitch (P) is made the same as on a vertical wall to prevent fin overheating. Additionally, by spiraling around the furnace, every tube is part of all the walls, which means that each tube acts as a heat integrator around the four walls of the combustion chamber.

The spiral-wall concept thus addresses two major challenges of the full variable pressure super critical pressure boiler.

- Achieving the required mass flow to avoid overheating and excessive metal temperature by reducing the number of tube circuits.
- Minimizing difference in tube to tube heat absorption by exposing each tube to all four furnace walls.

Spiral-wall furnaces have been in operation in Europe and Japan for many years and have given satisfactory performance.

As an alternative to the spiral-wall design for larger-size steam generators, a certain manufacturers offer a tangentially fired unit with vertical walls consisting of rifled tubes for ease of fabrication, erection, and maintenance. A stable fireball is formed in



the center of the furnace with tangential firing, with essentially equal distribution of the lateral heat absorption on all furnace walls. Unbalances are minimized and lateral heat-absorption patterns are predictable over the entire load range.

Rifled tubing is used in the furnace walls to avoid overheating or DNB at sub-critical pressures.

(iii) UP Type / Benson Type

UP type is applied to constant pressure once through boiler and Benson type is applied to variable pressure once through boiler. Variable pressure Benson type boiler is suitable to improve plant efficiency at partial load and flexible operability.

- **Startup System**

In the case of UP type (constant pressure) boiler, it is necessary to keep the super critical pressure at boiler and the minimum water flow rate at water wall from the early stage of unit starting in order to prevent the water wall from tube burning-out, while the turbine needs low pressure superheated steam at starting. For these purposes, UP type boiler usually has flash tank drainage start up system and uses de-pressurized steam from flash tank for starting turbine. This start up system requires so-called ramping operation which means switching operation from starting system to main system during load increasing operation, because this start up system capacity is only around 10% of turbine TMCR. This ramping operation is so complicated operation under the large different pressure that some valves are required with enough durability.

On the other hand, Benson type boiler can start from under the low pressure condition because Benson type boiler has availability of variable pressure operation owing to spiral structure of water wall tubes (or rifled tubes used for vertical water walls), and circulation system with Boiler Circulation Pump (BCP) can be applied to this type of boiler. This system can shorten the start up time and heat loss during start up period.

- **Description of Steam Generator**

The steam generator will be supercritical, technology designed for firing coal as primary fuel, balanced draft furnace suitable for semi-outdoor installation. Boiler including auxiliaries will be designed for operation with 100% Imported coal and with a coal blending of imported coal and indigenous coal in the ratio of 50:50.

The steam generator will be capable of operating on sliding parameter. The load charge for sliding parameter will be from 40% SGMCR to 100% TGMCR. However, it will be possible to operate the steam generator with modified pressure sliding mode with constant pressure mode operating between 90% TGMCR to 100% SGMCR. Steam generator will be designed to meet the Indian Boiler Regulation (IBR)



requirement. Wherever IBR is not specific, ASME or equivalent reputed international code will be used.

Steam and water system will essentially comprise of steam separator, separator storage tanks evaporator down comers, water walls, superheater, reheater, desuperheater, economizer, valves, fittings, piping, insulation, supporting hanger's instrumentation etc.

The furnace will be designed to withstand pressure regimes without permanent deformations and will be made of gas tight welded membrane walls design required for openings of wall blowers, observation ports, access doors and instruments.

The furnace walls will either be spiral wound and vertical tubes or vertical rifle tubes as per the manufacturer's design. The furnace will have hopper bottom with stainless steel seal plates suitable for connection to an ash hopper. A suitable sealing arrangement shall be provided for connecting to water impounded wet type bottom ash hopper.

The water / steam separators will be arranged at the evaporator outlet and will be so sized to ensure adequate steam separation. The water / steam mixture will be fed into the separators by connecting pipe work which will enter around the circumference at an inclined angle to ensure mixture moving spirally downwards and the water / steam separation is done by means of applied centrifugal force. The water will be led downwards to the collecting vessel and the steam escapes centrally upwards to the connections towards the first superheater stage.

The water received in the separators will be re-circulated to the economizer inlet via 1x100% startup water re-circulation pump. At higher loads the re-circulation pump will not be in operation and the entire flow from the evaporator is directed to the superheater. It will also be possible to start the steam generator without the re-circulation pump.

The superheater and reheater will be designed to maintain superheat and reheat steam temperatures at superheater and reheater outlet over the entire steam temperature control range.

The attemperators are to be of spray type fitted with an inner removable lining. RH temperature control is by means of damper control of the flue gases or gas recirculation.

The economizer will be of non-steaming and bare tube type. The tube banks will be of inline arrangement.

2.8.2 Coal Feeding and Burning System

Coal feeding and burning system will essentially comprise of gravimetric coal feeders, coal mills, coal pipes and coal burners.

For firing high ash content abrasive coal, medium speed vertical spindle of large capacity bowl mills will be provided having low power consumption; relatively high availability, low aintenance cost and fineness control. The mill size and numbers will be selected such that on an average two mills remain standby.

Considering the grinding fineness required, the mills will be equipped with rotating classifiers having speed adjustment to control grinding fineness. The firing system will employ latest “State of the Art” burners and will permit load variation from 40 to 100% BMCR without use of support fuel. The ratio of fuel and air flow will be controlled. Due to sufficient burner wall distance and the burner swirl direction, operation with low excess air will be possible without the risk of wall damage.

Tilting Tangential Firing system in which injection of fuel and air from wind box in the furnace corner is envisaged.

2.8.3 Auxiliary Boiler

One number outdoor installation type, natural circulation, single / bi-drum, pressurized furnace, water tube Boiler suitable for firing LDO and having required steaming capacity but not less than 60 T/hr (Excluding steam requirement of Auxiliary Boiler) with operating steam parameters of 19 kg/sq.cm(g) pressure & 250 deg.C temperature at super-heater outlet. Output steam of the auxiliary boiler shall be connected to the low temperature station header.

Boiler and its supporting auxiliaries are capable to generate 110% MCR steaming capacity for half hour every shift of eight hours.

The steam temperature control range of Auxiliary boiler shall be from 60% to 100% load.

The design of Auxiliary Boiler shall meet (or exceed) all requirements of IBR. The Bidder shall be responsible to obtain necessary approval of Inspection Authority / Chief Inspector of Boiler on behalf of Customer as may be required for design & design calculation, manufacturing & erection procedures, testing etc as called for under IBR.

The auxiliary Boiler, including its interlock & protection system shall conform to NFPA – 85.

2.8.4 Steam Turbine and Auxiliaries

• **Steam Turbine Plant**

The turbine component and its auxiliaries will be designed and selected to meet the stringent requirements in respect of superior thermal performance, excellent product reliability & operational flexibility.

The turbine will be designed based on modular design approach that divides the turbine into three main parts:

- High-pressure (HP) section
- Intermediate-pressure (IP) section and
- Low-pressure (LP) section

The turbine will have one single flow HP, one double flow IP and two double flow low-pressure cylinders exhausting downwards into condensers. All components will be selected based on long-proven records and standardized modules. The turbines will be of the tandem compound design. The individual shafts of the cylinders and the generator rotor shaft will be coupled rigidly together.

• **Gland Steam Sealing System**

A fully automatic gland sealing steam supply system will be provided for the TG Set and the turbine drives of BFPs. HP & IP turbine shaft glands will be sealed to prevent escape of steam into the atmosphere and the LP turbine glands will be sealed for preventing leakage of atmospheric air into the turbine. Steam will be used for sealing these spring backed labyrinth glands.

During start-up and low loads (say 40% load), seal steam will be supplied to the turbine glands from the auxiliary steam header or cold reheat line through a seal steam regulating valve. During normal operation (above 40% load), the HP and IP turbines will be of self-sealing type and under that condition the auxiliary / CRH steam source will be cut off and the leak-off steam from HP and IP glands will be used for sealing the LP glands. The excess leak-off steam will be led to the condenser.

A gland steam condenser will be provided to condense and return to the cycle, all gland leaks off steam including that from BFP turbines. 2x100% capacity vapour exhausters will be provided to remove non-condensable gases from the gland steam condenser.

2.8.5 Electrostatic Precipitators

The high efficiency electrostatic precipitators having collection efficiency of 99.89% will limit the outlet dust emission to 30 mg/Nm³ at ESP outlet with all fields in service



while the boiler is operating at its BMCR, firing worst coal having maximum ash content in coal.

For each unit, four electrostatic precipitators comprising of eight (8) bus sections in the direction of gas flow and two bus sections perpendicular to the gas flow will be provided. Electrostatic precipitators will be provided with microprocessor based programmable type rapper control system and ESP management system to ensure the safe and optimum operation of ESP. The dust collection hoppers at all strategic locations will have a minimum storage capacity of eight (8) hours.

2.8.6 Boiler Structures

Boiler and auxiliaries will be complete with necessary piping, valves and fittings. Supporting structural steel, stairways, platforms and walkways, hand rails complete, weather covering interconnecting platforms, buck stay and tie bars for boiler, refractory & insulation etc. will be provided.

FGD system will be installed to comply new Thermal Power Plant Emission Standards in respect of Sulphur dioxide, and will be kept behind the chimney as per environmental stipulation. The design and layout of steam generator and its auxiliaries will be such that a wet/dry flue gas desulphurisation system can be installed, taking suction from duct after ID fan and feeding the desulphurised flue gases back to the chimney with provision for bypassing the FGD system.

- **HP-LP Bypass Station**

60% HP / LP Turbine bypass station will be provided to act not only as a protection to the turbine during pressure rise resulting from sudden load throw-off but also to enable operation of the unit at loads lower than the control load. Further, HP/LP bypass will permit quick, repeated hot starts of the unit on its tripping.

The LP bypass station will be connected to the hot reheat line and discharges the steam into the condenser. The hot reheat steam will be desuperheated by means of condensate injection. The bypass system shall be in operation when the steam turbine is not able to receive the entire steam quantity, e.g. during start-up or in case of a load rejection.

2.8.7 Boiler Feed Pumps (BFP)

The unit will comprise of 2x50% turbine driven boiler feed pumps and 1x50 % electric motor driven boiler feed pump per unit with boiler feed booster pumps mounted on the common shaft. The boiler feed booster pump will be double volute casing, vertical split, casing type. The discharge line of the booster pump will be connected to suction boiler feed pump. Each boiler feed pump will be designed to give parameters to suit the steam generator requirements; such that motor driven feed pump will be used for



start-up of unit and will also act as standby BFP. Turbine driven boiler feed pumps will be located at operating floor and the motor driven pump will be located on operating floor and both types will be accessible to turbine house EOT crane for erection and maintenance.

The feed pump will be able to handle feed water of pH. 8.5 to 9.5 and of temperature up to 185°C (tentative).

The boiler feed pumps will be of horizontal, centrifugal type. The boiler feed pumps outer casing will be of barrel type with end removal. The inner pump assembly comprising of shaft, impellers, stage casings will be capable of being removed and replaced as a unit without disturbing the feed piping. Each feed pump will be provided with ON-OFF / modulating type recirculation control valve to protect the pump under low flow condition. The boiler feed water system will be designed to operate primarily in an automatic mode over the range of system design loads. The arrangement will provide automatic start-up one of the standby motor driven feed pump under conditions like tripping of the running TDBFP's and/or discharge header pressure low etc.

The turbine of boiler feed pump will be of total controlled governing and consist of reaction stages. During stable / normal operation, steam sources for TDBFP will be from IP / LP crossover piping.

Hydraulic coupling will be utilized to achieve speed control of motor driven feed pumps. Provisions will be made for warm up to standby pump, if required.

2.8.8 Typical Design Parameters of Steam Turbine

The data mentioned in **Table 2.8** is indicative and each supplier will offer data for the machine being offered:

Table 2.8: Typical Design Parameters of Steam Turbine

Description	Unit	Parameter
Type	-	Tandem Compound
Number of cylinders	-	Four (4)
Type of governing	-	Digital electro hydraulic
Speed	RPM	3000
Rated output (continuous)	kW	800,000
Steam pressure before emergency stop valve HP	Kg/cm ² (a)	242
Steam temperature before emergency stop valve	°C	565



Description	Unit	Parameter
Reheat steam inlet pressure	Kg/cm ² (a)	56
Reheat steam temperature	°C	593
SH Steam flow required with 0% make- up and 0.098 ata back pressure	tph	2427
Reheat steam flow	tph	1995
Rated pressure at exhaust of LP turbine	kg (a)	0.1
Maximum temperature rise of circulating water	°C	9

Source: Project Report, TSGENCO

2.8.9 Mechanical Systems

- **Coal Transportation, Unloading Facilities and Handling Plant**

1. The coal will be transported to power Station from coal mines through Indian Railways. The nearest port is Kakinada which is about 328 km from the project site
2. The coal handling plant (CHP) will be designed to operate throughout the year with coal with average gross, calorific value of 4550 kcal/kg.
3. As per BHEL considering Gross Station Heat Rate of 2109.4 kcal/kwh, the coal requirement for the each unit works out at full load with GCV of coal as 4550 kcal/kg as:

- i) Tonnes per hour (tph) $= (800 \times 2109.4) / 4550$
 $= 370.88$
- ii) Tonnes per day (tpd) $= 8901.20$
- iii) Million tonnes per year at 85% PLF (mtpa) $= 2.76$

2.8.10 Coal Handling Plant

Two (2) independent CHPs are envisaged designated as CHP I & II. CHP-I caters to the fuel requirements for Unit-1/2 and CHP-II for Unit-3/4/5. Two (2) Wagon Tippler Complex# WTC-1A/1B (each with two (2) Crescent type Wagon Tipplers) are provided for CHP-I as well as for CHP-II. Track Hopper Complex # THC-1A & THC-1B are provided for CHP-I & CHP-II respectively. Suitable number of rail tracks appropriately interconnected with each other shall be laid ahead and prior to the track hoppers / wagon tipplers for handling / return of empty rakes. Necessary line side equipment and signaling arrangement for rake movement shall be provided.

Two (2) Wagon Tippler Complexes are proposed so that stock building and rake unloading operations can be carried out expeditiously. Two (2) Track Hopper



Complexes are proposed so that during emergency situation, rakes with bottom discharge wagons can be unloaded in sufficient numbers.

CHP-I & CHP-II are interconnected so that coal can be transferred from CHP-I to CHP-II & vice versa. Each of CHP- I /II is composed of two (2) streams (1W + 1S) operating at guaranteed capacity of 2156 tph each. However, both streams of CHP-I /II shall be designed to operate simultaneously in case of emergency.

2.8.11 System Requirements

Following **Table 2.9** describes the coal handling capacity requirements for CHPs.

Table 2.9: Coal Handling Capacity Requirements for CHPs

Sr. No.	Item Description	Symbol	Unit	Value for CHP- I	Value for CHP-II
1	Installed, MW			2x800 [U-1/2]	3x800 [U-3/4/5]
2	No of Units	N	no.	2	3
3	Unit capacity	C _{p1}	MW	800	800
4	Total MW	C _t	MW	1600	2400
5	Fuel	-	-	Blended Coal	Blended Coal
6	Calorific value of above coal	Cv1	kcal/kg	4550	4550
7	Station heat rate for 1x800 MW	SHR1	kcal/k whr	2109.4	2109.4
8	Hrly coal consumption per unit	q ₀	tph	370.88	370.88
9	Coal consumption per hour	q ₁	tph	741.8	1112.7
10	Coal consumption per day	q ₂	tpd	17802.4	26703.4
11	Operating Hrs/ day for one CHP stream	t ₁	hr	14	14
12	Capacity of one CHP stream	C ₀	Tph	1271.6	1907.4



Sr. No.	Item Description	Symbol	Unit	Value for CHP- I	Value for CHP-II
13	Hence, Capacity of one CHP stream with 10% Margin & post round off	C1	tph	1400	2100
14	Capacity of one CHP Stream selected	C2	tph	2156	2156
15	Hence operating hr. per CHP Stream	t0	hr	~9 (<14)	~13 (<14)
16	Coal rake size i.e. no of wagon per rake	n1	no	58	58
17	Pay load per wagon	q1	tonne	77	77
18	Coal qty per rake [=rake load]	qd	tonne	4466	4466
19	No. of coal rakes to be unloaded per day (Round off)	n2	no	4	6
21	No. of coal rakes to be unloaded per day considering 2-rake	n4	no	6	8

Source: Project Report, TSGENCO

2.8.12 Ash Handling System

Ash handling system of each unit will include bottom ash handling system, coarse ash system, wet fly ash handling system, dry fly ash handling system, ash disposal system and ash water recovery system. The ash handling system will be complete in all respects with mechanical, civil, structural, electrical, control and instrumentation systems.

Coal consumption at BMCR per unit	- 370.88 TPH
Ash content in coal @ 32 %	
(50% Indian + 50% Imported) per unit	- 119 TPH
Bottom ash hopper generated @ 25%	- 29.75 TPH
Ash generated in Eco hoppers @ 5 %	- 6 TPH
Ash generated in APH hoppers @ 5 %	- 6 TPH
Ash generated in Duct hoppers @ 5%	- 6 TPH
Fly ash in ESP hoppers @ 90 %	- 107.1 TPH



Ash formed due to combustion of pulverized coal in the steam generator will be collected either as bottom ash in the bottom ash hopper; coarse ash in economizer hoppers, air pre heater hoppers, duct hoppers and fly ash ESP hoppers.

Bottom ash of each unit will be collected in a W-shaped water impounded hopper and conveyed to ash slurry sump through jet pumps once in a shift of eight hours. The ash slurry will further be conveyed to ash disposal area by means of Ash disposal pumps.

Ash collected in the economizer hoppers of each unit will be extracted continuously by means of flushing apparatus located below each economizer hopper and conveyed to bottom ash hopper. The ash slurry collected in the bottom ash hopper will further be conveyed to the ash slurry sump along with bottom ash slurry for further disposal to ash disposal area.

Ash collected in the air pre heater and duct hoppers of each unit will be extracted intermittently by means of feeder ejectors located below each APH & Duct hoppers and conveyed to coarse ash tank. The slurry collected in the coarse ash tank will be conveyed to the ash slurry sump through jet pumps.

- **Disposal Mechanism of Fly Ash**

The fly ash collected in Electrostatic Precipitator hoppers of each unit will be extracted through vacuum and conveyed to buffer hoppers and thereafter to fly ash silos through pressure conveying system. Fly ash stored in fly ash silos will be disposed in dry form through closed tankers. Also fly ash will be disposed in dense form duly mixed with water at 1: 1 ratio by high concentration slurry disposal pumps to the ash pond, which will be again issued to the requirement of back filling of low lying areas, highways, embankment construction etc.,

- **Bottom Ash Handling System**

Bottom Ash System of each unit will consist of 'W-shaped' water impounded, storage type, water-cooled refractory lined bottom ash hopper located directly below the boiler furnace. The bottom ash produced during the burning of coal will be collected in the bottom ash hopper which is water cooled and will be disposed to the ash pond duly crushing the boulders with the help of clinker grinders and the slurry through vacuum ejector pumps by utilizing the mechanism of ejector pumps and this evacuation process will be carried out once in 8 hours of operation.

The bottom ash deposited in the ash pond will be issued to the road laying agencies, embankment works of highways etc.,

2.8.13 Plant Water System

- **Raw Water**

Consumptive water requirement of five units of 800 MW will be made available by pumping from Krishna river to Plant Raw Water reservoir of capacity 10,17,500 m³, which is sufficient for 3.5 days consumptive water requirement.

Water is required in a thermal power station for:

- Cooling Tower make-up.
- Auxiliary cooling water system - Water for bearing cooling and other auxiliary systems through closed loop circulation
- Boiler make-up.
- Potable water for plant/colony.
- Plant services
- Fire fighting
- Ash handling

In the initial year of the Plant, the water requirement may be varying from 11-12 cusecs depending upon the ash handling system i.e. wet disposal or dry disposal.

- **Pretreatment System**

Raw water drawn from in plant water storage reservoir will be filtered through 40 (36W + 4S) 335 m³/hr capacity ultra / micro filtration units along with back wash arrangement. Chlorine will be dozed in raw water reservoir to avoid micro-biological growth. The filter water with SDI<3 and turbidity of 0.5 NTU will be stored in filter water storage of capacity 32,000 cu.m. The reject of ultra / micro filtration units will be transferred to CMB or Ash Handling Plant.

- **Filter Water System**

Filter water will be distributed to various areas of the plant through dedicated pump sets as follows:

a) Four (4) – (3 working + 1 standby) 33% capacity & adequate head DM plant supply pump sets to supply water to 4 nos. (3 working + 1 standby) DM plant streams, each of capacity of 80 cu.m/hr.

b) Four (4) - (3 working + 1 standby) 33% capacity adequate head service water pumps to supply filter water to service water distribution network all over the plant building through an adequately sized overhead tank suitably located at a height in the Power Station.



c) Five (5) – (4 working + 1 standby) 25% capacity CW make up water pumps to supply make-up water to two(2) nos. CW sumps for loss towards evaporation & CW blow down losses.

d) Two (2) – (1 working + 1 standby) 100% capacity service water pumps to supply filter water to APH/ESP wash each of capacity 550 cu.m/hr.

• **Demineralization Plant**

A fully automatic PLC based Demineralizing plant having four (4) (3W+1S) – 80 cu.m/hr capacity streams (3 normally operating) will be provided to have mixed bed outlet quality as follows:

- Silica : < 10 ppb
- pH : 6.8 – 7.2
- Conductivity : $\leq 0.1 \mu\text{S/cm}$
- TOC : < 200 ppb

The filtered water will be pumped to DM plant through cation exchangers, degassifiers, anion exchangers and mixed beds all installed within the DM plant building. The DM water will be stored in five (5) – 1000 cu.m each capacity steel plate fabricated vertical cylindrical DM water storage tanks along with proper breathers and floating PVC balls arrangement to prevent absorption of atmospheric gases.

DM water from storage tank will be transported to five (5) nos. Condensate Storage Tanks (CST), DM water will be used for heat cycle makeup, chemical feed system, DMCW make up, etc. For this, purpose, two (2) numbers 100% capacity Hot well make up pumps for each units, will be provided. Two (2) 100% boiler fill pump sets common for 3 units & two (2) 100% boiler fill pumps sets common for 2 units will be provided, for filling of boiler, condenser and deaerator as per operational requirements.

• **Hydrogen Generation Plant**

Requirement of the generator for hydrogen quality and make-up quantity, the parameter is as follows:

- Quality - Purity > 99.9% (H₂)
 - Moisture < 4g/Nm³
 - Dew Point $\leq -40^{\circ}\text{C}$
- Quantity - $(C \times 1.5 \times A + B) / 10 \text{ Nm}^3/\text{hr.}$

C Number of TG units

A Nm³/hr Leakage rate per generator

B Nm³ Requirement of one generator filling

Three (3) (2Working + 1Standby) unit of hydrogen generation plant of 10 Nm³/hr, 3.2 MPa shall meet the requirement 5 x 800 MW Unit use.

The hydrogen shall be generated by the electrolysis of a suitable mixture of DM water & soda or Potash lye or Bipolar Proton Exchange Membrane.

- **Sewage Treatment Plant**

The sanitary waste of all the toilets from the different buildings of the plant shall be collected by gravity into the respective collection chambers and shall lead to common collection sump under gravity flow as far as possible. However, if hydraulics do not permit gravity flow the intermittent collection sumps shall be provided with the lifting stations and such lifting stations shall be provided with 2 nos. (1W + 1S) of pumps.

The sewage treatment plant shall be designed as per guidelines of CPHEEO Manual. The anticipated no. of users shall be 4000 persons. The sewage treatment plant shall be designed to handle a flow of 180 Kld considering average per capita consumption of 45 lpcd with 80% of used water generated as sewage. The Sewage Treatment Plant shall be modular type based on FAB/MBBR technology followed by disinfection by Hypo and necessary tertiary treatment prior to reuse in horticulture purpose.

The finally treated sewage shall meet the norms of environment protection rules 1986 and its amendments and the rules of CPCB / MoEF&CC/ State Pollution Control Board.

- **Fire Protection System**

For protection against fire, all yard equipment and plant equipment will be protected by a combination of hydrant system; automatic sprinkler spray system (emulsifier system); fixed foam system for oil handling areas; automatic high velocity and medium velocity sprinkler spray system; auto-modular inert gas based system for control rooms apart from portable and mobile fire extinguishers located at strategic areas of plant buildings and adequate Passive Fire Protection measures. The systems will be designed as per the recommendations of NFPA or approved equals in accordance with the Tariff Advisory Committee (TAC) of the Insurance Association of India stipulations.

- In view of vulnerability to fire and its importance in the running of the power station, effective measures will be taken to tackle fire in the susceptible areas such as cable galleries; fuel oil handling areas; coal handling plant areas including transfer points, crusher houses and tunnels, etc.
- For containment of fire and preventing it from spreading in cable galleries, unit wise fire barriers with self-closing fire doors will be provided. In addition, all cable entries/openings



in the cable galleries, tunnels, floors will be sealed with non-/fire resistant sealing materials to prevent fire propagation for at least three (3) hours. Fire protection cable coating compound over cables at switchgear entry points, power station building entry points and trays will be provided to prevent damage from fire for at least thirty (30) minutes.

Adequate distances will be maintained between different process blocks and hazardous equipment. To prevent fire from spreading through ventilation & air conditioning ducts, dampers with auto closing arrangements will be provided at appropriate locations.

Dedicated fire water pumps will be installed in the clarified water pump house. In the clarified water storage tank about 4000 m³ water will be stored as dedicated dead storage for meeting fire water requirement in exigencies. The details of system are as follows:

- Three (3) electric motor driven fire water pump sets of 410 m³/hr capacity having 88 MWC head along with two (2) identical capacity & head diesel engine driven backup fire water pumps will be provided for hydrant and sprinkler system in addition to two (2) Jockey pump sets having capacity of 25 m³/hr and 88 MWC which would be brought to operation automatically when hydrant pressure drop indications are received. In addition to these pump sets, other auxiliaries for the fire protection system such as hydro-pneumatic tanks, compressors, pipe work, valves etc will be provided as required.
- Hydrant system will feed pressurized water to hydrant valves located throughout the plant and also at strategic locations within the powerhouse.
- High velocity water spray system (HVWS) will be provided for Generator transformers; Unit auxiliary transformers, station transformers, turbine oil storage tanks, boiler burner zone and generator seal oil system.
- Medium Velocity Water Spray System (MVWS) will be provided for
 - Cable galleries, cable valets, cable vaults, cable spreader room, cable riser/shaft in main plant, switchyard, ESP, AHP control room & CHP control room, coal conveyers & transfer points etc.
 - Fuel oil area,
 - Compressor room & DG set room.

Adequate arrangement for detection of fire and smoke will be provided at different locations of vital installations. Laser based fiber optic type LHS fire detection and alarm system will be provided for coal conveyors and cable galleries. IRD system with sprinkles will also be provided for coal conveyors. Centralized control panel indicating



zone of fire will be located at central control room. Fire alarms will be distributed throughout the plant and important location so that security gate/fire station persons and control room get immediate information.

The ventilation system provided in cable galleries will be so interlocked with the fire alarm system that in the event of a fire, the ventilation system would be automatically switched-off.

Automatic high velocity spray system will be used for protection of burner zone of each of the boilers.

- Fuel oil tanks in the fuel oil farm area will be provided with MVWS system as well as fixed foam mechanical system to extinguish accidental fires in tanks as well as outside the dyke. Water for foam system will be drawn from the plant hydrant system. Adequate numbers of hydrant points will be distributed near the oil tanks farm area. Fire hoses fitted with couplings and nozzles will be located suitably at the oil unloading station and kept in hose boxes.
- Automatic inert gas based flooding type extinguishing system will be provided for unit control room, areas independently apart from the provision of detection and fire alarm system in that area.
- Adequate number of fire hydrant points will be distributed through out the plant building, service building, coal handling plant, ash handling plant and other areas along with fire hoses fitted with couplings and nozzles and kept in the hose boxes.

In addition to the above facilities, adequate number of manual call points; (MCP) as well as portable and mobile (wheel mounted) fire extinguishers of soda acid type; foam type; chemical type; and carbon-dioxide type will be provided at strategic locations throughout the plant area to meet National Fire Protection Association (NFPA) and Loss Preventive Association (LPA) codes, Tariff Advisory Committee (TAC) stipulation etc. These extinguishers may be used during the early stages of fire to prevent the fire from spreading.

Two (2) nos. of fire tenders will be provided which will be kept in readiness complete with all accessories at fire station located close to fire control room.

- **Quantity of wastes to be generated (liquid and solid) and scheme for their Management/disposal.**

The power Station, being Coal-fired power station, would generate coarse as well as fine ash. All efforts shall be made to utilize the fly ash for various purposes. Ash Management Plan will be developed for 100 % utilisation of fly ash within the time period prescribed by MoEFCC. The unused ash, till such time, would be disposed in the emergency ash pond to be built within the plant premises.

All the necessary equipment and systems will be provided in the plant to meet all applicable environmental regulations. The plant has been proposed to have the following features, which will help in minimizing emissions and effluents.

DeNOx /SCR will be provided for the boiler to limit the NO_x emissions within the stipulated limits and a stack of 275 m as per CPCB requirements shall be provided in line with the MoEFCC guidelines, which will help dispersion of air borne emissions over larger area and thus reducing the impact of the power Station on ground level concentrations.

On the basis of raw water quality available, clariflocculation, filtration, and demineralization plants would be required and the treatment plants would be accordingly designed permitting adequate redundancy as well as storage capacities for different qualities of treated water.

It is proposed to collect 100% bottom ash and fly ash in dry form which is proposed to be utilized for industrial purposes as per MoEFCC guidelines. Ample opportunities for ash use tie-up with prospective users/off-takers exist and the same are proposed to be finalized during construction phase of the project. The responsibility for transportation of ash from plant area lies with the entrepreneur/off-taker of ash. Provision for transportation of ash by railway wagons and road tankers has been kept in the layout. During emergency only, ash may be sent to the ash dyke with a provision for storage of ash up to 15 m level as per CEA norms. A plot of land measuring 160 Ha, outside the allocated plot has been selected for ash dyke with a storage of 3 to 9 years ash generation as per CEA recommendations, to cater for any exigencies.

2.9 Resource and Utility Requirement

The details of various resources and utilities required for the proposed power plant project are given in following sections:

2.9.1 Land Requirement

- **Land Type**

Total 2800 acres of land area is proposed for the 5x800 MW Yadadri Thermal Power Station, Including 100 acres for Colony. This includes Ac. 2095.28 Gts of Forest Land and Ac. 704.12 Gts of Patta Land, Government Land, Udafa patta Land and D-Patta Land etc.



The above mentioned land has already been acquired by the TSGENCO. A stream (Tungapadu vagu) is passing which will be strengthened in consultation with the Irrigation Department. The stream will not be diverted.

- **Land-use Breakup**

The breakup of land required for the proposed power Station is as below in **Table 2.10**.

Table 2.10: Landuse Break-up of Proposed Power Station

S.No	Details	Area (acres)
1	Main Plant Area	250.00
2	BOP Area	350.00
3	Raw Water Reservoir	100.00
4	Coal Handling Plant	250.00
5	Ash Dyke Area	400.00
6	Green Belt Area	1225.00
7	Housing Colony	100.00
8	Raw water Pipeline and Railway Corridor	50.00
9	Roads	75.00
Total		2800.00

Source: Project Report, TSGENCO

The land required for coal transportation system, pipeline, Right of Way (ROW) and Transmission lines is estimated as under:

- Pipeline – 15 acres (considering 10 km of water pipeline from Krishna river intake point)
- Railway line – 42 acres (8.5 km from Vishnuparam Railway station)

2.9.2 Water Requirement and Source

- **Water Requirement**

The estimated make up water required for the proposed plant is about 9755 m³/hr. The source of raw water for the power plant would be Krishna river. This water will be used in power cycle and for make-up purpose. Raw water reservoir will be constructed for the storage of 3.5 days water requirement within the plant boundary. The water requirement details for the proposed plant units are given in **Table 2.11**. The water balance diagram is shown in **Figure 2.9**. Water allocation letter for 208 cusecs (6.60 TMC per year) vide GO Ms No 13 dated 31.01.2015 from I&CAD Department regarding water drawl is enclosed as **Annexure 6**.

The water allocated for the above project is for 4000 MW in the first phase and the balance for future expansion and also supply of drinking water to surrounding villages.



Table 2.11: Water Requirement Details

Sr. No.	Water Usage Description	Water Requirement Quantity (m ³ /hour)	Remarks
1	Make-up water for cooling tower	8250	(1540) to ash water pond/ CHP; (100) to CMB
2	DMF feed pump	290	(15) Silting chamber of PTP (20) CMB (205) Make-up to Boiler CST
3	Service water	215	to CMB
4	HVAC Makeup	275	
5	Potable water	25	Treated in STP
6	AHS compressor cooling, makeup for wastage from Clarifier, AHP Water sump, Coal Handling Plant, Miscellaneous	700	Sludge handling system, CMB
	Total	9755	

Source: Project Report, TSGENCO

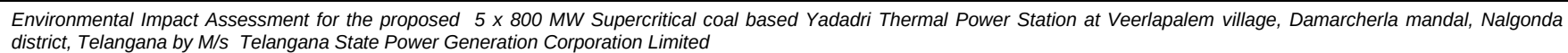


Figure 2.10: Water Balance Diagram

- **Optimization of COC for Water Conservation**

Closed cycle condenser cooling is envisaged with Natural Draught Cooling Tower (NDCT). Make-up water will be pumped to the circulating water (CW) sump through two (2) no. 100% capacity buried steel pipe. One CW sump will be provided with 5 nos. (4W + 1S) CW pump sets and other CW sump will be provided with 7 (6W + 1S) CW pump sets for pumping water to condenser of two & three units and will discharge back to Natural Draught Cooling Tower having cooling range of 10°C and maintaining a Cycle of Concentration of 5. The recooled water from cooling tower will be channeled to each CW sump. Suitable arrangement for chlorine or chlorine dioxide dosing to curb organic growth and chemical dosing for maintaining Cycle of concentration (COC) of 5 will be made.

- **Water Source**

The source of water for the proposed coal based power plant would be river Krishna water. The water quality of the Krishna river at the intake point is given in **Table 2.12**.

Table 2.12: Intake Water Quality

S. No.	Description	Unit	Concentration
Physical Characteristics			
1	pH	-	8.51
2	Conductivity $\mu\text{S}/\text{cm}$	$\mu\text{S}/\text{cm}$	850
3	Turbidity	NTU	60
4	Total Dissolved Solids	PPM	570
5	Color	Hazen	<5
Cations			
6	Calcium Hardness	PPM	120
7	Magnesium Hardness	PPM	100
8	Sodium + Potassium	PPM	258
9	Iron	PPM	0.5
Anions			
10	M-alkalinity	PPM	208
11	Chlorides	PPM	170
12	Sulphate	PPM	100
13	Nitrates	PPM	0.5
14	Total Hardness	PPM	220
15	P-alkalinity	PPM	3.0
16	Dissolved silica	PPM	15.5
17	Organic Matter	KMnO ₄ No	3

Source: Project Report, TSGENCO

The water quality indicates that the conventional treatment viz., clariflocculation and demineralization will be necessary.

2.9.3 Wastewater Generation and Feasibility of Zero Discharge

The sources of waste water effluents from a thermal power station are mainly:

- CW System blow down
- Effluents from WT Plant (Clarifiers, Filters & UF)
- Effluents from regeneration waste (DM, CPU)
- Plant drains
- Oily waste fuel oil unloading & storage areas
- Oily waste from transformer yard areas
- Coal pile area runoff
- Ash water from ash pond.

The Wastewater Management Scheme adopting the philosophy of 100% recycling of treated effluent for a “Zero Discharge” concept. Each identified effluent stream shall be subjected to required treatment. The treatment facilities will be such that quality of outlet from each treatment facility as well as that at the Central Monitoring Basin (CMB) outlet must individually meet applicable standards for discharge of liquid effluents to surface water. Wastewater emanating from the DM Plant are either acidic or alkaline in nature. The combined wastewater from the DM plant would be neutralized in a neutralizing pit. The neutralized wastewater is expected to have suspended solids less than 5 ppm and pH in the range of 6.5 to 8.5. This will also be led to the CMB.

2.9.4 Fuel Requirement and Source

The coal requirement for the proposed power project is based on Station Heat Rate (SHR) and Gross Calorific Value (GCV) of coal. Imported coal and Indian coal will be blended in 50:50 ratio and will be fired in the steam generators.

The details of fuel requirement are provided in **Table 2.13**. The coal analysis report is furnished in **Table 2.14**.

Table 2.13: Fuel Requirement

S. No	Fuel	Quantity
1	50% domestic coal + 50% imported coal of GCV 4550 kcal/ kg and heat rate 2109.4 kcal/ kwh	1854.42 tph 13.81 mtpa
2	100% imported coal) of GCV 5700 kcal/kg and heat rate 2109.4 kcal/kwh	1480.28 tph 11.02 mtpa
3	Support fuel (HFO/LDO) 0.5 ml/kwh	17520 KL/Year (Average)

Source

50% quantity of Domestic coal will be sourced from M/s SCCL and the balance 50% of coal will be from foreign origin. Accordingly an MOU is entered with M/s SCCL for supply of 50% domestic coal of G9 grade which has GCV of 4600 Kcal/Kg.

With regard to imported coal M/s MSTC, a Government of India under taking has given consent for supply of required quantity and quality of imported coal. TSGENCO is in the process of entering long term MoU with M/s MSTC for supply of imported coal.

The MoU made with M/s SCCL and the consent given by M/s MSTC, GOI under taking are enclosed as **Annexure 7**.

Table 2.14: Expected Coal Quality Details

S. No	Item	Indigenous (F Grade)	Imported	Blended (50:50)
1	Fixed Carbon (%)	25	40	33
2	Ash (%)	40	10-15	25-28
3	Volatile Matter (%)	25-30	25-45	13.5-18.5
4	Total Moisture (%)	12	15-25	31
5	Sulphur (%)	<0.5	<0.9	0.65-0.7
6	HGI	50	45-60	50
7	GCV (HHV) Kcal/kg	3400	5700-6000	4550-4850

The coal analysis reports, including Heavy Metal Analysis and Radioactivity Test Report of typical coal samples are enclosed in **Annexure 8**.

Transport

Imported coal will be transported from nearest ports to plant site by Indian railways net work system.

The issue regarding movement of both domestic and imported coal has been discussed with South Central Railways on 08.07.2015. S.C Railways informed TSGENCO that coal rakes both domestic and imported coal will be moved through the existing railway network.

The minutes of South Central Railways and TSGENCO in this regard are enclosed as **Annexure 9**.

The existing infrastructural facilities at Kakinda/Krishnapatnam/Gangavaram port will be utilized for imported coal. The coal will be transported through Indian Rail Network from

2.9.5 Infrastructure

The basic facilities at a reasonable price will be made available, which includes clear landmass, availability of fuel, availability of water supply on year-round basis and proximity to the sub-station for evacuating the power. Besides, the area is endowed with favorable infrastructure in terms of availability of housing, market, educational centers, health care, telecommunication facilities etc.

It can also be inferred that the availability of skilled and unskilled manpower would not pose any problem. During initial stages of construction, water can be made available from groundwater sources. Further, during the operation phase also, the casual workers including truck drivers will be provided basic infrastructure facilities such as sanitation, fuel, restroom etc.

2.9.6 Manpower

The proposed power plant will require skilled and semi-skilled personnel during operation, maintenance and administration of the proposed plant to a total capacity 4000 MW. People from neighbouring villages, if found suitable, shall be employed during construction and operational phases. The total manpower estimated to be about 800 people will be deployed during peak construction phase and about 1200 personnel will be employed either directly or indirectly during the operation phase.

2.9.7 Health and Sanitation

To ensure optimum hygienic conditions in the plant area, proper drainage network will be provided to avoid water logging and outflow. Adequate health related measures and a well equipped safety and environment department will be provided to ensure clean and healthy environment.

2.9.8 Residential Colony

Considering all the factors and on the ground of economy, accommodation is proposed for personnel for the power plant operation and maintenance staff, staff

employed in finance, administration, accounts, welfare and purchase, and staff for schools, bank, post office, hospital, park, township maintenance, for the security and firefighting staff. Guesthouse & bachelor hostels will also be provided

2.9.9 Community Facilities

The township will be developed with an aim to satisfy the diversified needs of the employees and their families. Accordingly, adequate and different types of community facilities will be provided in township area. These will include children's play areas and play fields, park, primary-cum-nursery schools, crèche, health center and hospital, shopping facilities, community center, club house, open air theatre, bank, post office, police outpost etc.,

2.9.10 Infrastructure Facilities for Labour Force

During construction phase of the project, work force needs to be deployed, consisting of skilled and un-skilled workers. All the workers will be housed in labour colony, which will be located near the project site. The colony which will be temporary in nature will have the following amenities:

- Drinking water facility;
- Sanitation facilities will be constructed which will include the adequate number of separate toilets for men and women. The make shift treatment plant will be installed and treated wastewater will be utilized in greenbelt development;
- Bins will be installed to collect municipal waste from the colony; and
- Fuel (kerosene/LPG) will be supplied by the contractor to the labours for cooking to prevent tree felling.

2.10 Sources of Pollution and Mitigation Measures

The various types of pollution from the proposed power plant are categorized under the following types:

- Air pollution;
- Water pollution;
- Solid waste; and
- Noise pollution.

The stacks attached to the boilers will be the major source of gaseous emissions in the power plant. In addition, wastewater will also be generated. The quantities and the composition of the gaseous and liquid waste that are generated in the plant will be managed and treated such that their final disposal into the environment meets all the statutory requirements and the environmental impacts are minimized.

2.10.1 Air Emissions and Control

Electrostatic precipitators (ESP) would be installed to control the emission of ash particles. The precipitators would be designed to limit the particulate emission to less than 30 mg/Nm³. Two twin-flue & One single-flue stack of 275 m height are envisaged as per existing norms for deciding stack height. Besides on-line monitoring system, the chimney would be provided with access for regular monitoring of stack emissions. For the control of fugitive dust emission within and around the coal handling plant, coal dust extraction and suppression systems would be provided.

Dust suppression system would be installed at all requisite points in CHP and coal stack yard. Advanced combustion technology for lower emission of nitrogen oxide would be necessary to control NO_x emission in the boilers. Space is provided for the Flue Gas Desulphurisation system. The design and layout of steam generator and its auxiliaries would be such that a wet / dry FGD system can be installed.

• Continuous Emission Monitoring System (CEMS)

Separate Continuous Emission Monitoring System shall be envisaged for each Unit as per Emission latest Regulation of CPCB/State PCB. CEMS shall comprises of Flue Gas Oxygen analyzer for control and monitoring, Carbon monoxide (CO), Sulphur dioxide (SO_x) / Oxides of Nitrogen (NO_x), Dust & Opacity analyzer, Mercury analyser for Boiler Emission monitoring system. All stack emission monitoring instruments shall be of Extraction type. A programmable controller shall be provided for signal output, alarms, calibration cycle timers and measurement indication for each analyzer. Each analyser shall be independent and shall not share power supply processor etc. All the data shall also be available on Distributed Digital Control Monitoring and Information System (DDCMIS) for analysis and monitoring from CEMS.

Following are the Flue Gas measurements and their locations:

- Zirconia Probe type Boiler Flue Gas Oxygen analyzer and before and after APH for control and monitoring (i.e. HT O₂ Analyser and LT O₂ Analyser).
- Stack emission monitoring system comprising of CO, SO_x / NO_x, Dust, Opacity analyzer, Mercury Analyser.

The details of stack emissions envisaged from the project are given in **Table-2.15**.

Table 2.15: Stack Emission Details

Sr No.	Parameters	Units	2 X 800 MW (Unit 1 & 2)	2 X 800 MW (Unit 3 & 4)	1 X 800 MW (Unit 5)
1	Stack Height	m	275	275	275
2	No. of flue	No.	2	2	1
3	Top diameter of flue	m	7.6	7.6	7.6
4	Flue gas velocity in each flue	m/s	22	22	22

Sr No.	Parameters	Units	2 X 800 MW (Unit 1 & 2)	2 X 800 MW (Unit 3 & 4)	1 X 800 MW (Unit 5)
5	Flue gas temperature	$^{\circ}\text{K}$	413	413	413
6	Flow rate of gas in each flue	Nm^3/s	998.02	998.02	998.02
8	Emission rates				
A	SO ₂ (emission rate based on 100 mg/Nm ³ emission standard)	g/s/flue	61.06	61.06	61.06
B	PM (emission rate based on 30 mg/Nm ³ emission standard)	g/s/flue	18.32	18.32	18.32
C	NO _x (emission rate based on 100 mg/Nm ³ emission standard)	g/s/flue	61.96	61.96	61.96
D	Mercury (emission rate based on 0.03 mg/Nm ³ emission standard)	g/s/flue	0.02	0.02	0.02

Source: Minutes of Board meeting on latest norms of MoEF&CC, TSGENCO

The emission rates have been considered based on the Minutes of Board meeting on latest norms of MoEF&CC by TSGENCO, copy of which is enclosed as **Annexure 10**.

2.10.2 Wastewater Generation

The project will source its entire water requirement from the Krishna river. The total water requirement for the project is 9755 m³/hr. The project will not extract groundwater and hence there will be no impact on ground water.

The wastewater generated in the plant area will be treated in the guard pond system and part of the wastewater will be utilized in various activities such as cooling water make up, ash/coal handling, ash disposal, service water and greenbelt development. No discharge is envisaged into any surface river water bodies; hence, no impact is envisaged on surface river water quality. Water Conservation Measures are given below:

- The treated wastewater will be used for cooling tower make up, dust suppression in coal yards, coal conveyors and for greenbelt development;
- Part of the treated effluent from the guard pond will be used for horticulture and greenbelt development, dust suppression and ash quenching within the plant;
- Quantity of effluents will be minimized through reuse to the maximum extent feasible;
- The treatment schemes proposed would be finalized before the commissioning of the plant; and
- Sludge would be removed regularly and sufficient time would be given for proper settling of solids.

- Provision of sewage treatment plant to treat domestic sewage from plant;
- Utilization of treated wastewater for greenbelt development;
- Provision of separate storm water system to collect and store run-off water during rainy season;

Suitable rainwater harvesting structures will be constructed to re charge the ground water.

The Water treatment plant effluent comprises of DM and CPU regeneration waste. This effluent shall be pumped to the Central Monitoring Basin (CMB) after neutralizing. Plant drains from Fuel Oil Tank Farm area, Lube oil system, Transformer area and TG area shall be led to a sump. These oily effluents shall be treated in an oil water separator for removal of oil. The clear water shall be led to the CMB and the dirty oil shall be disposed off in drums separately. The CMB shall have two (2) compartments, each compartment having adequate storage to collect a day's effluents. Facilities in the form of chemical dosing system, effluent recirculation system, etc. shall be provided to treat the effluent and to bring the quality suitable for disposal outside the plant, if required.

- **Steam And Water Analysis System (SWAS)**

Separate Steam and Water Analysis System shall be envisaged for continuous monitoring and control of water and steam purity in the plant cycle of each unit and at other important points as specified in this specification. The sampling system shall obtain samples from steam and water system, which shall be adequately conditioned and fed to analyzers for continuous analysis and provide parallel facility for grab sampling as specified. The system shall be furnished complete with sample conditioning devices and monitoring instruments (for temperature, pressure, flow & sample), analyzers, transmitters, indicators, alarm initiating devices, interlocks, isolated 4-20 mA DC for plant monitoring system and all required accessories to provide a complete and integrated sampling and analysis system. All analysers shall be connected to SWAS workstation via RS-485 modbus protocol

The system shall be designed in accordance with the recommendations in ASME PTC 19.11 (2008), Water and Steam in Power Cycle, ASTM standards - 31 water and ASTM D1066-69 standard method of sampling steam.

2.10.3 Solid Waste Generation

The power plant, being Coal-fired power station, would generate coarse as well as fine ash. All efforts shall be made to utilize the fly ash for various purposes. Ash Management Plan will be developed for 100 % utilisation of fly ash within the time period prescribed by MoEF&CC. The unused ash, till such time, would be disposed in the emergency ash pond to be built within the plant premises.

	<i>Environmental Impact Assessment for the proposed 5 x 800 MW Supercritical coal based Yadadri Thermal Power Station at Veerlapalem village, Damarcherla mandal, Nalgonda district, Telangana by M/s Telangana State Power Generation Corporation Limited</i> Chapter-2: Project Description

2.10.4 Noise Pollution

The major noise generating sources are turbines, generators, compressors, pumps, fans, coal handling plant etc. Acoustic enclosures shall be provided to control the noise level below 90 dB (A). Personal protective equipment shall be provided to the persons working in high noise area.

Ambient noise inside and outside the plant area will conform to the prescribed noise levels for various land use categories as per National Standards for Ambient Noise. This will be ensured through proper designing of the equipment with adequate acoustics permitting the ambient noise levels without exceeding the specified criteria from the source.

3.0 DESCRIPTION OF THE ENVIRONMENT

3.1 Preamble

This chapter presents the baseline environmental status, depicting the existing conditions of climate, atmosphere, ambient air quality, noise levels, water quality, soil quality, hydrology, hydro-geology, ecology, land use/ land cover and socio-economic environment in the study area. The report incorporates the primary baseline environmental data for various attributes and the secondary data collected from various Government and Semi-Government organizations.

3.2 Baseline Environmental Study

3.2.1 Study Area

The study area for the primary field data collection for baseline studies has been considered as 10 km radius from the proposed project area as per EIA Notification, 2006.

3.2.2 Study Period

The baseline study for the project was carried from 1st December, 2015 to 5th March 2016 as per the Standard ToRs published by MoEF&CC, GoI, New Delhi.

3.2.3 Study Components and Methodology

Baseline environmental studies have been conducted for the environmental attributes and frequency of monitoring given in **Table-3.16**.

Table 3.16: Environmental Attributes & Frequency of Monitoring

S. No	Attribute	Parameters	Number of Locations	Frequency of Monitoring
1	Land Use	Trend of land use change for different categories	Once during the study period	Data from various Government agencies
2	Meteorology	Wind speed, Wind direction, Temperature, Relative Humidity, Atmospheric Pressure, Rainfall and Cloud Cover	1	Continuous monitoring station for entire study period on hourly basis and also data collection from secondary sources
3	Ambient Air Quality	PM ₁₀ , PM _{2.5} , SO ₂ , NO _x , NH ₃ , H ₂ S, CO, C ₆ H ₆ , HC(Me), HC(nMe), BaP, As, Pb and Ni	2 within plant complex; 10 in study area	24 hourly samples twice a week during study period
		CO & O ₃		8 hourly samples twice a week during study period



S. No	Attribute	Parameters	Number of Locations	Frequency of Monitoring
4	Noise Levels	Noise levels in dB (A)	13	Hourly observations for 24 hours per location
5	Water Quality	Physical, Chemical and Bacteriological Parameters	Surface water - 2 Ground Water - 10	Once during the study period
6	Ecology	Existing Flora and Fauna	Once during the study period	Through field visit during the study period and substantiated through secondary sources
7	Soil Characteristics	Parameters related to agricultural and afforestation potential	13	Once during the study period
8	Socio-economic aspects	Socio-economic characteristics, labour force characteristics, population statistics and existing amenities in the study area	Once during the study period	Secondary data (Census 2011)
9	Traffic studies	Once during the study period	2	Once during the study period

Source: EIA Studies, BALPL

3.3 Climatology & Meteorology

3.3.1 Climatology

The region experiences a hot and dry summer throughout the year except during the south west monsoon season. The year may broadly be divided into four seasons. It experiences cold season from December to mid February, summer season from mid february to first week of june. South west monsoon season from June to September and retreating monsoon or the post monsoon season during October to November. Cold season, extending from December to February, is followed by summer when both day and night temperatures increase sharply

3.3.2 Meteorology

The site-specific meteorological data recorded is used for interpretation of the baseline information as well as for prediction analysis. Site-specific micro-meteorological data has been collected for the study period using an automatic weather monitoring station to study the meteorological conditions of the study area. The automatic weather monitoring station was installed at a height of about 5 m above the ground level, ensuring that there are no obstructions to the free flow of winds.

Wind speed, wind direction, temperature, relative humidity and atmospheric pressure



have been recorded on hourly basis for the total study period and cloud cover and rainfall have been recorded by visual observations and rain gauge respectively. Wind rose on sixteen-sector basis (N, NNE, NE, ENE, E, ESE, SE, SSE, S, SSW, SW, WSW, W, WNW, NW, and NNW) has been drawn for 24 hours. The meteorological data has been recorded on hourly basis. The onsite meteorological data is given in Table 3.17.

The generated site data is compared with the available meteorological data generated by the nearest Indian Meteorological Department (IMD) station located at Nalgonda.

Table 3.17: Onsite Meteorological Data (Period: Dec 2015 – March 2016)

Months	Temp (C)		Relative Humidity (%)		Average velocity (m/s)	Total Rainfall (mm)
	Max	Min	Max	Min		
Dec-2015	33.3	16.6	76.0	67.0	1.9	3.5
Jan -2016	34.5	17.3	76.0	70.0	1.8	11.2
Feb - 2016	37.7	20.1	82.0	74.0	1.9	8.1
Mar- 2016	39.1	20.8	83.0	74.0	1.9	9.1

3.3.3 Site-Specific Wind Speed/ Directions

The 24 hourly during winter shows that the winds were recorded from SE and NE directions largely, thereby, projecting the impact zone in NW and SW sectors with respect to the location of proposed facilities. Winds are found to be varying from 0.5 to 5.7 m/s during the 24 hours period. The windrose diagram for winter season is given below in **Figure 3.10**.

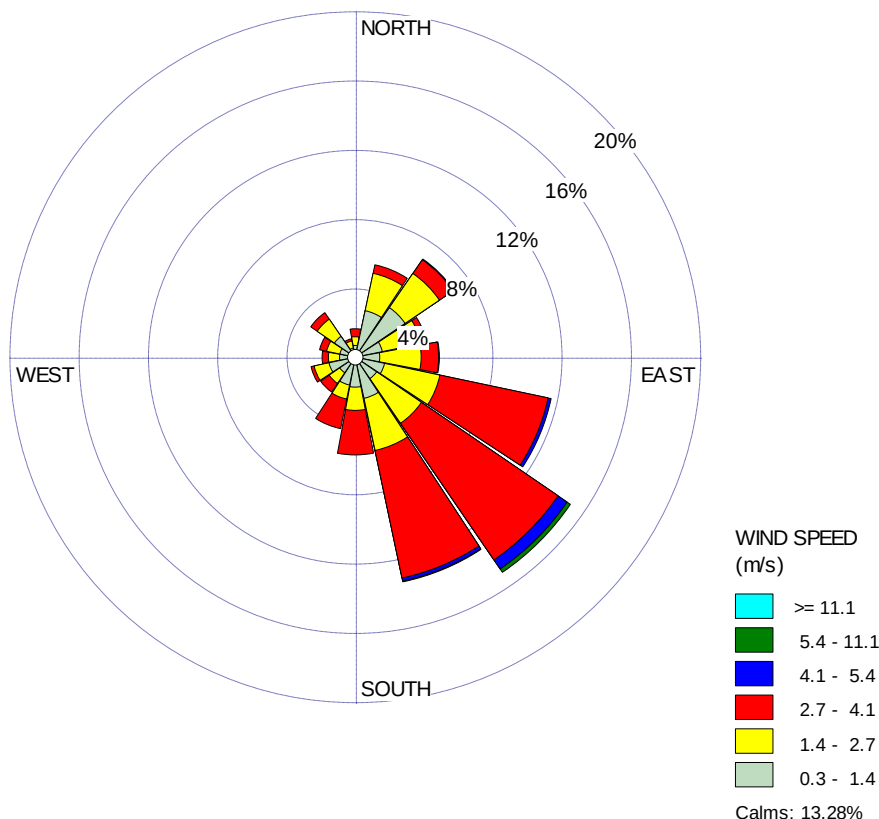


Figure 3.11: Site-Specific Windrose :Winter Season (Dec'15 to Mar'16)

3.3.4 Secondary Data Collected from IMD, Nalgonda

Secondary meteorological data was collected from the nearest IMD station located at Nalgonda. Latest available chronological data for 30 years has been collected and analyzed to interpret the historical meteorological conditions prevailing in the region. The details were provided below in **Table 3.17(A)**.

Table 3.18 (A): Climatological Data at IMD, Nalgonda Station

Month	Temperature (°C)		Relative Humidity (%)	Rainfall (mm)	Predominant winds (% no of days wind from)	
	Mean Max	Mean Min			08:30 hr	17:30 hr
January	33.8	16.1	82	13.5	SE (39)	SE (51)
February	36.5	18.1	82	7.2	SE (55)	SE (64)
March	40.9	19.9	80	6.5	SE (55)	SE (69)
April	43.0	22.4	73	17.6	SE (46)	SE (65)
May	44.8	23.5	63	27.0	NW (30)	SE (29)



Month	Temperature (°C)		Relative Humidity (%)	Rainfall (mm)	Predominant winds (% no of days wind from)	
	Mean Max	Mean Min			08:30 hr	17:30 hr
June	42.6	23.4	71	65.9	NW (47)	SE (43)
July	37.3	23.2	77	124.6	NW (44)	NW (43)
August	35.4	22.8	78	133.0	NW (55)	NW (57)
September	36.4	22.8	77	145.5	NW (42)	NW (31)
October	36.2	21.4	78	104.3	NE (29)	NE (37)
November	33.5	17.9	75	48.1	NE (33)	NE (38)
December	32.2	15.7	73	3.8	NE (46)	NE (55)
Total	44.8-15.7		63-82	696.8	NW(26)	SE (33)

Source: Climatological Tables, 1975-2000, India Meteorological Department, Nalgonda

• Temperature

Monthly surface temperature recorded at IMD Station, Nalgonda for a period of 25 years. The monthly mean maximum temperature and mean minimum temperature varied between 32.2°C to 44.8°C and 15.7°C to 23.5°C respectively. The highest temperature was 46.3°C in June, 1988 and lowest temperature was 12.6 °C in the month of December, 1993.

• Relative Humidity

The relative humidity at Nalgonda varied between 63% to 82% during 1975 - 2000.

3.4 Ambient Air Quality

The Ambient Air Quality studies have been carried out during the winter season (Dec'15 to Mar'16). Details of Ambient Air Quality monitoring locations are given in **Table 3.18**.

The scenario of the existing Ambient Air Quality in the study area of 10 km radius around the project site has been assessed through a network of Ambient Air Quality monitoring locations. The design of monitoring network in the air quality surveillance program is based on the following considerations:

- Topography / Terrain of the study area
- Human Settlements
- Wind pattern
- Health status
- Representation of Regional Background levels
- Accessibility of monitoring site
- Resource Availability

Table 3.19: Details of Ambient Air Quality Monitoring Locations

S. No	Location	Distance (km)	Direction	Remarks
		w.r.t. Project site		



S. No	Location	Distance (km)	Direction	Remarks
		w.r.t. Project site		
1	Project Site	0	-	-
2	Virappagudem	1.5	E	Cross wind
3	Wazirabad	7.25	E	Cross wind
4	Daida	4.6	SSE	Up wind
5	Gottimukkala	4.0	S	Cross wind
6	Adividevulapalli	5.6	SW	Down wind
7	Virlapalem	2.6	W	Down wind
8	Ragadappa	5.0	NW	Down wind
9	Kallepalli	3.8	E	Cross wind
10	Damaracherla	5.0	NE	Up wind

Maximum, minimum values have been computed from the raw data collected at all individual sampling stations to represent the AAQ status in the study area.



Chapter-3: Description of the Environment

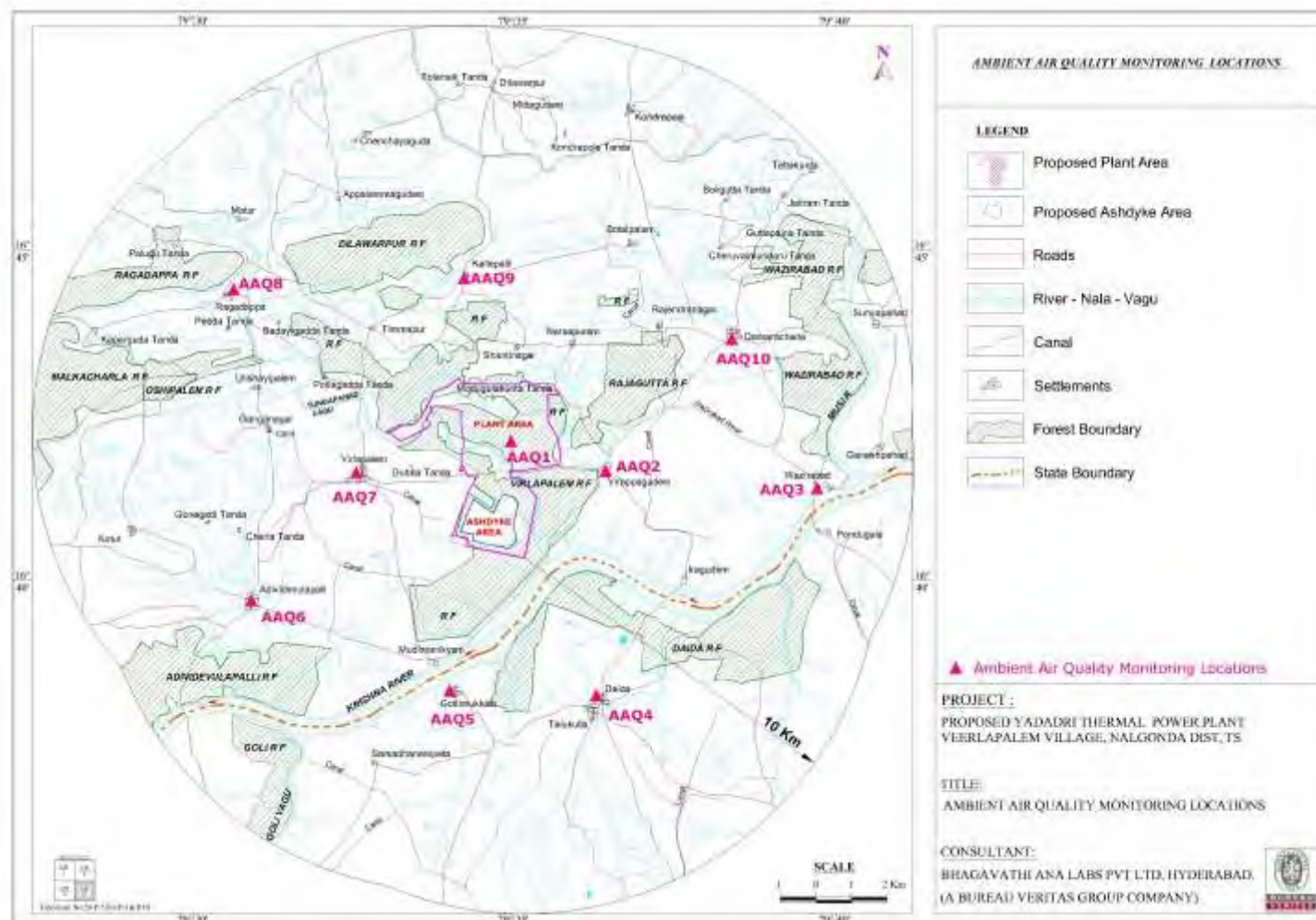


Figure 3.12: Ambient Air Quality Monitoring Locations

3.4.1 Sampling and Analytical Techniques

PM₁₀ and PM_{2.5} have been estimated by gravimetric method. Modified West and Gaeke method (IS-5182 Part-II, 1969) has been adopted for estimation of SO₂. Jacobs-Hochheiser method (IS-5182 Part-IV, 1975) has been adopted for the estimation of NO_x. The methodology adopted for sampling is given in **Table 3.19**.

Table 3.20: Details of sampling methodology for the monitored parameters

S. No.	Pollutant	Time Weighted Average	Method of Measurement	Minimum Detection Limit	NAAQ standards, 2009 (Industrial, Residential, Rural and Other Area)
1	Particulate Matter size less than 10µm (RSPM/PM ₁₀)	24 hourly	Gravimetric IS:5182 – Part 23, 2006	5 µg/m ³	100 µg/m ³ (24 hours)
2	Particulate Matter size less than 2.5µm (PM _{2.5})	24 hourly	Gravimetric Guidelines of CPCB	5 µg/m ³	60 µg/m ³ (24 hours)
3	Sulphur dioxide (SO ₂)	24 hourly	Improved West and Gaeke Method IS: 5182 - Part 2, 2001	4 µg/m ³	80 µg/m ³ (24 hours)
4	Oxides of Nitrogen (NO ₂)	24 hourly	Jacob & Hochheiser modified (NaOH – NaAsO ₂) Method IS: 5182 - Part 6, 2006	9 µg/m ³	80 µg/m ³ (24 hours)
5	Carbon monoxide (CO)	8 hourly	Non Dispersive Infrared Spectroscopy (IS:5182 (Part-10, 1999	1 ppm (1.145 mg/m ³)	2 mg/m ³
6	Ammonia (NH ₃)	24 hourly	Indo-Phenol blue method	10 µg/m ³	400 µg/m ³
7	Ozone (O ₃)	8 hourly	Chemical method IS:5182 (Part-9, 1974)	10 µg/m ³	180 µg/m ³
8	Lead (Pb)	24 hourly	AAS/ICP Method after sampling on EPM 2000 or equivalent filter paper	0.01 µg/m ³	1.0 µg/m ³
9	Nickel (Ni)	24 hourly		0.1 ng/m ³	20 ng/m ³ (annual)
10	Arsenic (As)	24 hourly		0.1 ng/m ³	06 ng/m ³ Annual
11	Benzene (C ₆ H ₆)	24 hourly	Adsorption and desorption followed by GC analysis IS:5182- Part-11,2006	0.1 µg/m ³	5 µg/m ³ (annual)



S. No.	Pollutant	Time Weighted Average	Method of Measurement	Minimum Detection Limit	NAAQ standards, 2009 (Industrial, Residential, Rural and Other Area)
12	Benzo (a) Pyrene	24 hourly	Solvent Extraction followed by HPLC/ GC analysis IS:5182- Part-12,2004	1.0 ng/m ³	1 ng/m ³ (annual)
13	HC (Me)	24 hourly average	Gas Chromatography with FID & ECD	0.01 µg/m ³	Not Available
14	HC (nMe)	24 hourly average	Gas Chromatography with FID & ECD	0.01 µg/m ³	Not Available

The summary of the measured values of AAQ during winter season at each location are presented in the **Table 3.20**. The measured values have been compared with the National Ambient Air Quality (NAAQ) Standards (November, 2009).

AAQ monitoring has been carried out at a frequency of two days per week for three months. The sampling duration for CO and O₃ was 8 hours continuously, thrice a day and for rest of the parameters, it is twenty-four hourly continuous samples per day.

Table 3.21: Summary of Ambient Air Quality in the Study Area – Winter Season (Dec'15 to Mar'16)

Location	Minimum/ Maximum	PM ₁₀	PM _{2.5}	SO ₂	NO ₂	CO	O ₃	C ₆ H ₆	NH ₃	BaP	As	Ni	Pb
		µg/m ³	µg/m ³	µg/m ³	µg/m ³	mg/m ³	µg/m ³	µg/m ³	µg/m ³	ng/m ³	ng/m ³	ng/m ³	µg/m ³
Project Site	Minimum	48.4	22.2	9.8	13.0	1.1	11.8	<0.01	18.0	<1.0	< 0.1	< 0.1	<0.01
	Maximum	66.4	31.6	23.7	26.1	1.5	27.3	<0.01	27.4	<1.0	< 0.1	< 0.1	<0.01
Virrappagudem	Minimum	25.3	8.3	5.8	9.3	1.3	19.8	<0.01	18.8	<1.0	< 0.1	< 0.1	<0.01
	Maximum	42.1	13.5	10.2	11.6	1.8	45.6	<0.01	28.8	<1.0	< 0.1	< 0.1	<0.01
Wazirabad	Minimum	51.4	35.1	13.2	13.9	0.9	19.8	<0.01	19.0	<1.0	< 0.1	< 0.1	<0.01
	Maximum	63.8	44.5	17.5	18.3	1.3	45.6	<0.01	29.0	<1.0	< 0.1	< 0.1	<0.01
Daida	Minimum	24.6	7.7	5.6	9.8	0.9	16.6	<0.01	16.3	<1.0	< 0.1	< 0.1	<0.01
	Maximum	37.6	11.5	8.7	13.6	1.5	38.2	<0.01	24.9	<1.0	< 0.1	< 0.1	<0.01
Gottimukkala	Minimum	27.0	12.5	9.0	14.5	0.9	16.6	<0.01	14.0	<1.0	< 0.1	< 0.1	<0.01
	Maximum	31.9	19.3	13.4	18.0	1.2	38.2	<0.01	21.4	<1.0	< 0.1	< 0.1	<0.01
Adividevulapalli	Minimum	22.4	8.3	5.1	12.0	1.0	19.0	<0.01	18.3	<1.0	< 0.1	< 0.1	<0.01
	Maximum	37.1	11.8	9.0	20.3	1.1	43.8	<0.01	27.9	<1.0	< 0.1	< 0.1	<0.01
Virrapalem	Minimum	25.3	8.3	5.8	9.1	1.0	18.9	<0.01	16.6	<1.0	< 0.1	< 0.1	<0.01
	Maximum	42.1	18.8	10.7	13.8	1.4	43.2	<0.01	25.3	<1.0	< 0.1	< 0.1	<0.01
Ragadappa	Minimum	19.9	6.4	6.1	9.8	1.0	19.1	<0.01	15.9	<1.0	< 0.1	< 0.1	<0.01
	Maximum	32.6	11.1	10.6	13.2	1.3	41.2	<0.01	24.3	<1.0	< 0.1	< 0.1	<0.01
Kallepalli	Minimum	27.1	8.6	5.6	11.0	1.1	18.6	<0.01	22.4	<1.0	< 0.1	< 0.1	<0.01
	Maximum	38.4	12.5	9.8	16.3	1.3	41.9	<0.01	34.2	<1.0	< 0.1	< 0.1	<0.01
Damaracherla	Minimum	46.8	21.5	15.5	21.5	1.0	20.9	<0.01	22.6	<1.0	< 0.1	< 0.1	<0.01
	Maximum	63.4	30.0	24.6	28.1	1.2	48.1	<0.01	34.6	<1.0	< 0.1	< 0.1	<0.01
Minimum		19.9	6.4	5.1	9.1	0.9	11.8	0.7	<0.01	<1.0	< 0.1	< 0.1	<0.01
Maximum		66.4	44.5	24.6	28.1	1.8	48.1	3.8	<0.01	<1.0	< 0.1	< 0.1	<0.01

BDL: Below Detection Limits; Source: EIA Studies, BALPL



3.4.2 Regional Scenario

The discussion about the levels of air pollution parameters observed during monitored season all the selected sampling locations are given below. The results were compared with NAAQS standard issued by MoEF vide Notification G.S.R 826 (E) dated 16th November, 2009 for Industrial, Residential, Rural and Other Area.

Particulate Matter: The PM₁₀ concentration range was 19.9 – 66.4 µg/m³ for 24 hourly averages while PM_{2.5} concentration levels were in the range of 6.4 µg/m³ during the season. At all ambient air quality locations, the PM₁₀ and PM_{2.5} levels recorded are within the prescribed standards of 100 µg/m³ and 60 µg/m³ respectively.

Gaseous Pollutants: SO₂, NO_x and NH₃: The SO₂, NO_x and NH₃ concentrations were observed in the range of 5.1 – 24.6 µg/m³, 9.1 – 28.1 µg/m³ and 14.0-34.6 µg/m³ during the season.

Ozone: The 8 hourly observed concentration of ozone ranged between 11.8 to 48.1 µg/m³, which were below the stipulated NAAQS.

Carbon Monoxide: The observed carbon monoxide concentration varied between 0.9 to 1.8 mg/m³ which are within the permissible limits of NAAQS.

Arsenic (As): Arsenic was not detected in the particulate matter of samples collected during the season. .

Nickel (Ni): Nickel was not detected in the particulate matter of samples collected during the season.

Benzo(a)Pyrene (BaP): Benzo(a)Pyrene, was not detected during the season.

3.5 Noise Level Survey

The baseline survey for noise levels in the study area was carried out by selecting thirteen noise-monitoring stations. Sound Pressure Level (SPL) measurements were measured at all locations. The readings were taken for every hour for 24 hours. The day noise levels have been monitored during 6 am to 10 pm and night levels during 10 pm to 6 am at all the locations covered in the study area.

The noise quality monitoring stations are shown in **Table 3.21** and are shown in the topographical map **Figure 3.12**.



Table 3.22: Details of Noise Monitoring Locations

Location	Distance (km)	Direction	Zone-wise Sampling Points at each Location	
	w.r.t. Project site			
Project Site	0	-	1)	Industrial Area
Virappagudem	1.5	E	1)	Residential Area
			2)	Silence (Primary Health Centre)
Wazirabad	7.25	E	1)	Residential Area,
			2)	Commercial Area (Bus stop)
			3)	Industrial Area (India Cements)
			4)	Silence Zone (Narsimha Swami Temple)
Daida	4.6	SSE	1)	Residential Area
			2)	Silence Zone (Primary School)
Gottimukkala	4.0	S	1)	Residential Area
Adividevulapalli	5.6	SW	1)	Residential Area
			2)	Commercial Area (Bus stop)
			3)	
Virlapalem	2.6	W	1)	Residential Area,
			2)	Silence Zone (Gangamma Thalli Temple)
Ragadappa	5.0	NW	1)	Residential Area
			2)	Silence (Primary School)
Kallepalli	3.8	E	1)	Residential Area,
			2)	Silence Zone (Angan Wadi Centre)
Dameracharla	5.0	NE	1)	Residential Area,
			2)	Commercial Area (NH-5)
			3)	Silence Zone (Shiva Temple)

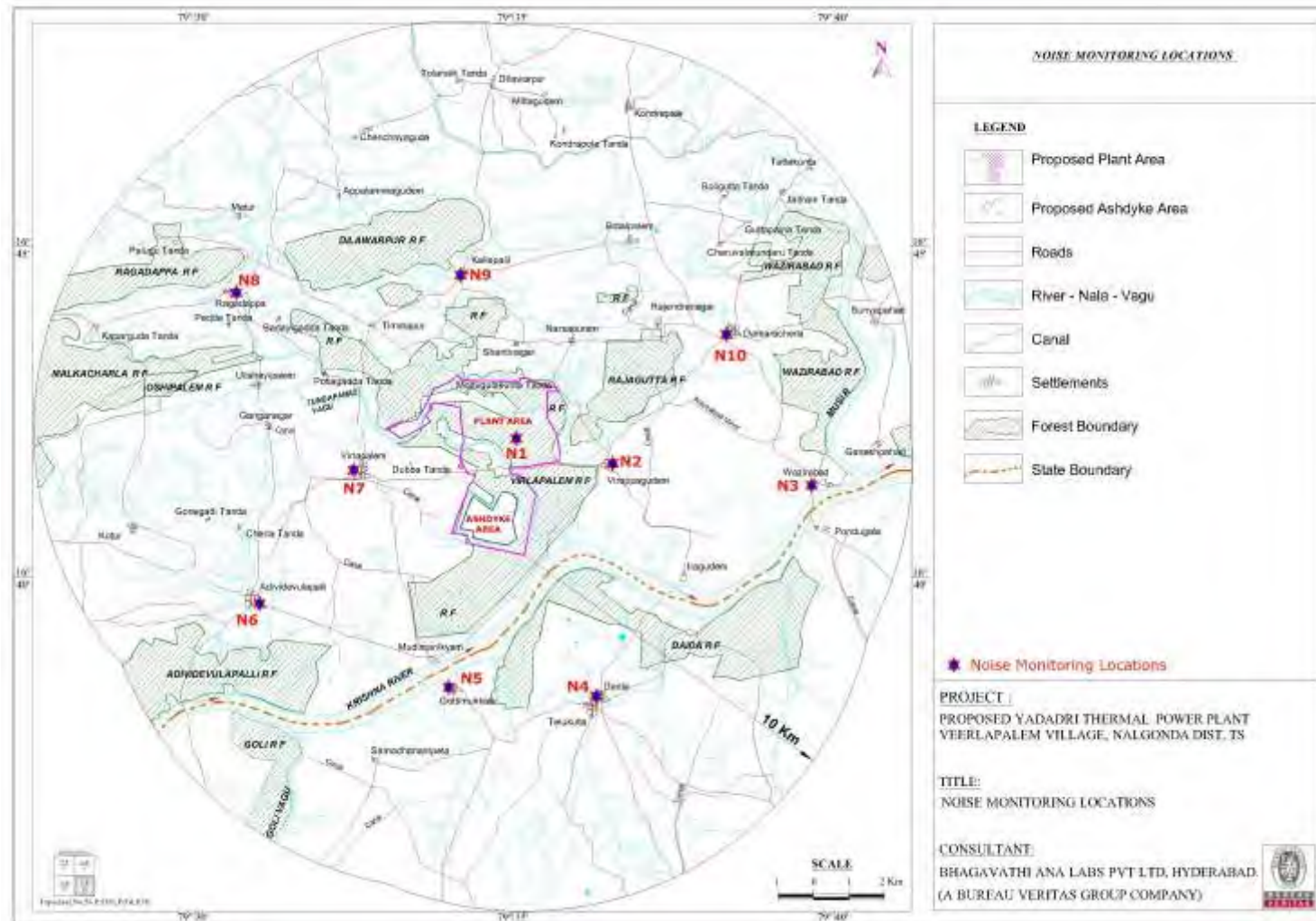


Figure 3.13: Noise Monitoring Locations



Table 3.23: Monitored Noise Levels in Winter Season (Dec'15 to Mar'16)

Sr. No.	Sampling Location	Day Time	Night Time
		dB(A)	dB(A)
	Residential Areas		
1	Virappagudem	50.3	44.1
2	Wazirabad	49.9	41.6
3	Daida	50.8	42.9
4	Gottimukkala	50.3	42.4
5	Adividevulapalli	48.2	42.4
6	Virlapalem	51.2	45.1
7	Ragadappa	51.2	47.9
8	Kallepalli	50.5	50.4
9	Dameracherla	48.8	40.8
	CPCB Standards	55	45
	Commercial Areas		
1	Wazirabad (Bus stop)	62.3	54.4
2	Adividevulappalli (Bus stop)	62.3	52.0
3	Dameracherla (NH-5)	60.0	53.7
	CPCB Standards	65	55
	Industrial Areas		
1	Wazirabad (Near India Cements Gate)	65.2	56.1
2	Project Site (TSGENCO Pylon)	64.9	56.5
	CPCB Standards	75	70
	Silence Zone		
1	Virappagudem (Primary Health Centre)	47.0	39.7
2	Wazirabad (Narsimha Swami Temple)	46.1	38.2
3	Daida (Primary School)	48.4	38.9
4	Virlapalem (Gangamaa thalli Temple)	47.1	38.7
5	Ragadappa (Primary School)	48.9	36.0
6	Kallepalli (Angan wadi Centre)	42.8	38.4
7	Dameracherla (Shiva Temple)	46.3	39.1
	CPCB Standards	50	40

3.5.1 Regional Scenario

The ambient noise level monitored during the season for residential, commercial, industrial & silence zones revealed the following:

During the season, the noise level in the residential area during day time is ranging between 48.8 - 51.2 dB(A) and the night time values are 40.8 – 44.1. which is below CPCB range.

In Commercial area, such villages Wazirabad, Adavi devulappalli and Dameracherla have shown the maximum value of 62.3 dB(A) during day and 54.4 at night. The CPCB value for commercial areas during day is 65 dB(A) and at night is 55 dB(A).

In Industrial areas, the maximum noise level value at the industrial area was 65.2 dB(A), which is below 75 dB(A) of CPCB standard. During night the value was 56.5 dB(A) safely below the CPCB value of 70 dB(A) during the season.

In Silence zones, during day the maximum value recorded was 48.9 dB(A) at primary school, Ragadappa. The night time maximum value was 39.7 dB(A) at Virappagudem.

3.6 **Water Environment**

The purpose of the water quality monitoring in the study area is to assess the water quality characteristics for critical parameters and to predict the impact of water quality by the proposed project activities.

Samples were collected as per IS-2488 (Part I-V). Sampling and analysis of water samples for physical and chemical parameters and heavy metal analysis were undertaken as per IS 3025 & American Public Health Association (APHA) method.

However, certain on-site parameters such as pH, Temperature and Dissolved Oxygen were estimated immediately on-site using pre-calibrated water analyzer kit.

All the sampling norms, recording of field observations in the field logbook of water, filling of chain-of custody (CoC) sheets for each location and labeling of containers were rigorously followed as per QA plan.

The samples were collected and analysed once during the study period. The samples were analyzed for various parameters as per the procedures specified in 'Standard Methods for the Examination of Water and Wastewater' published by APHA to compare with the standards for drinking water as per IS:10500.

3.6.1 Water Sampling Locations

Ground water samples and surface water samples, covering the study area were examined for physico-chemical, heavy metals and bacteriological parameters in

order to assess the effect of existing industrial and other activities on water quality in the study area. The water sampling locations are listed in **Table 3.23** and are shown in **Figure 3.13**. The results are presented from **Table 3.24** to **3.25**.

Table 3.24: Details of Water Sampling Locations

S. No	Location	Distance (km)	Direction
		w.r.t. Project Site	
	Ground Water		
GW1	Project Site (Modugulakunta)	-	-
GW2	Virappagudem	1.5	E
GW3	Wazirabad	7.25	E
GW4	Daida	4.6	SSE
GW5	Gottimukkula	4.0	S
GW6	Adividevulapalli	5.6	SW
GW7	Virlapalem	2.6	W
GW8	Ragadappa	5.0	NW
GW9	Kallepalli	3.8	E
GW10	Damaracherla	5.0	NE
	Surface Water		
SW1	Tungapadu vagu (Near project site)	-	-
SW2	River Krishna (at Wadepalli temple)	9.1	E



Chapter-3: Description of the Environment

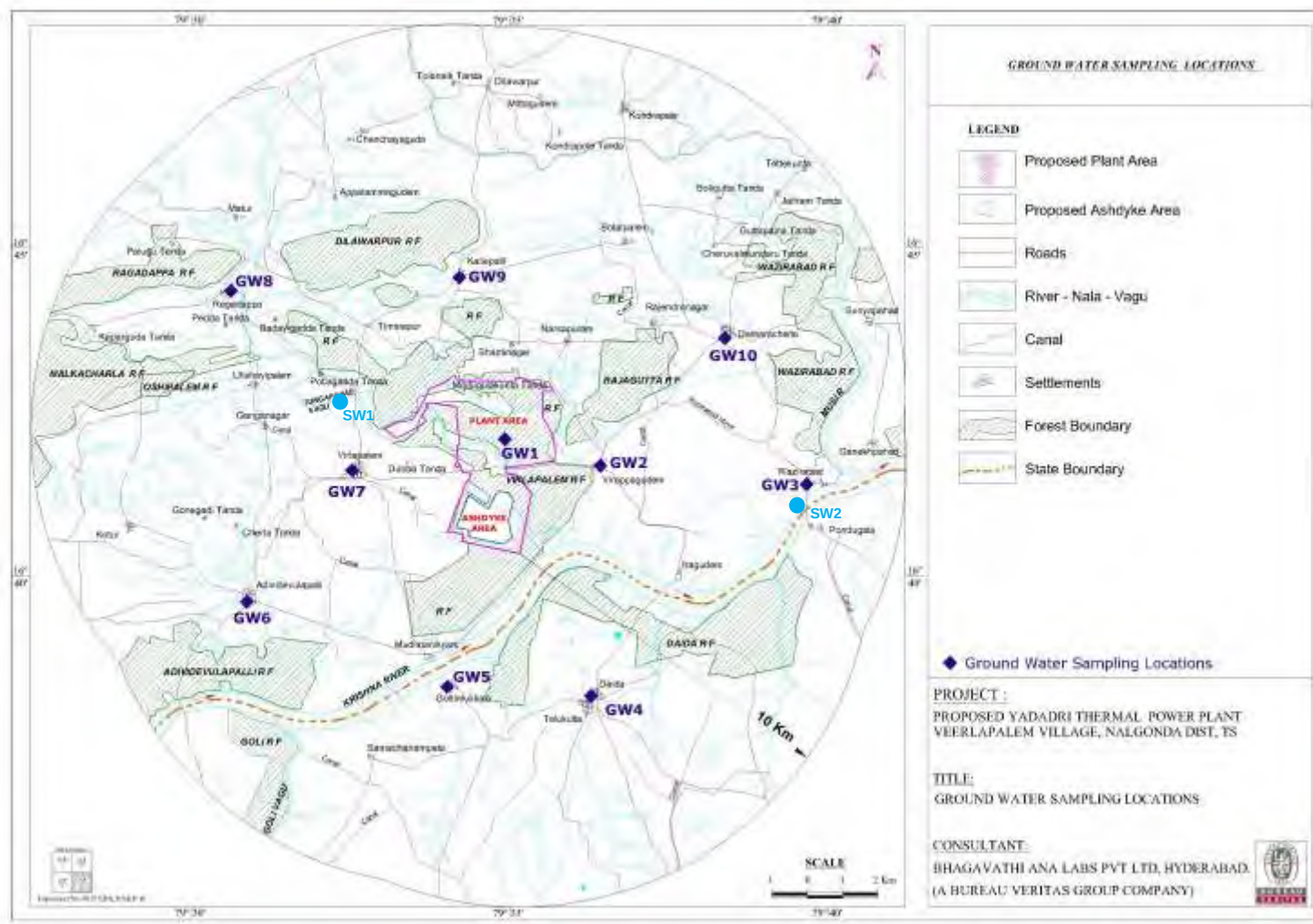


Figure 3.14: Water Sampling Locations

Table 3.25: Ground Water Quality Data – Winter Season (Dec'15 to Mar'16)

S. No	Tests	IS:10500 Limits†	Results							
			Project Site	Virappagudem	Wazirabad	Gottimukkula	Adividevulapalli	Virlapalem	Ragadappa	Damaracherla
1	Colour (Hazen Units)	5 (25)	< 5	< 5	< 5	5	< 5	< 5	< 5	< 5
2	Odour	UO	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
3	Taste	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
4	pH	6.5-8.5	7.57	7.90	8.07	8.33	8.35	8.08	8.01	8.06
5	Turbidity, NTU	5 (10)	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
6	Total Alkalinity as CaCO ₃ , mg/l	200(600)	115	210	250	295	375	295	290	200
7	Total Hardness as CaCO ₃ , mg/l	300(600)	145	375	380	365	480	340	390	300
9	Iron as Fe, mg/l	0.3 (1.0)	0.01	0.02	0.02	0.01	0.02	0.02	0.01	0.02
10	Chlorides as Cl, mg/l	250 (1000)	120	118	125	125	135	182	145	168
11	Total Dissolved Solids, mg/l	500 (2000)	492	796	778	802	964	968	760	764
12	Calcium as Ca, mg/l	75 (200)	26	94	112	84	110	96	108	64
13	Magnesium as Mg, mg/l	30 (100)	19	34	24	38	50	24	29	34
14	Sulphate as SO ₄ , mg/l	200 (400)	97	227	164	142	169	184	93	157
15	Nitrate as NO ₃ , mg/l	45 (NR)	0.5	0.9	0.8	0.50	0.8	0.5	0.7	0.7
16	Fluoride as F, mg/l	1.0 (1.5)	0.20	0.30	0.10	0.20	0.20	< 0.001	0.40	0.20
17	Boron as B, mg/l	1	0.10	0.20	0.13	0.14	0.22	< 0.003	0.20	0.16
18	Residual free, Chlorine, mg/l	0.2 Min		0.09	0.10	0.09	0.09	< 0.01	0.10	0.08

	Environmental Impact Assessment for the proposed 5 x 800 MW Supercritical coal based Yadadri Thermal Power Station at Veerlapalem village, Damarcherla mandal, Nalgonda district, Telangana by M/s Telangana State Power Generation Corporation Limited Chapter-3: Description of the Environment

S. No	Tests	IS:10500 Limits†	Results							
			Project Site	Virappagudem	Wazirabad	Gottimukkula	Adividevulapalli	Virlapalem	Ragadappa	Damaracherla
	(If Chlorinated)									
19	Copper as Cu, mg/l	0.05 (1.5)	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
20	Manganese as Mn, mg/l	0.1 (0.3)	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
21	Phenolic Compounds as C ₆ H ₅ OH, mg/l	0.001 (0.002)	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.01	< 0.001	< 0.001
22	Mercury as Hg, mg/l	0.001 (NR)	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
23	Cadmium as Cd, mg/l	0.01 (NR)	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
24	Selenium as Se, mg/l	0.01 (NR)	0.04	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.02	< 0.01
25	Total Arsenic as As, mg/l	0.01 (NR)	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
26	Cyanide as CN, mg/l	0.05 (NR)	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
27	Lead as Pb, mg/l	0.05 (NR)	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
28	Zinc as Zn, mg/l	5.0 (15)	0.04	0.01	0.01	< 0.01	0.17	< 0.01	0.05	0.01
29	Anionic Detergents as MBAS, mg/l	0.2 (1.0)	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
30	Total Chromium as Cr, mg/l	0.05 (NR)	< 0.05	< 0.005	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
31	Mineral Oil, mg/l	0.01 (0.03)	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent
32	Sodium as Na, mg/l	\$	110	106	100	117	115	136	92	139
33	Potassium as K, mg/l	\$	5	7	3	0.8	10	2	2	0.6
34	Total Coliform,	10	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent

	Environmental Impact Assessment for the proposed 5 x 800 MW Supercritical coal based Yadadri Thermal Power Station at Veerlapalem village, Damarcherla mandal, Nalgonda district, Telangana by M/s Telangana State Power Generation Corporation Limited Chapter-3: Description of the Environment

S. No	Tests	IS:10500 Limits†	Results							
			Project Site	Virappagudem	Wazirabad	Gottimukkula	Adividevulapalli	Virlapalem	Ragadappa	Damaracherla
	MPN/100ml									
35	Fecal Coliform, MPN/100ml	-	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent

†: Limits in parenthesis are permissible limits in absence of alternate source; \$: Limits not specified; NR: No relaxation specified; UO: Unobjectionable; Ag: Agreeable



Table 3.26: Surface Water Quality Data – Winter Season (Dec'15 to Mar'16)

Sl. No	Tests	Results	
		Tungapadu Vagu (Near Project Site)	Krishna River at Wadepally
1.	Colour (Hazen Units)	< 5	< 5
2.	Odour	Agreeable	Agreeable
3.	Taste	Agreeable	Agreeable
4.	pH	7.57	8.07
5.	Turbidity, NTU	< 1	< 1
6.	Total Alkalinity as CaCO ₃ , mg/l	115	250
7.	Total Hardness as CaCO ₃ , mg/l	145	380
8.	Dissolved Oxygen, mg/l	6.8	6.7
9.	Iron as Fe, mg/l	0.01	0.02
10.	Chlorides as Cl, mg/l	120	125
11.	Total Dissolved Solids, mg/l	492	778
12.	Calcium as Ca, mg/l	26	112
13.	Magnesium as Mg, mg/l	19	24
14.	Sulphate as SO ₄ , mg/l	97	164
15.	Nitrate as NO ₃ , mg/l	0.5	0.8
16.	Fluoride as F, mg/l	0.20	0.10
17.	Boron as B, mg/l	0.10	0.13
18.	Aluminium as Al, mg/l	0.07	0.10
19.	Copper as Cu, mg/l	< 0.01	< 0.01
20.	Manganese as Mn, mg/l	< 0.01	< 0.01
21.	Phenolic Compounds as C ₆ H ₅ OH, mg/l	< 0.001	< 0.001
22.	Mercury as Hg, mg/l	< 0.001	< 0.001
23.	Cadmium as Cd, mg/l	< 0.003	< 0.003
24.	Selenium as Se, mg/l	0.04	< 0.01
25.	Total Arsenic as As, mg/l	< 0.01	< 0.01
26.	Cyanide as CN, mg/l	< 0.01	< 0.01
27.	Lead as Pb, mg/l	< 0.01	< 0.01
28.	Zinc as Zn, mg/l	0.04	0.01
29.	Anionic Detergents as MBAS, mg/l	< 0.10	< 0.10
30.	Chromium as Cr ⁺⁶ , mg/l	< 0.05	< 0.05
31.	Mineral Oil, mg/l	Absent	Absent
32.	Sodium as Na, mg/l	110	100
33.	Potassium as K, mg/l	5	3
34.	Total Coli Form, cfu per 250ml	Absent	Absent
35.	Fecal Coli Form, cfu per 250ml	Absent	Absent

Physical parameters of water quality for the studies carried out during season and the observations made were discussed below:

3.6.2 Surface Water Quality

During the winter season, the analysis results indicate that the pH ranges in between 7.57 to 8.07, which is well within the specified standard of 6.5 to 8.5. Total Dissolved Solids (TDS) concentrations were found to be ranging in between 492 to 772 mg/l.

During the season, the Total alkalinity and Total hardness is observed in between 115 to 250 mg/l and 145 to 380 mg/l respectively. Chlorides and Sulphates are observed to be between 120 to 125 mg/l and 97 to 164 mg/l.

During the season, the Nitrates and Dissolved Oxygen observed in between 0.5 to 0.8 mg/l and 6.8 to 6.7 mg/l.

The physico-chemical characterization surface water body could be classified under Class C with respect to CPCB Classification for inland surface waters.

3.6.3 Ground Water Quality

During the study period, the analysis results of ground water samples indicate that the pH value was observed in between 7.57 to 8.35, Total Dissolved Solids levels were observed as 492 mg/l near project site and high values of 968 mg/l near Veerlapalem village.

During the winter season, the Total alkalinity and Total hardness is observed in between 115 to 375 mg/l, 145 to 480 mg/l. Chlorides and Sulphates are observed to be between 118 to 182 mg/l and 93 to 184 mg/l.

During the season, the Total Nitrates were observed in between 0.5 to 0.80 mg/l and no traces of Dissolved Oxygen is observed. Oil & Grease is observed to be <1 mg/l.

The ground water quality conforms to drinking water standards IS:10500 -2003 (in the absence of alternate source) with respect to physico-chemical parameters.

3.7 **Hydro-geology**

The geology and hydro-geological features of the study area are discussed below:

3.7.1 Regional Geology

The project area forms the northeastern part of the Peninsular Indian shield and exposes the igneous and metamorphic Archaean rocks and the sedimentary Cuddapah and Kurnool group of rocks belonging to Upper Precambrian and Lower Paleozoic age.

The geological succession observed and established by the workers for the area is as follows in **Table 3.26**:

Table 3.27: Geological Succession of Cuddapah Supergroup

System	Series	Stage of formation
Recent and sub-recent	Superficial deposit	Alluvium and soil
-----U N C O N F O R M I T Y-----		
Kurnool Group Late Proterozoic (600-1100 m.y.)	Kundair Series	Nandyal shaly limestones
		Koilkuntla limestones
	Jammalamadugu Series	Auk Shales
		Narjee Limestone
		Banganapalli Limestone
-----U N C O N F O R M I T Y-----		
Cuddapah Supergroup Middle Proterozoic (1100-1400 m.y.)	Krishna Series	Srisailem Quartzite
	-----U N C O N F O R M I T Y-----	
	Nallamali Series	Cumbum Shales and Phyllite
		Bairankonda Quartzite
	-----U N C O N F O R M I T Y-----	
	Chitravati Series	Pullumpet (Tadipatri) Shales
		Nagari Quartzite
	-----U N C O N F O R M I T Y-----	
	Papaghani Series	Vempalli Dolomites & Shales
		Gulcheru Quartzite
-----E P A R C H E A N U N C O N F O R M I T Y-----		
Archaeans (2400 m.y.)	Crystallines	Granite, Gneisses and Schists

The mineralogical map of the region as furnished by Assistant Director, Mines and Geology, Miryalaguda along with the report furnished by him is enclosed as **Annexure 11**.

3.7.2 Drainage

The Nalgonda district is drained by the River Krishna along with tributaries Musi, Aler, Dindi, Halia and Peddavagu rivers. Krishna River forms the southern boundary of the district and enters the south western part of the district and flows along the southern boundary for a distance of about 85 kms. The Musi River is the main tributary of river Krishna. The Paler river drains eastern part of the district. The directions of all the three river courses are controlled by two major lineaments in east-west and northwest-southeast directions. All other lower order streams and nallas are controlled by minor lineaments. The district is divided into 64 micro-water sheds. The major river Krishna is perennial and all other rivers are seasonal and ephemeral. The overall drainage pattern in the district is dendritic to sub-dendritic and rectangular.

3.7.3 Hydrogeology

The geology of the core and major part of the buffer zones is occupied by limestone of Late Proterozoic tapped by both dug wells and bore wells. The northern part of the buffer zone comes under the Archaean granite and gneisses.



The consolidated meta-sedimentary rocks of Kurnool system comprising limestone, quartzite and shale occupy most of the buffer zone specifically in the southern part. The crystalline rocks (granites) are inherently devoid of primary porosity. However, subsequently, with dynamic process of weathering, the rocks undergo fracturing and fissuring and joints over a period of time, lead to the development of secondary porosity, which forms the repository for ground water. The ground water occurs under water table conditions in weathered zone and semi-confined and confined conditions in fractured zone.

3.7.4 Watershed

Entire buffer zone falls in one watershed of Krishna river where in total, there are five micro-watersheds. There are two micro-watersheds in northern part of the buffer zone and north of Krishna river while there are three micro-watersheds in southern part of the buffer zone and south of Krishna river.

Two micro -watershed which are located in north of Krishna river are Tungpahad river micro-watershed in north-western part while another micro-watershed is of Musi river micro-watershed in the north -eastern part of the buffer zone.

There are three micro-watersheds in southern part of the buffer zone and are Gol Vagu micro-watershed in the south western part, Golidela micro-watershed in south-central part while there is Dangi micro-watershed in the south-eastern side. All these five micro-watershed are part of Krishna watershed. Among these only two watersheds of Tungpahad river and Musi river have large catchment area and significant catchment yield while the other three micro watersheds have small catchment area and limited catchment yield.

3.7.5 Drainage

It is observed that Tungpahad Vagu (stream), an ephemeral stream, passes through the centre of the plant area taking south-easterly course. This is big stream having significant catchment area outside the plant in north western side.

There are many streamlets originating within the plant area which meet Tungpahad Vagu. These streamlets which originate due to rainfall in the plant area will stop flowing as Storm water drainage system will be designed before constructing the plant and it will be allowed to meet the Vagu as and where feasible. There is a stream with limited catchment area entering in the ash pond area which has to be diverted to join another stream flowing in the south. Another streamlet just passes through the southern part of the ash pond and will be allowed to flow undisturbed and the ash pond will be formed away from the streamlet. The drainage pattern, after the setting up of the plant is discussed along diversion program in the chapter dealing with the impact of the plant on natural drainage system.

Detailed hydro-geological study of the area has been carried out by M/s Vimta Labs Ltd, summary of which is provided as **Annexure 12**.



3.8 Traffic Studies

The traffic study has been conducted during the study period to know the existing traffic and assess the impact of increase in traffic due to the proposed project. This study would help to assess the adequacy of the existing roads for the increased traffic. The traffic study has been conducted at two locations on the National Highway 35, near Dameracherla, near to plant site. The variation of traffic depends upon the time and weekdays. The traffic flow is low during holidays and in afternoon. The details of the monitoring locations are presented in **Table 3.27**.

Table 3.28: Details of Traffic Monitoring Locations

Location Code	Location
T1	NH-35 Towards Miryalaguda
T2	NH-35 Towards Guntur

3.8.1 Methodology

The vehicles plying in both the directions were counted continuously for 24 hours simultaneously. The vehicles were counted every hour and recorded under respective category. The vehicles were categorized under various heads like 2 & 3 Wheeler, 4-Wheeler (LMV), HMV Single Axial, HMV Multi Axial and Others. The categorization of the vehicles is necessary because the speed and the emission factors vary with type of the vehicle.

3.8.2 Existing Traffic

The daily traffic count for the monitoring location is presented in **Table 3.28**.

Table 3.29: Recorded Traffic Details

S. No.	Locations	2-Wheeler	3-Wheeler	4-Wheeler (LMV)	HMV Single Axial	HMV Multi Axial	Others	Total PCUs
T1	NH-65 at Dameracherla – Towards Miryalaguda	700	225	838	223	65	18	2174
T2	NH-65 at Dameracherla – Towards Guntur	650	250	742	186	66	16	1956

The traffic data presented below represents vehicles in both directions

*PCU- Passenger Car Units (2/3 Wheeler: 0.5, 4-Wheeler: 1, HMV: 3, Others: 0.5)

3.9 Land Environment

3.9.1 Soil Characteristics

It is essential to determine the potential of soil in the area and identify the impacts of urbanization and industrialization on soil quality. To assess the soil quality in the study area, ten locations were selected for sampling and analysis of soil samples for physical and chemical parameters.

- Sampling and Analysis Techniques**



Soil samples were collected by ramming a core-cutter into the soil to a depth of 90 cm. At each of the sampling location, soil samples were collected from three different depths, viz., 30 cm, 60 cm and 90 cm below the surface and homogenized. The homogenized samples were then packed in a polythene plastic bag and sealed. The sealed samples were sent to the Central Laboratory for analysis. The physical, chemical analysis for all the samples were carried out.

The details of the soil sampling locations are given in **Table 3.29** and are shown in **Figure 3.14**. The sampling has been carried out in the study period.

Table 3.30: Details of Soil and Sediment Sampling Locations

Location Code	Location	Distance (km)	Direction
		w.r.t. Project site	
S1	Project Site	0	-
S2	Virappagudem	1.5	E
S3	Wazirabad	7.25	E
S4	Daida	4.6	SSE
S5	Gottimukkala	4.0	S
S6	Adividevulapalli	5.6	SW
S7	Virlapalem	2.6	W
S8	Ragadappa	5.0	NW
S9	Kallepalli	3.8	E
S10	Damaracherla	5.0	NE

The soil quality results at the sampling locations during the season are given in **Table 3.30**. The results have been compared with the standard classification given in **Table 3.31**.

• Results and Discussions

It has been observed that the pH of the soil ranged from 7.56 – 8.68 indicating that the soils are neutral to alkaline in nature. The soil in the study area is predominantly of sandy loam type. The Electrical Conductivity was observed in the range of 144-683 $\mu\text{S}/\text{cm}$.

The Nitrogen and Phosphorous values are in the range of 98-540 kg/ha and 10-20 kg/ha respectively. The Nitrogen and Phosphorous levels of the soils in the region indicate that soils are sufficient for Nitrogen and less for Phosphorous levels. The Potassium values range between 210-2832 kg/ha, which indicate that the soils have sufficient quantity of Potassium. The soil from the study area shows good fertility due to their NPK content.



Chapter-3: Description of the Environment

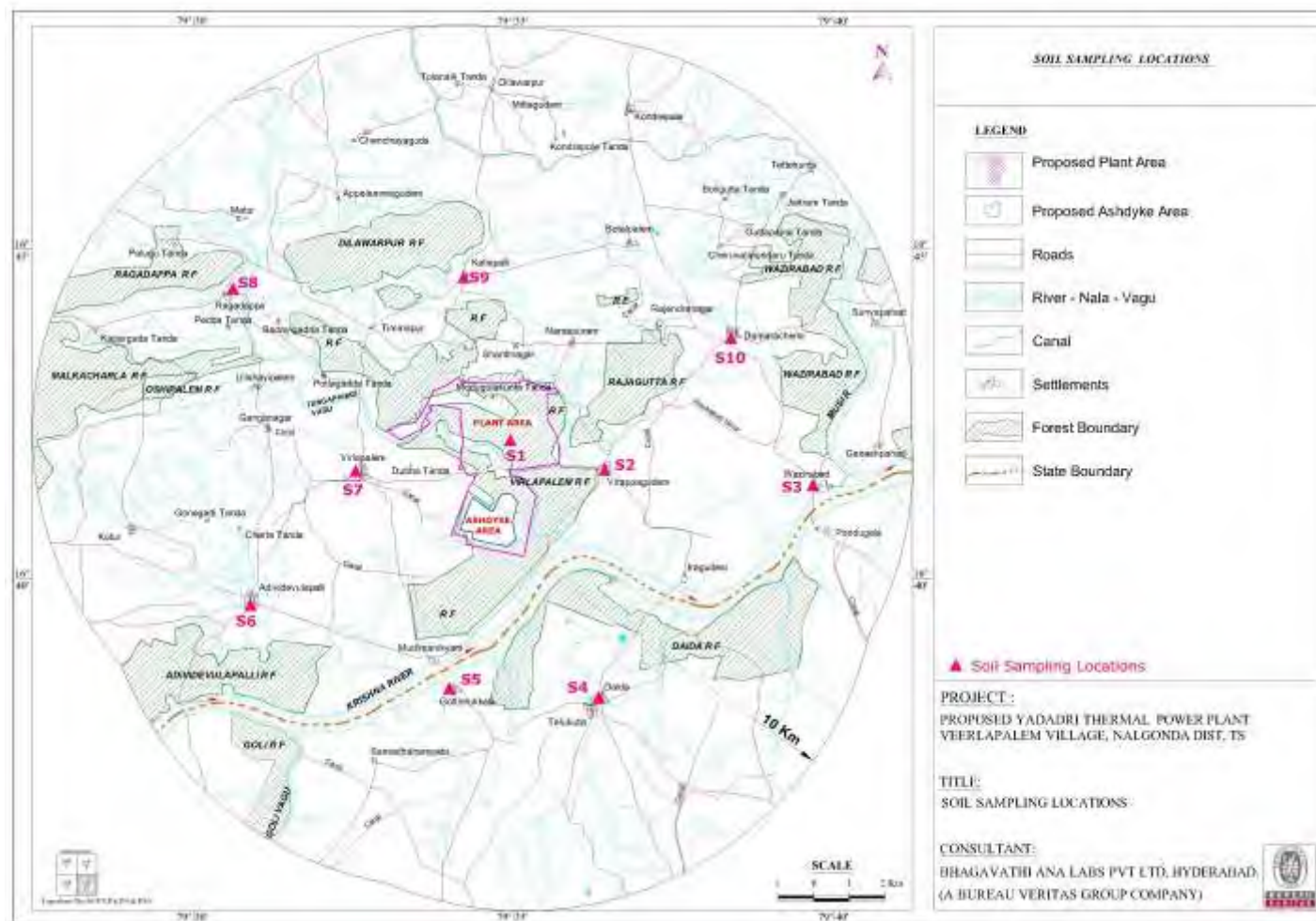


Figure 3.15: Soil Sampling Locations



Table 3.31: Soil Analysis Results (Winter Season)

Sl. No.	Test Parameters	Results									
		S1	S2	S3	S4	S5	S6	S7	S8	S9	S10
1	pH (1.2 Soil Water Extract)	7.95	7.81	8.03	8.36	8.68	8.08	8.06	7.56	8.05	8.35
2	E.C (μ mhos) (1:2 Soil water Extract)	438	683	358	144	237	465	215	186	268	197
3	Available Nitrogen, Kg/Hec	540	520	489	320	338	410	430	98	210	282
4	Available Phosphorous as P_2O_5 , Kg/Hec	14	20	14	12	16	18	12	10	13	10
5	Available Potassium as K_2O , Kg/Hec	252	305	2832	516	284	316	452	2052	210	432
6	Ex. Sodium as Na, ppm	202	294	506	35	168	308	74	420	154	237
7	Ex. Calcium as Ca, ppm	1400	6960	3280	3600	3680	7240	2600	3360	4400	5640
8	Ex. Magnesium as Mg, ppm	730	24	681	49	48	292	486	584	24	705
9	Sodium Absorption Ratio (SAR)	0.35	0.31	0.66	0.05	0.24	0.31	0.11	0.56	0.20	0.25
10	Water soluble Chloride as Cl, ppm	20	30	30	10	20	30	20	20	30	10
11	Organic Carbon, %	1.17	1.27	0.96	0.76	0.95	1.19	0.68	0.02	0.12	0.02
12	Texture	Sandy loam	Sandy clay	Sandy clay loam	Sandy loam	Sandy loam	Clay	Sandy Loam	Sandy clay loam	Sandy clay loam	Sandy Clay
	a) Sand, %	72	35	50	60	57	23	58	55	53	34
	b) Silt, %	15	29	22	21	24	35	24	20	24	30
	c) Clay, %	13	36	28	19	19	42	18	25	23	36
13.	Silica as SiO_2 , %	71.02	68.94	65.12	62.40	59.96	62.40	40.10	45.24	46.28	

Note: The above results are expressed dry basis except pH and EC



Table 3.32: Standard Soil Classification

S.No.	Soil Test	Classification
1	pH	<4.5 Extremely acidic 4.51-5.00 Very strongly acidic 5.00-5.50 slightly acidic 5.51-6.0 moderately acidic 6.01-6.50 slightly acidic 6.51-7.30 Neutral 7.31-7.80 slightly alkaline 7.81-8.50 moderately alkaline 8.51-9.0 strongly alkaline 9.01 very strongly alkaline
2	Salinity Electrical Conductivity (mmhos/cm) (1 ppm = 640 · mhos/cm)	Upto 1.00 Average 1.01-2.00 harmful to germination 2.01-3.00 harmful to crops (sensitive to salts)
3	Organic Carbon	Upto 0.2: very less 0.21-0.4: less 0.41-0.5 medium, 0.51-0.8: on an average sufficient 0.81-1.00: sufficient >1.0 more than sufficient
4	Nitrogen (Kg/ha)	Upto 50 very less 51-100 less 101-150 good 151-300 Better >300 sufficient
5	Phosphorus (Kg/ha)	Upto 15 very less 16-30 less 31-50 medium, 51-65 on an average sufficient 66-80 sufficient >80 more than sufficient
6	Potash (Kg/ha)	0-120 very less 120-180 less 181-240 medium 241-300 average 301-360 better >360 more than sufficient

Source: Hand Book of Agriculture, Indian Council of Agricultural Research, New Delhi



3.9.2 Land Use / Land Cover Classification

The Land Use (LU)/Land Cover (LC) classification for the study area was carried out based on visual interpretation of satellite imagery data of IRS Resourcesat-2.

- **Methodology**

The land use/land cover map is prepared by adopting the interpretation techniques of the image in conjunction with collateral data such as topographical maps and census records. Image classification can be done by using visual interpretation techniques and digital classification using any of the image processing software.

For the present study, ERDAS and Arc View Softwares are used for preprocessing, rectification, enhancements and classifying the satellite data for preparation of land use land cover map and assessing land use land cover and land developmental activities.

The imagery is interpreted initially based on the secondary data available and image characteristics. Thorough ground verification is done along with Bhagavathi team to check each class of land use/land cover spread over the entire study area and final land use/land cover analysis is made after necessary corrections. Flowchart showing the methodology adopted is presented in **Figure 3.15**.

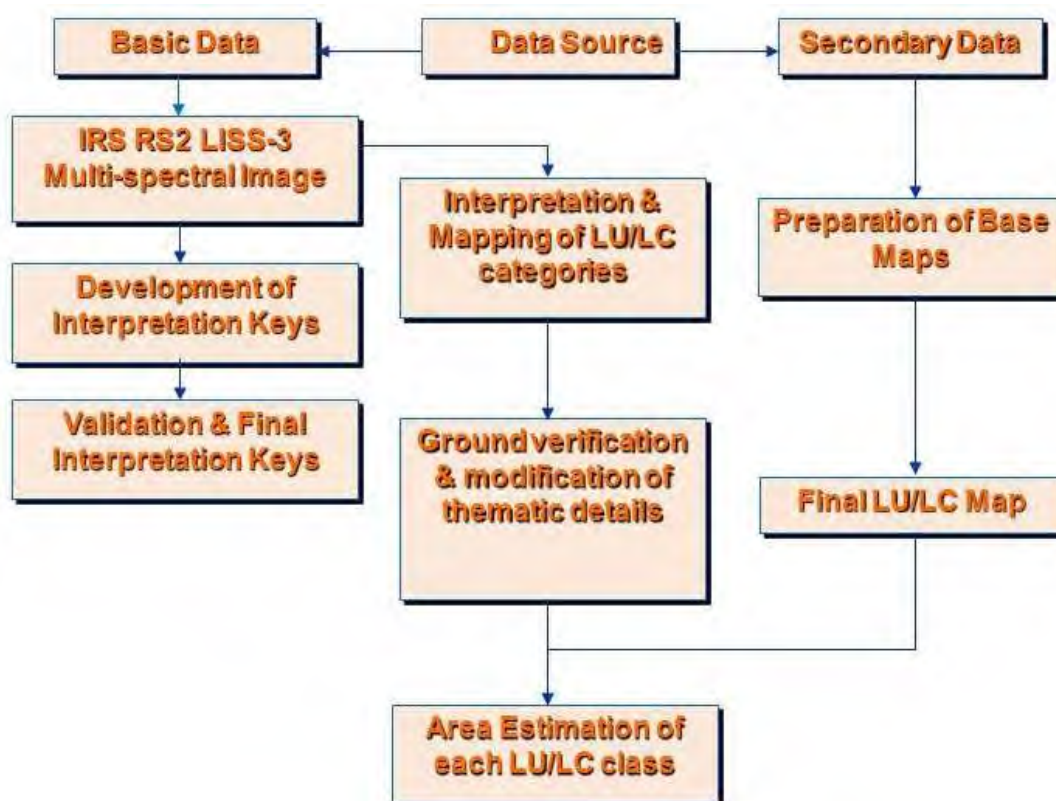


Figure 3.16 : Flowchart of simplified methodology

- **Satellite Data**

IRS Resourcesat-2 LISS3 multispectral satellite data of 28th January 2016 was utilized for the present study and shown in **Figure 3.16**. The rectification of imagery was carried out on to bring the digital data on the earth coordinate system by means of ground control point (GCP) assignments from SOI toposheets.

Table: 3.33: Details of Satellite Data

S.No.	Satellite	Sensor	Scale	Path & Row	SOI Toposheet No.	Date of Pass
1	IRS Resource sat-2	LISS3	1:50,000	101 & 61	56P5, 56P6, 56P9 & 56p10	28.01.2016

The spectral bands of IRS Resroucesat-2 data are furnished in **Table 3.32** and **3.33** respectively.

Table: 3.34: Characteristics of IRS Resourcesat-2 Data

Type of the Satellite	Multi Spectral Bands	Bandwidth / wave length in microns	Spectral resolution (m)	Product type	Format / scale
IRS Resource sat-2	2,3,4	Band 2 : 0.52-0.59 Band 3 : 0.62-0.68 Band 4 : 0.76-0.86	24	Digital	Geocode d scale 1:50,000

Table: 3.35: IRS Resources at-2 LISS3, Satellite Spectral Bands and their Principal Applications

Band	Wave Length (microns)	Application
2	0.52 - 0.59	Soil/vegetation differentiations, coniferous/deciduous flora discrimination, vegetation vigour assessment, rock/soil boundary differentiation, turbidity and bathymetry in shallow water.
3	0.62 - 0.68	Strong chlorophyll absorption leading to discrimination of vegetation types mining area, mapping of settlements and transport network.
4	0.76 - 0.86	Delineation of surface water features, land forms / rock types, mining area, mapping of settlements and transport network.

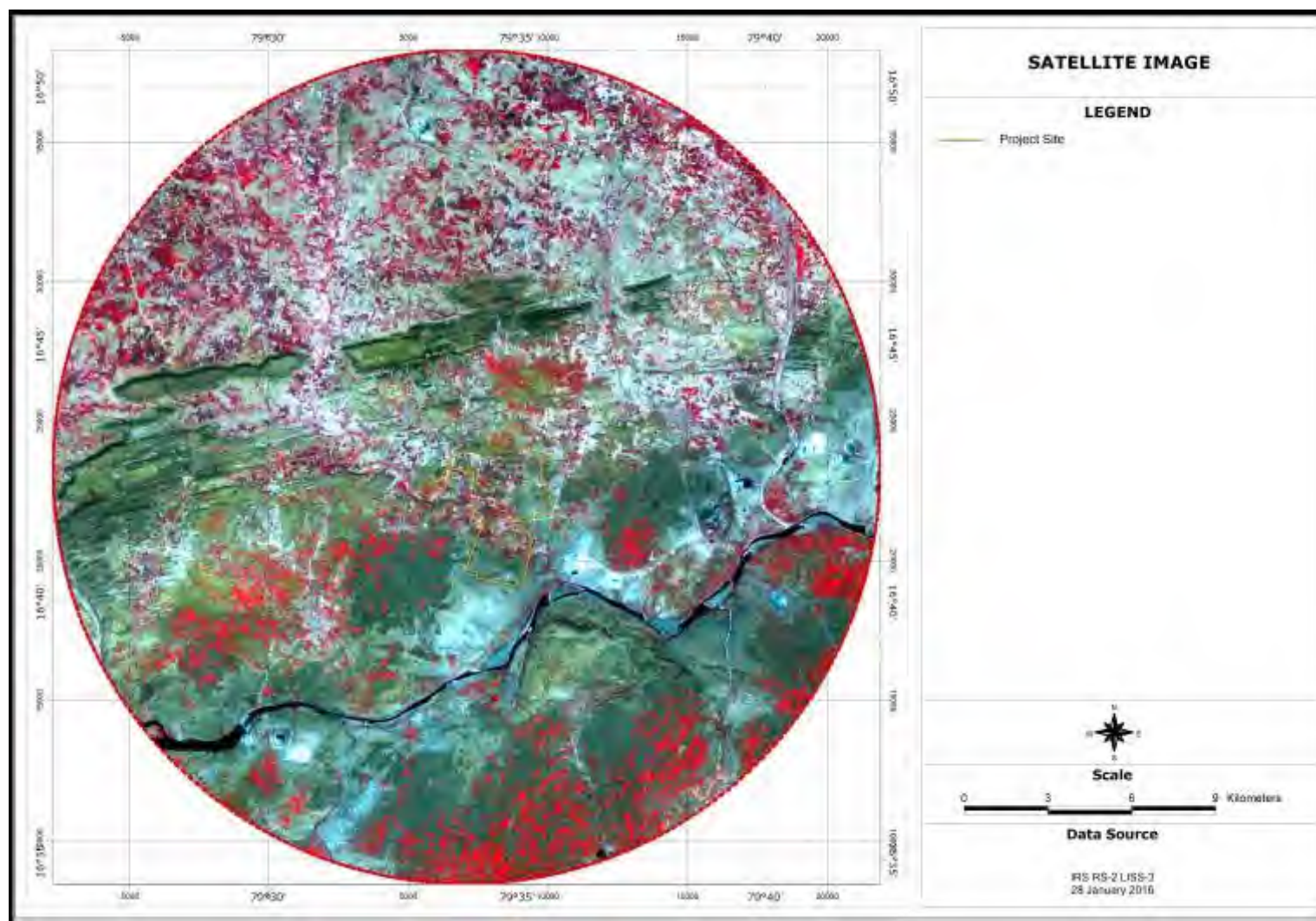


Figure 3.17 : IRS Resourcesat-2 LISS3 Image of the Study Area

- **Collateral Data, Other Data and Ground Verification**

The imagery was interpreted initially based on the secondary data available such as Survey of India Toposheets, land use data from revenue/census records and satellite image characteristics.

Visually interpreted 10 Km radius area of the satellite image and the interpreted features were checked on the ground during the field visit between 26.02.2016 and 27.02.2016 by Empanelled Expert – J Rajendra Prasad along with Bhagavathi team.

The pre-field interpreted map details were revised based on the additional field information, wherever necessary and modified Land Use/Land Cover (LU/LC) legend was adopted for finalizing the LU/LC maps.

- **Land Use/ Land Cover Classification System**

The Land Use / Land Cover - Land Use refers to man's activity and the various uses, which are carried on land. Land Cover refers to natural vegetation, water bodies, rock/soil, artificial cover and others, resulting due to land transformation. The terms Land Use and Land Cover are closely related and interchangeable. Knowledge about the existing land use and trends of change is essential if the nation is to tackle the problems associated with the haphazard and uncontrolled growth. The purposes, for which land is being used commonly, are associated with different types of cover such as built-up land, agriculture, forest, wasteland, water body and others.

Built-up Land

Built-up land is an area of human habitation developed due to non-agricultural use and all manmade constructions covering the land surface. These are human settlements comprising residential area, transportation and communication lines, industrial and commercial complexes, utility and services etc. Collectively cities, towns and habitations are included under this category. Their shape and multi-spectral response differentiate them from other classes. Rabi season data provides better expression of built-up areas, which appear in greenish blue tint whereas the interfering influence of extraneous features that are common in Kharif season such as weedy vegetation, accumulated water in depression and low lying areas are minimized. In the present study, it is further subdivided into settlements, industrial/institutional areas and major transport network enclosed.

Damaracherla, Mandal headquarters is the major town in the study area and Virappagudem, Virlapalem, Modugulakunta Tanda, Potlagadda Tanda, Bodayigadda Tanda, Timmapur and Shantinagar are the villages/settlements around the proposed project site. There are a few cement and other minor industries in the study area

Agricultural Land

It is defined as the land primarily used for farming and production of food, fiber, and other commercial and horticultural crops. It includes land under crops, fallow, plantations, etc.

Agriculture

It includes those lands with standing crop as on the date of satellite imagery. The standing crops during June to October are known as Kharif crop, whereas standing



crops during November to March are classified as Rabi crops. It is further subdivided into single cropped (Kharif or Rabi), irrigated/double cropped and at places separated as irrigated and rain-fed. At places this includes lands, which are partially submerged under water from June to mid January, but later paddy and other vegetables are grown on them. They have distinct signatures on the imagery i.e. whitish light green implying moist nature. Paddy, jowar, castor (cotton picked and left), groundnut and vegetables are standing crops noticed during the field visit.

Plantation

It is described as an area under agricultural tree crops planted, adopting certain agricultural management techniques. It includes orchards and other horticultural nurseries. Generally, plantations are well separable from croplands during Rabi season by their relative low response, particularly in red and infrared regions related to internal structure of their foliage and sizable open areas of soil exposed between the trees. and organe/lime, mango, eucalyptus and teak were the plantations observed during field visit

Fallow Land

Cropland that is not seeded for a season; it may or may not be plowed. The land may be cultivated or chemically treated for control of weeds and other pests or may be left unaltered

Forest

It is an area (within the notified forest boundary) bearing an association predominantly of trees and other vegetation types capable of producing timber and other forest produce. In forest where the vegetation density (crown cover) is 40% or above, is called dense or close forest. If it is between 10-40%, it is called open forest and below 10% is called degraded forest.

Malkacharla, Adividevulapalli, Goli, Oshipalem, Ragadappa, Dilawarpur, Virlapalem, Rajagutta, Gangadevigutta, Wazirabad, Daida, Saidulna and, Pasupulabodu Reserved Forests are the forest covers in the study area. Major part of the proposed project site covers Virlapalem Reserved Forest. The forest cover in the project site and study area is mainly thorny bush type with reasonable area under rocky exposures and devoid of vegetation.

Waste Land

Wastelands are described as degraded lands which can be brought under vegetative cover, with reasonable efforts or which are currently under-utilized, or lands which are deteriorating due to lack of appropriate water and soil management or on account of natural causes. Wastelands include:

Undulating Land with or without Scrub

All other wastelands that do not qualify for placement under any of the aforementioned wasteland categories are placed under this class. Besides scrubland, other lands with soils that are too shallow, skeletal, concretionary, otherwise chemically degraded are included in this category. It has been observed that scrub land often appears like fallow in Rabi seasons and like crop land in Kharif seasons, which are discriminated by using multi temporal data.



Rocky/Stony/Barren Areas

Areas having rock exposures, stony wastes and barren ground without soil cover are interpreted under this land use class.

Quarry/Mining Areas

Areas used for stone quarrying, brick industry and mining minerals are interpreted under this land use class. There are number of limestone quarries supporting cement and red earth dugs supporting brick industries in the study area. Limestone quarry of India Cements near Wazirabad is one of the major quarries in the study area.

Water Bodies

A major share in this class is occupied by surface water either impounded in the forms of ponds, lakes and reservoirs or flowing streams, rivers, canals, etc. These are clearly seen on FCC (False Colour Composite) in blue greenish and black colours.

River/Stream/Canals

It is natural course of water along a definite channel. It may be seasonal or perennial. The study area is mainly drained by Krishna River and its tributary Musi River. Secondary distributories/minors from Nagarjunasagar Left Bank Canal run through major part of the study area.

Reservoirs/Lakes/Tanks

A lake is a large body of surface impounded water, natural or artificial within the landmass. Reservoir is a artificial lake created by construction of a dam across the river specifically for (i) generation or hydroelectric power (ii) irrigation (iii) water supply for domestic and industrial uses (iv) flood control; either singly or in combination. Tanks are small lakes or pounded water. Canals are man made waterways constructed on land surface for irrigation. There are number of small water bodies spread in the entire area

• Results of Land Use/ Land Cover Mapping

Using the standard land use classification system proposed by NRSC, five classes of level I, eighteen of level II land use/land cover classes were identified and mapped using satellite data in the present study. Subsequently land use/land cover map of the study area was digitally composed in ArcView module and the final area statistics was worked out and presented in **Table 3.35**. Distribution of land use/land cover in the study area is depicted in the form of a column chart in **Figure 3.17**.

Table 3.36: Level-II - Land Use/Land Cover statistics of 10 km Radius Area

S.No.	Level I	Level II	Area (Ha.)	Area (%)
1	Built-up Land			
1.1		Settlements	1504.75	2.17
1.2		Industry/Institutional Land	454.98	0.66
2	Forest			
2.1		Forest - mostly thorny shrub and rocky	9809.06	14.13



2.2		Industry	3.51	0.01
2.3		Plantation	113.93	0.16
2.4		Irrigated/Double Crop	256.91	0.37
2.5		Other Agriculture Land/Single Crop	1943.56	2.80
2.6		Fallow Land	586.78	0.85
2.7		Quarry/Mining Land	124.10	0.18
3	Agricultural land			
3.1		Plantation	470.27	0.68
3.2		Irrigated/Double Crop	10580.70	15.25
3.3		Other Agriculture Land/Single Crop	29308.76	42.23
3.4		Fallow Land	1489.72	2.15
4	Waste Land			
4.1		Land with/without Scrub	8294.05	11.95
4.2		Rocky/Stony/Barren Land	664.31	0.96
4.3		Quarry/Mining Land	517.64	0.75
5	Water Body			
5.1		Stream/River/Canal	2395.45	3.45
5.2		Tank/Reservoir/Pond/Lake	880.03	1.27
Total			69398.49	100.00

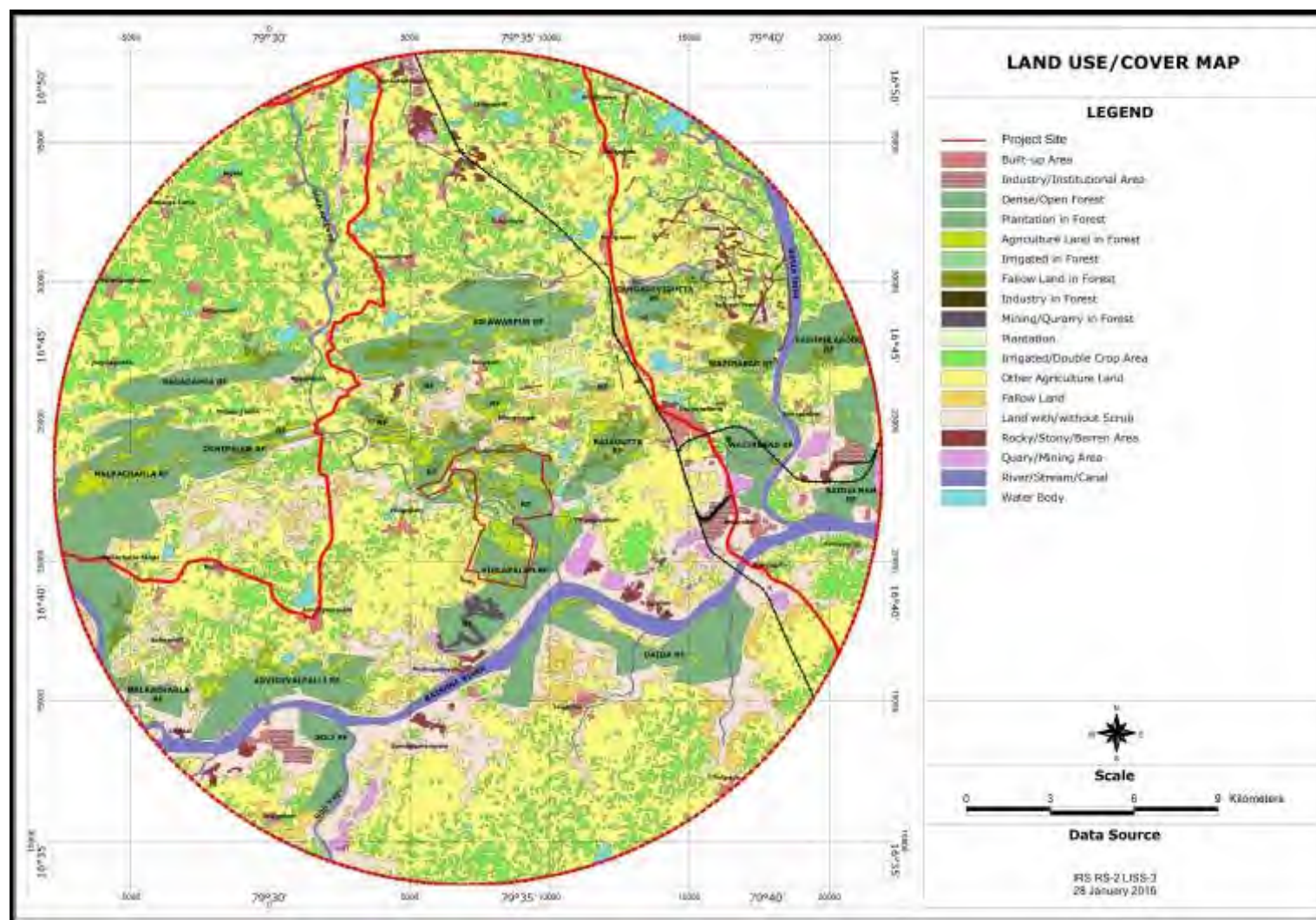


Figure 3.18 Land Use/Land Cover Map of 10 Km Radius Area

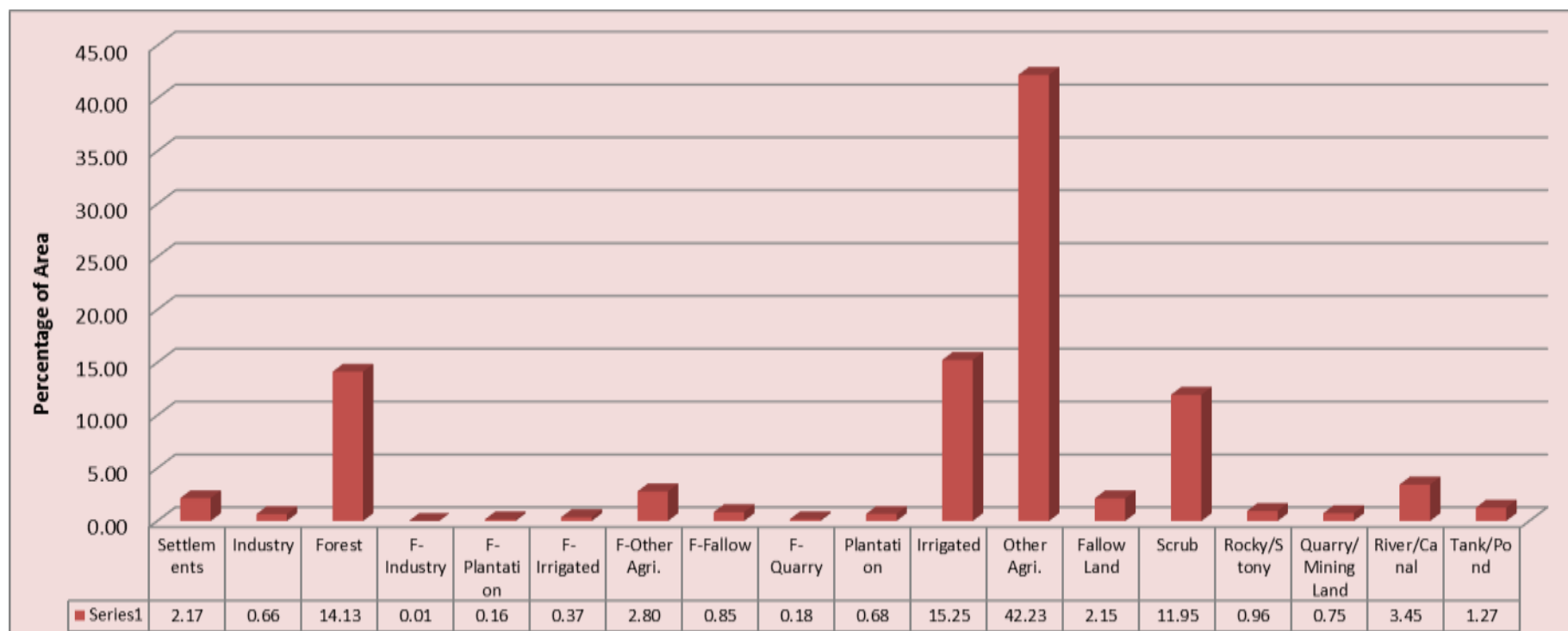


Figure 3.19: Distribution of Land Use/Cover in 10 Km Radius Area

3.10 Ecological Environment

3.10.1 Introduction

Biodiversity conservation is of prime importance both nationally and globally. Ecological assessment is very critical for decision-making and for locating a developmental project or industry. The study includes field investigation of the ecological setting of the project, the flora, the vegetation, the fauna and the ongoing human activities.

Flora & Fauna are more susceptible to environmental stress. A change in the components of environment is reflected by a change in the distribution pattern, density, frequency, abundance, diversity and dominance of natural species of flora and fauna existing in that ecosystem.

Keeping in view the importance of biological component, this study was carried out in the study area of the proposed project. Besides biological characterization of terrestrial and aquatic environments.

3.10.2 Objectives of Ecological Studies

The primary objectives of the biological environment study are:

- To inventorize floral and faunal components of project area (project site / core zone and 10 km. radius / buffer zone).
- To locate / demarcate and understand ecological setting of the project area in terms of national parks / wildlife sanctuary / reserve forests / tiger reserve / Eco-sensitive Areas / wetlands etc. within 10 km. radius from project site (if any).
- To identify threatened, rare, endangered and endemic species within the project study area and prepare conservation plan for same.
- To identify likely impact zone and evaluate the likely impact of the proposed project activities on floral and faunal components of the project study area.
- To suggest / prepare action plan to mitigate likely impacts on the biodiversity of the project area through green belt development.

3.10.3 Methodology

The methodology followed to collect information on flora and fauna from the study area are as follows:

• Field Data Collection/Inventory

Proposed project site mostly encompasses forest area. Buffer zone was roamed randomly covering various habitats to enlist floral and faunal components.

• Threat Assessment Criteria

The Threat status has been assessed as per Schedule categorization given in Indian wild Life Protection Act (IWPA), 1972.

3.10.4 Terrestrial Biodiversity Status

- **Core Zone**

Flora

Core zone involves three forest patches namely, Veerlapalem RF, Dilawarpur RF and Gangadevi Gattu RF. The forest area consists of Southern Tropical Dry deciduous scrub forest and Thorny forests of type 5A/C3/DS1 and 6A/C3/DS1. The dominant species in the forest consist of *Acacia sundra*, *Grewia rotundifolia*, *Albizia amara*, *Cloroxylon swetenia*, *Beuatia monosperma*, kalime, Xerophytes species like *Opuntia*, *Euphorbias*, *Zizyphous* species.

The canopy density varies from 0.05 to 0.02. In the upper reaches of the hillocks there is moderate growth of 0.02 density. The lower plain areas and foot hills is basically with scrub growth and open thorny area.

The wildlife boundary map w.r.t. the Project site is given as **Figure 3.19**.

Fauna

The area supports fauna like Hare and Wild boar. There are no any endangered/ rare / unique species of flora and fauna in these Reserve Forests.

- **Buffer Zone**

Flora

Overall 215 flora species has been reported from the buffer zone of the study area. Detail taxonomic account for all life forms is tabulated in following **Table 3.36**.

Table 3.37: Flora Reported from Buffer zone of the Project Area

S. No. / Habit	Scientific Name	Family	Vernacular name	IUCN Status	
Trees					
1	i.	Acacia arabica	Mimosaceae	Nalla tumma	
2	ii.	Acacia auriculiformis	Mimosaceae	Auriculiformis	LC
3	iii.	Acacia leucophloea	Mimosaceae	Tella tumma	--
4	iv.	Acacia sundra	Mimosaceae	Sundra	--
5	v.	Aegle marmelos	Rutaceae	Maredu	--
6	vi.	Ailanthus excelsa	Simaroubaceae	Peddamaanu	--
7	vii.	Alangium salvifolium	Cornaceae	Ooduga	--
8	viii.	Albizia lebbek	Mimosaceae	Dirisanam	--
9	ix.	Annona squamosa	Annonaceae	Custard apple	--
10	x.	Azadirachta indica	Meliaceae	Vepa	--
11	xi.	Bauhinia racemosa	Caesalpiniaceae	Ari	--
12	xii.	Bauhinia variegata	Caesalpiniaceae	Mandari	LC
13	xiii.	Benkara malabarica	Rubiaceae	Pedda manga	--
14	xiv.	Bombax ceiba	Bombacaceae	Booruga	--
15	xv.	Borassus flabellifer	Arecaceae	Taati / Taadi	EN
16	xvi.	Breynia retusa	Phyllanthaceae	Chinna purugudu	--

17	xvii.	<i>Breynia vitis-idaea</i>	Euphorbiaceae	Nalla purugudu	--
18	xviii.	<i>Butea monosperma</i>	Fabaceae	Modugu	--
19	xix.	<i>Canthium dicoccum</i>	Rubiaceae	Nalla balusu	VU
20	xx.	<i>Canthium parviflorum</i>	Rubiaceae	Balusu	--
21	xxi.	<i>Cassia fistula</i>	Caesalpiniaceae	Rela	--
22	xxii.	<i>Casuarina equisetifolia</i>	Casuarinaceae	Sarvi (Sarugudu)	--
23	xxiii.	<i>Catunaregam spinosa</i>	Rubiaceae	Manga / Chinna manga	--
24	xxiv.	<i>Chloroxylon swietenia</i>	Rutaceae	Billudu	VU
25	xxv.	<i>Cocos nucifera</i>	Arecaceae	Coconut	--
26	xxvi.	<i>Dalbergia sisso</i>	Fabaceae	Sisso or seesum	--
27	xxvii.	<i>Desmodium pulchellum</i>	Fabaceae	Deyyapu mokka	LC
28	xxviii.	<i>Diospyros melanoxylon</i>	Ebenaceae	Tunki	--
29	xxix.	<i>Eucalyptus spp.</i>	Myrtaceae	Jama oil	--
30	xxx.	<i>Euphorbia caducifolia</i>	Euphorbiaceae	Brahma jemudu	--
31	xxxi.	<i>Feronia elephantum</i>	Rutaceae	Velaga	--
32	xxxii.	<i>Ficus benghalensis</i>	Moraceae	Marri	--
33	xxxiii.	<i>Ficus religiosa</i>	Moraceae	Raavi	--
34	xxxiv.	<i>Hardwickia binata</i>	Caesalpiniaceae	Yepi	--
35	xxxv.	<i>Hibiscus platanifolius</i>	Malvaceae	--	--
36	xxxvi.	<i>Holoptelea integrifolia</i>	Ulmaceae	Nemali naara	--
37	xxxvii.	<i>Lagerstroemia parviflora</i>	Lythraceae	Chennangi	--
38	xxxviii.	<i>Leucaena leucocephala</i>	Fabaceae	Subabul	--
39	xxxix.	<i>Mangifera indica</i>	Anacardiaceae	Mamidi	DD
40	xl.	<i>Maytenus emarginata</i>	Celastraceae	Danti	--
41	xli.	<i>Mimusops elengi</i>	Sapotaceae	Pogada	--
42	xlii.	<i>Morinda pubescens</i>	Rubiaceae	Togaru	--
43	xliii.	<i>Moringa oleifera</i>	Moringaceae	Munaga	--
44	xliv.	<i>Muntingia calabura</i>	Muntingiaceae	Wild cherry	--
45	xl.	<i>Phoenix sylvestris</i>	Arecaceae	Eetha	--
46	xlvi.	<i>Phyllanthus emblica</i>	Phyllanthaceae	Usiri	--
47	xlvi.	<i>Phyllanthus eticulatus</i>	Phyllanthaceae	Pulasari / Puliseru	--
48	xlvi.	<i>Pithecellobium dulce</i>	Mimosaceae	Seema chinta	--
49	xlix.	<i>Polyalthia longifolia</i>	Annonaceae	Ashoka	--
50	i.	<i>Polyalthia pendula</i>	Annonaceae	Asoka	--
51	li.	<i>Pongamia pinnata</i>	Fabaceae	Ganuga	LC
52	lii.	<i>Prosopis juliflora</i>	Fabaceae	English tumma	--
53	liii.	<i>Prosopis spicigera</i>	Mimosaceae	Jammi chettu	--
54	liv.	<i>Samanea saman</i>	Mimosaceae	Nidrabhangi	--
55	lv.	<i>Sapindus emarginatus</i>	Sapindaceae	Kunkundu	--
56	lvi.	<i>Spathodea campanulata</i>	Bignoniaceae	Flame of the forest	--
57	lvii.	<i>Sterculia foetida</i>	Sterculiaceae	Adavi badam	--
58	lviii.	<i>Syzygium cumini</i>	Myrtaceae	Neradu	--

	Environmental Impact Assessment for the proposed 5 x 800 MW Supercritical coal based Yadadri Thermal Power Station at Veerlapalem village, Damacherla mandal, Nalgonda district, Telangana by M/s Telangana State Power Generation Corporation Limited Chapter-3: Description of the Environment

59	lix.	<i>Tamarindus indica</i>	Caesalpiniaceae	Chinta	--
60	lx.	<i>Tectona grandis</i>	Verbenaceae	Teku	--
61	lxi.	<i>Terminalia arjuna</i>	Combretaceae	Tella maddi	--
62	lxii.	<i>Thespesia populnea</i>	Malvaceae	Ganga Raavi	--
63	lxiii.	<i>Vitex negundo</i>	Verbenaceae	Vaavili	--
64	lxiv.	<i>Ziziphus nummularia</i>	Rhamnaceae	Gotti	--
65	lxv.	<i>Ziziphus rugosa</i>	Rhamnaceae	Regu	--
Herbs / Grasses					
66	i.	<i>Abutilon crispum</i>	Malvaceae	--	--
67	ii.	<i>Acalypha lanceolata</i>	Euphorbiaceae	--	--
68	iii.	<i>Acanthospermum hispidum</i>	Asteraceae	Palleru	--
69	iv.	<i>Achyranthes aspera</i>	Amaranthaceae	Uttareni	--
70	v.	<i>Aerva lanata</i>	Amaranthaceae	Pindidonda	--
71	vi.	<i>Ageratum conyzoides</i>	Asteraceae	Pumpullu	--
72	vii.	<i>Allmania longipedunculata</i>	Amaranthaceae	--	--
73	viii.	<i>Allmania nodiflora</i>	Amaranthaceae	Gurugu koora	--
74	ix.	<i>Alloterospis cimicina</i>	Poaceae	Neeru sajjae hullu	--
75	x.	<i>Alternanthera pungens</i>	Amaranthaceae	Mullu	--
76	xi.	<i>Alternanthera sessilis</i>	Amranthaceae	Ponna Ganti-Kura	LC
77	xii.	<i>Althaea rosea</i>	Malvaceae	--	--
78	xiii.	<i>Alysicarpus monilifer</i>	Fabaceae	--	--
79	xiv.	<i>Amaranthus roxburghianus</i>	Amaranthaceae	--	--
80	xv.	<i>Amaranthus spinosus</i>	Amaranthaceae	Yerra Mullu-Gorinta	--
81	xvi.	<i>Amaranthus viridis</i>	Amaranthaceae	Chilaka-thotakoora	--
82	xvii.	<i>Amisophacelus axillaris</i>	Commelinaceae	Golla gundi, Kodi kalu	--
83	xviii.	<i>Ammannia baccifera</i>	Lythraceae		LC
84	xix.	<i>Argemone Mexicana</i>	Papavaraceae	Balurakkisa, Brahmadandi	--
85	xx.	<i>Bacopa monnieri</i>	Srophulariaceae	Sambranichettu, Chilukakura	LC
86	xxi.	<i>Bergia capensis</i>	Elantinaceae	--	--
87	xxii.	<i>Biophytum nervifolium</i>	Oxalidaceae	Pulicenta	--
88	xxiii.	<i>Bothriochloa pertusa</i>	Poaceae	--	--
89	xxiv.	<i>Brachiaria eruciformis</i>	Poaceae	--	LC
90	xxv.	<i>Brachiaria reptans</i>	Poaceae	--	LC
91	xxvi.	<i>Brachiaria ramosa</i>	Poaceae	Eduruqaddi	LC
92	xxvii.	<i>Bulbostylis barbata</i>	Cyperaceae	--	--
93	xxviii.	<i>Caesulia axillaris</i>	Asteraceae	Erra gobbi, Thella jiluga	LC
94	xxix.	<i>Cassia absus</i>	Caesalpinaceae	Chanupala-vittulu	LC
95	xxx.	<i>Cassia occidentalis</i>	Caesalpinaceae	Benukaku, Kasinta, Kasinda	--
96	xxxi.	<i>Cassia tora</i>	Caesalpinaceae	Tagarisa, Tantepu,	--
97	xxxii.	<i>Catharanthus pusillus</i>	Apocyanaceae	Errimirapa, Guluvidi	--
98	xxxiii.	<i>Celosia argentea</i>	Amaranthaceae	Adavithurai, Gurugu	--
99	xxxiv.	<i>Chamaesyce hirta</i>	Euphorbiaceae	--	--

100	xxxv.	<i>Chamaesyce indica</i>	Euphorbiaceae	--	--
101	xxxvi.	<i>Chamaesyce serpens</i>	Euphorbiaceae	--	--
102	xxxvii.	<i>Chamaesyce thymifolia</i>	Euphorbiaceae	--	--
103	xxxviii.	<i>Chloris barbata</i>	Poaceae	Uppu gaddi	--
104	xxxix.	<i>Chloris Montana</i>	Poaceae	--	--
105	xl.	<i>Chloris villosa</i>	Poaceae	--	--
106	xli.	<i>Chrozophora rottleri</i>	Euphorbiaceae	Erra miriyamu	--
107	xlii.	<i>Cleome aspera</i>	Cleomaceae	--	--
108	xliii.	<i>Cleome gynandra</i>	Cleomaceae	Atakura, Tellavaminta, Vaminta	--
109	xliv.	<i>Cleome viscosa</i>	Cleomaceae	Kukkavaminta, Vaminta	--
110	xliv.	<i>Commelina benghalensis</i>	Commelinaceae	Amruthakeda, Kancherakanteri	LC
111	xlvi.	<i>Corchorus tridens</i>	Tiliaceae	--	--
112	xlvi.	<i>Croton bonplandianus</i>	Euphorbiaceae	Errimirapa, Galivana, Vanachettu	--
113	xlvi.	<i>Cynodon dactylon</i>	Poaceae	Garikagaddi, Gurkaharia!	--
114	xlix.	<i>Cyperus compressus</i>	Cyperaceae	--	LC
115	l.	<i>Cyperus difformis</i>	Cyperaceae	--	LC
116	li.	<i>Cyperus exaltatus</i>	Cyperaceae	--	--
117	lii.	<i>Cyperus iria</i>	Cyperaceae	--	LC
118	liii.	<i>Cyperus rotundus</i>	Cyperaceae	--	LC
119	liv.	<i>Dactyloctenium aegyptium</i>	Poaceae	--	--
120	lv.	<i>Desmodium pulchellum</i>	Fabaceae	Deyyapu mokka	LC
121	lvi.	<i>Digera muricata</i>	Amaranthaceae	Chencheli-kura	--
122	lvii.	<i>Digitaria ciliaris</i>	Poaceae	--	--
123	lviii.	<i>Dinebra retroflexa</i>	Poaceae	--	--
124	lix.	<i>Echinochloa colona</i>	Poaceae	Bonthakammalu, Kaprodagaddi	LC
125	lx.	<i>Echinochloa crusgalli</i>	Poaceae	--	LC
126	lxi.	<i>Echinochloa procer</i>	Poaceae	--	--
127	lxii.	<i>Eclipta alba</i>	Asteraceae	Galagara	DD
128	lxiii.	<i>Enocostemma axillare</i>	Gentianaceae	Golimidi, Gulvidi	--
129	lxiv.	<i>Euphorbia heterophylla</i>	Euphorbiaceae	--	--
130	lxv.	<i>Evolvulus alsinoides</i>	Convolvulaceae	Vishnukrantha	--
131	lxvi.	<i>Fimbristylis bisumbellata</i>	Cyperaceae	--	LC
132	lxvii.	<i>Fimbristylis miliacea</i>	Cyperaceae	--	--
133	lxviii.	<i>Fimbristylis ovata</i>	Cyperaceae	--	LC
134	lxix.	<i>Fimbristylis quinquangularis</i>	Cyperaceae	--	LC
135	lxx.	<i>Fuirena ciliaris</i>	Cyperaceae	--	LC
136	lxxi.	<i>Gomphrena celosioides</i>	Amaranthaceae	Neeru Bogada	--
137	lxxii.	<i>Gomphrena globosa</i>	Amaranthaceae	--	--
138	lxxiii.	<i>Goniogyna hirta</i>	Fabaceae	--	--
139	lxxiv.	<i>Hedyotis puberula</i>	Rubiaceae	Chiruveru	--

140	lxxv.	<i>Heliotropium ovalifolium</i>	Boraginaceae	--	LC
141	lxxvi.	<i>Hibiscus lobatus</i>	Malvaceae	--	--
142	lxxvii.	<i>Indigofera linifolia</i>	Fabaceae	Gudlaku	LC
143	lxxviii.	<i>Indigofera linnaei</i>	Fabaceae	Yerra palleru, Cheragadam	--
144	lxxix.	<i>Indoneesiella echinoids</i>	Acanthaceae	--	--
145	lxxx.	<i>Justicia procumbens</i>	Acanthaceae	--	--
146	lxxxi.	<i>Kyllinga bulbosa</i>	Cyperaceae	--	LC
147	lxxxii.	<i>Lagascea mollis</i>	Asteraceae	--	--
148	lxxxiii.	<i>Leucas aspera</i>	Lamiaceae	Tellathummi, Tummachettu	--
149	lxxxiv.	<i>Limnophyton obtusifolium</i>	Alismataceae	Urrapu dekka chettu	LC
150	lxxxv.	<i>Ludwigia perennis</i> (=L.parviflora)	Onagraceae	Lavanga kaaya	LC
151	lxxxvi.	<i>Malachra capitata</i>	Malvaceae	--	--
152	lxxxvii.	<i>Malvastrum coromandelianum</i>	Malvaceae	--	--
153	lxxxviii.	<i>Melochia corchorifolia</i>	Tiliaceae	Ganugapindikura	--
154	lxxxix.	<i>Monochoria vaginalis</i>	Pontederiaceae	Nirakancha	LC
155	xc.	<i>Oxalis corniculata</i>	Oxalidaceae	Ambotikura, Pulichinta, Pulichenchali	--
156	xc.	<i>Paspalum distichum</i>	Poaceae	--	--
157	xcii.	<i>Pavonia zeylanica</i>	Malvaceae	Peramutti, Karubenda	--
158	xciii.	<i>Phyla nodiflora</i>	Verbenaceae	Bokkenaku, Gajapippalakada,	LC
159	xciv.	<i>Phyllanthus amarus</i>	Euphorbiaceae	Usiri	--
160	xcv.	<i>Phyllanthus maderaspatensis</i>	Euphorbiaceae	Nalla usirika	--
161	xcvi.	<i>Phyllanthus virgatus</i>	Euphorbiaceae	--	--
162	xcvii.	<i>Physalis minima</i>	Solanaceae	Kupanti	--
163	xcviii.	<i>Polygala arvensis</i>	Polygalaceae	--	--
164	xcix.	<i>Portulaca oleracea</i>	Portulacaceae	Pappukura	--
165	c.	<i>Portulaca quadrifida</i>	Portulacaceae	Chinnapavalikura, Goddupavali	--
166	ci.	<i>portulaca tuberosa</i>	Portulacaceae	--	--
167	cii.	<i>Psoralea corylifolia</i>	Fabaceae	--	--
168	ciii.	<i>Schoenoplectus auriculatus</i>	Cyperaceae	--	--
169	civ.	<i>Schoenoplectus lacustris</i>	Cyperaceae	--	LC
170	cv.	<i>Setaria pumila</i>	Poaceae	Gkkakora	--
171	cv.	<i>Sida corifolia</i>	Malvaceae	Suvarnamu, Tellaantisa	--
172	cvii.	<i>Sida rhombifolia</i>	Malvaceae	--	--
173	cviii.	<i>Solanum nigrum</i>	Solanaceae	Kamanchi, Gdiukura, Kamakshi	--
174	cix.	<i>Solanum surattense</i>	Solanaceae	Errivanga, Nelamulaka, Vakudu	--
175	cx.	<i>Sopubia delphinifolia</i>	Scrophulariaceae	--	--
176	cx.	<i>Spermacoce articularis</i>	Rubiaceae	Madanaku, Madana Katti	--
177	cxii.	<i>Spermacoce pusilla</i>	Rubiaceae	Tsukka-kada	--
178	cxiii.	<i>Sphaeranthus indicus</i>	Asteraceae	Boddatarapu	LC

179	CXIV.	<i>Sphenoclea zeylanica</i>	Sphenocleaceae	--	LC
180	CXV.	<i>Stemodia viscosa</i>	Scrophulariaceae	Bodasaramamu, Gunta Kaamin	--
181	CXVI.	<i>Striga angustifolia</i>	Scrophulariaceae	--	--
182	CXVII.	<i>Tephrosia procumbens</i>	Fabaceae	--	--
183	CXVIII.	<i>Tephrosia purpurea</i>	Fabaceae	Bonthavempali, Nelavempali	LC
184	CXIX.	<i>Tephrosia villosa</i> (=T.hirta)	Fabaceae	Nuguvempali	LC
185	CXX.	<i>Tragia plukenetii</i>	Euphorbiaceae	Chinnadulagondi, Dulagondi	--
186	CXXI.	<i>Tragus roxburghii</i>	Poaceae	--	--
187	CXXII.	<i>Trianthema portulacastrum</i>	Aizoaceae	Galieru	--
188	CXXIII.	<i>Trianthema triquetra</i>	Aizoaceae	--	--
189	CXXIV.	<i>Tribulus terrestris</i>	Zygophyllaceae	Palleru	--
190	CXXV.	<i>Trichodesma sedgwickianum</i>	Boraginaceae	--	--
191	CXXVI.	<i>Tridax procumbens</i>	Asteraceae	Gaddichamanthi, Palakaku	--
192	CXXVII.	<i>Urochloa panicoides</i>	Poaceae	--	LC
193	CXXVIII.	<i>Vernonia cinerea</i>	Asteraceae	Sahadevi	--
194	CXXIX.	<i>Vigna trilobata</i> (<i>Phaseolus trilobatus</i>)	Fabaceae	Pillipesalu	--
195	CXXX.	<i>Withania somnifera</i>	Solanaceae	Vajigandha	--
196	CXXXI.	<i>Xanthium strumarium</i>	Asteraceae	Marulutige	--

Shrubs

197	i.	<i>Abutilon indicum</i>	Malvaceae	--	--
198	ii.	<i>Acacia caesia</i>	Mimosaceae	Kirintha	LC
199	iii.	<i>Alhagi camelorum</i>	Fabaceae	Camel thorn	--
200	iv.	<i>Calotropis gigantea</i>	Asclepiadaceae	Tella Jilledu	--
201	v.	<i>Calotropis procera</i>	Asclepiadaceae	Jilledu	--
202	vi.	<i>Carissa spinarum</i>	Apocynaceae	Apocynaceae	--
203	vii.	<i>Cassia auriculata</i>	Caesalpiniaceae	Caesalpiniaceae	--
204	viii.	<i>Hygrophila auriculata</i>	Acanthaceae	Kokilakshi, Neetigobbi, Neetimalli	LC
205	ix.	<i>Indigofera tinctoria</i>	Fabaceae	--	--
206	x.	<i>Lantana camara</i>	Verbenaceae	Lantana	--
207	xi.	<i>Mimosa rubicaulis</i>	Mimosaceae	Pariki kampa	--
208	xii.	<i>Parthenium hysterophorus</i>	Asteraceae	--	--
209	xiii.	<i>Phyllanthus reticulatus</i>	Phyllanthaceae	Pulasari / Puliseru	--
210	xiv.	<i>Sida acuta</i>	Malvaceae	Chittemu, Nelabenda	--
211	xv.	<i>Triumfetta rhomboidea</i>	Tiliaceae	Oekki. Chirusitrika	--
212	xvi.	<i>Triumfetta rotundifolia</i>	Tiliaceae	--	--
213	xvii.	<i>Waltheria indica</i>	Tiliaceae	Nallabenda	--

Climbers

214	i	<i>Aristolochia bracteolata</i>	Aristolochiaceae	Gadidagadapaku, Gadaparaku	--
215	ii	<i>Cardiospermum halicacabum</i>	Sapindaceae	Buddakakara, Budduva	--

LC: Least Concern, VU: Vulnerable, EN: Endangered, DD: Data Dificient

	Environmental Impact Assessment for the proposed 5 x 800 MW Supercritical coal based Yadadri Thermal Power Station at Veerlapalem village, Damarcherla mandal, Nalgonda district, Telangana by M/s Telangana State Power Generation Corporation Limited Chapter-3: Description of the Environment

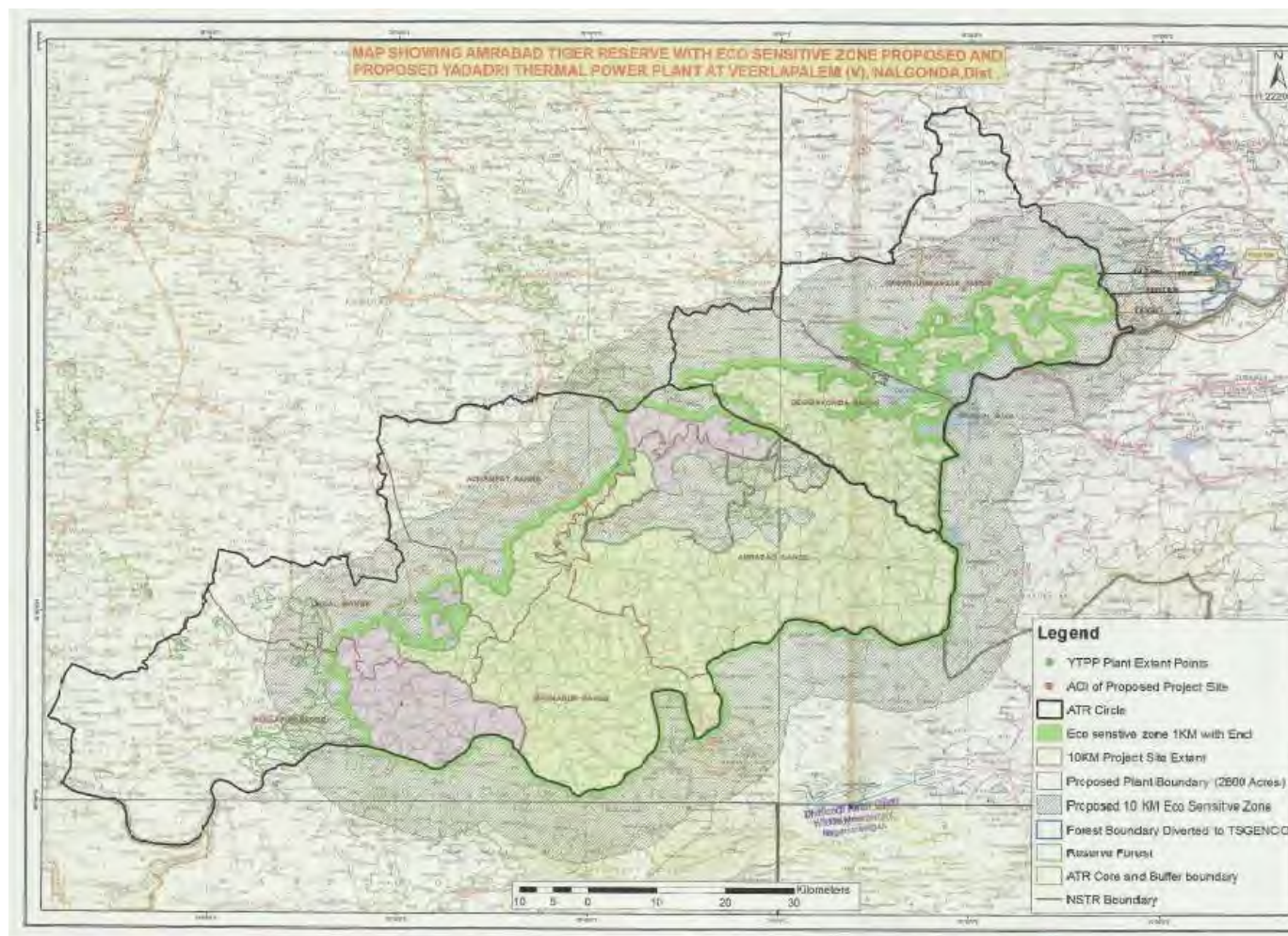


Figure 3.20: Wildlife Boundary Map

Fauna

Overall 54 faunal species have been reported from the buffer zone which includes 25 species of birds, 10 species of mammals and 19 species of herpetofauna. Details are given in the following **Table 3.37**.

Table 3.38: Fauna Reported from Buffer zone of the Project Area

S. No.		Common name	Latin name	Vernacular name	IUCN /IWPA-1972, Schedule
Avifauna / Birds					
1.	i.	<i>Phalacrocorax niger</i>	Little Cormorant	Cheruvukkai	LC/Schedule-IV
2.	ii.	<i>Corvus splendens</i>	Common Crow	Kaaki	LC/Schedule-V
3.	iii.	<i>Corvus macrohyuchos</i>	Jungle Crow	Advikaki	Schedule-IV
4.	iv.	<i>Centrpus sinesis</i>	Crow pheasant	Mohka	LC/Schedule-IV
5.	v.	<i>Cuculus varus</i>	Cuckoo	Kokila	LC/Schedule-IV
6.	vi.	<i>Streptopelia decactao</i>	Ring Dove	Kapothamu	LC/Schedule-IV
7.	vii.	<i>Bubulcus ibis</i>	Cattle Egret	Egret	LC/Schedule-IV
8.	viii.	<i>Egretta garetta</i>	Little Egret	Karchi Eagle	LC/Schedule-IV
9.	ix.	<i>Pseudibis papillosa</i>	Black Ibis	Kala Baz	LC/Schedule-IV
10.	x.	<i>Eudynamys scolopaceus</i>	Koel	Kokila	LC/Schedule-IV
11.	xi.	<i>Lonchura striata</i>	Spotted Munia	Tetai Munia	LC/Schedule-IV
12.	xii.	<i>Lonchura malabarica</i>	White-Throated Munia	Sar munia	LC/Schedule-IV
13.	xiii.	<i>Sturnus pagodarum</i>	Black-headed Myna	Goruvanka	LC/Schedule-IV
14.	xiv.	<i>Acridotheres tristis</i>	Common Myna	Saada goruvanka	LC/Schedule-IV
15.	xv.	<i>Galuciddum radiatum</i>	Owlet Barred Jungle	Adavi gudlaguba	LC/Schedule-IV
16.	xvi.	<i>Athene brama</i>	Spotted Owl	Gudlaguba	LC/Schedule-IV
17.	xvii.	<i>Psittacula eupatria</i>	Large Indian Parakeet	Chiluka	NT/Schedule-IV
18.	xviii.	<i>Francolinus pondicerianus</i>	Grey Partridge	Chakoram or Kouju	LC/Schedule-IV
19.	xix.	<i>Columbia livia</i>	Blue Rock Pigeon	Kabuther	LC/Schedule-IV
20.	xx.	<i>Treron phoenicoptera</i>	Green Pigeon	Pavuramu	LC/Schedule-IV
21.	xxi.	<i>Saxicoloides fulcata</i>	Indian Robin	Kalchuri	LC/Schedule-IV
22.	xxii.	<i>Apus affinis</i>	House Swift	Babila	LC/Schedule-IV
23.	xxiii.	<i>Hirando rustica</i>	Common Swallow	Babil or Vanakovela	LC/Schedule-IV
24.	xxiv.	<i>Amauornis phoenicurus</i>	Water hen	Neeti kodi	LC/Schedule-IV
25.	xxv.	<i>Ploceus philippinus</i>	Common Weaver Bird	Baya	LC/Schedule-IV
Mammals					
26.	i.	<i>Macaca mulatta</i>	Monkey	Kothi	LC/Schedule-II
27.	ii.	<i>Funambulus pennantii</i>	Three striped squirrel	Ground squirrel	LC/Schedule-IV
28.	iii.	<i>Herpestes edwardsii</i>	Common Mongoose	Mungisa	LC/Schedule-II
29.	iv.	<i>Bandicota indica</i>	Greater Bandicoot	Pandikokku	LC

30.	v.	<i>Mus musculus</i>	House rat	Yeluka	Schedule-V
31.	vi.	<i>Mus booduga</i>	Indian field rat	Yeluka	LC/Schedule-V
32.	vii.	<i>Pteropus giganteus</i>	Indian flying fox	Gabbilam	LC/ Schedule-V
33.	viii.	<i>Lepus nigricollis</i>	Indian hare	Kundelu	LC/Schedule-IV
34.	ix.	<i>Bandicota bengalensis</i>	Lesser Bandicoot	Pandikokku	LC
35.	x.	<i>Sus scrofa</i>	Wild boar	Adivi pandi	LC/ Schedule-III
Herpetofauna					
36.	i.	<i>Eryx johani</i>	Sand boa	Rendu pamu	Schedule-IV
37.	ii.	<i>Bungarus caeruleus</i>	Krait	Katla pamu	Schedule-IV
38.	iii.	<i>Vipera russelli</i>	Russell's viper	Raktha pinjari	Schedule-IV
39.	iv.	<i>Echis carinatus</i>	Saw scaled viper	--	Schedule-IV
40.	v.	<i>Ptyas mucosus</i>	Rat snake	Jerripothu	Schedule-II
41.	vi.	<i>Dryophis sp.</i>	Tree Snake	Chettu pamu	LC/Schedule-IV
42.	vii.	<i>Typhlops brahminus</i>	Blind Snake	Guddi pamu	Schedule-IV
43.	viii.	<i>Varanus bengalensis</i>	Monitor lizard	Udumu	LC/Schedule-I
44.	ix.	<i>Chamaeleo zeylanicus</i>	Chameleon	Usaravilli	LC/Schedule-IV
45.	x.	<i>Calodactylodes aureus</i>	Golden Gecko	Nallikeechu	Schedule-IV
46.	xi.	<i>Hemidactylus flaviviridis</i>	Wall lizard	Balli	Schedule-IV
47.	xii.	<i>Calotes versicolor</i>	Garden lizard	Tonda	Schedule-IV
48.	xiii.	<i>Trionyx sp.</i>	Fresh water turtle	Neetitabelu	VU/Schedule-I
49.	xiv.	<i>Testudo elegans</i>	Indian star tortoise	Mettatabelu	LRlc/Schedule-IV
50.	xv.	<i>Rana hexadactyla</i>	Ordinary frog	Kappa	Schedule-IV
51.	xvi.	<i>Bufo melanostictus</i>	South Indian Toad	Godrukuppa	LC/Schedule-IV
52.	xvii.	<i>Hyla arborea</i>	Tree Frog	Chettu kappa	LC/Schedule-IV
53.	xviii.	<i>Cacopus bystema</i>	Burrowing frog	Burada kappa	Schedule-IV
54.	xix.	<i>Rana tigrina</i>	Tiger Frog	Kappa	LC/Schedule-IV

LC: Least Concern, NT: Near Threatened, VU: Vulnerable, LRlc: Lower Risk/least concern

Aquatic Biodiversity Status

Since buffer zone encompasses Krishna River and other small water bodies, study area supports 31 species of plants and 22 species of fishes.

Table 3.39: Aquatic Plants Reported from Buffer zone of the Project Area

S. No.	Scientific Name	Family	Distribution Status	IUCN Status
1	<i>Alternanthera philoxeroides</i>	Solanaceae	Predominant	--
2	<i>Aponogeton natans</i>	Aponogetonaceae	Common	LC
3	<i>Azolla pinnata</i>	Azollaceae	Scattered and common	LC
4	<i>Brachiaria mutica</i>	Poaceae	Sporadic	LC

5	<i>Carex cruciata</i>	Cyperaceae	Occasional	--
6	<i>Centella asiatica</i>	Apiaceae	In localized patches	LC
7	<i>Chrysopogon aciculatus</i>	Poaceae	Occasional	--
8	<i>Colocasia esculenta</i>	Araceae	Occasional	LC
9	<i>Cynodon dactylon</i>	Poaceae	Extensive and widespread	--
10	<i>Cyperus arenarius</i>	Cyperaceae	Locally abundant	LC
11	<i>Cyperus exaltatus</i>	Cyperaceae	Locally abundant	--
12	<i>Echinochloa colona</i>	Poaceae	Occasional	LC
13	<i>Echinochloa stagnina</i>	Poaceae	Occasional	LC
14	<i>Eichhornia crassipes</i>	Pontederiaceae	Extensive and widespread	--
15	<i>Hydrilla verticillata</i>	Hydrocharitaceae	Prevalent	LC
16	<i>Ipomoea aquatica</i>	Convolvulaceae	Extensive and widespread	LC
17	<i>Ludwigia perennis</i>	Onagraceae	Occasional	LC
18	<i>Marsilea quadrifolia</i>	Marsiliaceae	Very common Pteridophyte	LC
19	<i>Nelumbo nucifera</i>	Nelumbiaceae	Very common	--
20	<i>Nymphaea nouchali</i>	Nymphaeaceae	Widely scattered	LC
21	<i>Nymphoides hydrophylla</i>	Nymphaeaceae	Scattered	LC
22	<i>Nymphoides indica</i>	Nymphaeaceae	Scattered	LC
23	<i>Ottelia alismoides</i>	Hydrocharitaceae	Widely scattered	LC
24	<i>Oxalis corniculata</i>	Oxalidaceae	Occasional	--
25	<i>Paspalidium geminatum</i>	Poaceae	Common	LC
26	<i>Phragmites karka</i>	Cyperaceae	Dominant along boundaries	LC
27	<i>Pistia stratiotes</i>	Araceae	Widespread	LC
28	<i>Salvinia auriculata</i>	Salviniaceae	Widespread	--
29	<i>Salvinia cucullata</i>	Salviniaceae	Common	LC
30	<i>Typha angustata</i>	Typhaceae	Extensive and widespread	LC
31	<i>Vallisneria spiralis</i>	Hydrocharitaceae	Widespread	LC

LC: Least Concern

Table 3.40: Fishes Reported from Buffer zone of the Project Area

S. No.	Common name	Scientific Name	IUCN Status
1	Catla	<i>Catla catla</i>	Least Concern
2	Rohu	<i>Labeo rohita</i>	Least Concern
3	Murrel	<i>Channa striata</i>	Least Concern
4	Murrel	<i>Channa punctata</i>	Least Concern
5	Wallago	<i>Wallago attu</i>	Near Threatened
6	Spiny eel	<i>Mastacembelus armatus</i>	Least Concern
7	Prawn	<i>Macrobrachium rosenberghii</i>	Least Concern
8	Prawn	<i>Macrobrachium malcolmsonii</i>	Least Concern

9	Silonia	<i>Silonia silondia</i>	Least Concern
10	Pearl spot	<i>Eetroplus suratensis</i>	Least Concern
11	Gobids	<i>Glossogobius giuris</i>	Least Concern
12	Gobids	<i>Platycephalus indicus</i>	Data Deficient
13	Mrigal	<i>Cirrhinus mrigala</i>	Least Concern
14	Tilapia	<i>Oreochromis mossambicus</i>	Near Threatened
15	Eel	<i>Anguilla bengalensis</i>	Near Threatened
16	Cat fish	<i>Mystus vittatus</i>	Least Concern
17	Cat fish	<i>Heteropneustes fossilis</i>	Least Concern

Status of Threatened and Endemic Biodiversity

Among flora, no species can be designated as a threatened / endemic to the study area. Also, in reported faunal species, all birds fall under schedule-IV category. In mammals, two species are Schedule-II, two species are in Schedule-IV and two are Schedule-V category. Among herpetofauna, two species i.e. *Trionyx sp* *Veranus monitor* and *Trionyx sp.* falls under Schedule-I category, one snake species is Schedule-II and 11 species under Schedule-IV.

3.11 Demography and Socio-Economics

The growth of industrial sectors and infrastructure developments in villages and towns are bound to create its impact on the socio-economic aspects of the local population. The impacts may be positive or negative depending upon the developmental activities. To assess the impacts on the local people, it is necessary to study the existing socio-economic status of the local population, which will be helpful for making efforts to further improve the quality of life in the study area.

3.11.1 Methodology adopted for the Study

For the study of 10 km radial map, the map was divided in 3 zones. First zone was 0-2 km, second zone 2-5 km and third zone 5-10 km. For the census study and existing study mainly 2 types of data were used for the preparation of socio-economic report.

- Primary data collection
- Secondary data collection

Primary data collection

For the primary data collection, structured questionnaires will be used by survey team. There were three types of formats has been prepared for the survey purpose, these were Household survey format, Focus group discussion format and village leader format. All these formats will include all type of village information like demographic details, infrastructure details etc. For household survey, surveyor will visit to household's house. For focus group discussion male, female group were

interviewed in open spaces like community hall, school ground, temple, panchayat hall etc.

For the selection of respondents random sampling will be used by surveyor. Direct observation during transit walk in villages, telephonic calls to peruse information is also comes under the primary data collection, these methods also a part of primary data collection.

For survey purpose, selection of villages was performed in 10 km radial study map by distribution in 16 directions (compass). Proportionate and purposive sampling methods were used for selecting respondents (male and female) for household survey. For official information of village, Sarpanch/ Gram panchayat members have been chosen. Structured questionnaire were used for survey. For group discussion, panchayat bhavan, Aanganwadi Bhavan, community halls were used by surveyor. Total 04 villages were selected and surveyed from the study area which is 25% of total 26 villages.

Secondary data collection

For secondary data collection, external sources collected through survey team. From various govt. departments secondary procured. Secondary data list is given below:

- Census of India 2011
- Census of India 2001
- District census handbook 2011

Socio-economic baseline report will be based on these parameters.

- Administrative set up
- Population details
- Population density
- Population comparison
- Literacy details
- Employment pattern details
- Infrastructure details
- Landuse pattern details
- Survey observations
- Awareness and opinion of the respondent
- Quality of life

3.11.2 Administrative Set-up of the Study Area

There are 26 villages surrounding the project area in a radius of 10 km. The 10 km radial study map covers total 1 mandals/tehsils from Nalgonda and Guntur district. From Nalgonda district total 6 Mandals covers 21 villages and from Guntur district total 3 Mandal comprises 5 villages. Details of districts and Mandals are presented in **Table 3.40**.

Table 3.41: Administrative Setup

Sr. No	District	Tehsils/ Mandals	0-2 km	2-5 km	5-10 km	Total

1	Nalgonda	Dameracherla	3	4	4	11
2	Nalgonda	Miryalaguda	1	0	0	1
3	Nalgonda	Mella Cheruvu	1	0	0	1
4	Nalgonda	Neredcherla	0	1	1	2
5	Guntur	Gurazala	0	3	0	3
6	Nalgonda	Thripuraram	0	0	5	5
7	Nalgonda	Nakrekal	0	0	1	1
8	Guntur	Rentachintala	0	0	1	1
9	Guntur	Dachepalle	0	0	1	1
Total			5	8	13	26

Source: Primary census abstract 2011, Nalgonda & Guntur district, Andhra Pradesh

The 10 km radial study map covers total 1 mandals/tehsils from Nalgonda and Guntur district. From Nalgonda district total 6 Mandals covers 21 villages and from Guntur district total 3 Mandal comprises 5 villages. Details of districts and Mandals are presented in **Table 3.41**.

- Population Size**

Table 3.42: Village Population Size

Population Size	0-2 km	2-5 km	5-10 km
100-199	0	0	0
200-499	0	0	1
500-999	0	0	1
1000-1999	1	3	2
2000-4999	2	5	3
5000-7999	1	0	4
8000 above	1	0	2
Total	5	8	13

Source: Primary census abstract 2011, Nalgonda & Guntur district, Andhra Pradesh

From the above table it depicts that 38.46% of villages were having population size in between 2000-4999. 23.07% village population were in the range of 1000-1999. Details are given in **Table 3.42**.



Environmental Impact Assessment for the proposed 5 x 800 MW Supercritical coal based Yadadri Thermal Power Station at Veerlapalem village, Damarcherla mandal, Nalgonda district, Telangana by M/s Telangana State Power Generation Corporation Limited

Chapter-3: Description of the Environment

Table 3.43: Population Details

Zone in km	No_ HH	TOT_P	TOT_M	TOT_F	P_06	P_SC	M_SC	F_SC	P_ST	M_ST	F_ST
0-2 km	6339	24047	12228	11819	2752	2247	1137	1110	7958	4079	3879
2-5	4810	18671	9346	9325	2162	2623	1302	1321	4156	2114	2042
5-10	14665	57224	29059	28165	6570	6479	3246	3233	22683	11699	10984
0-10 km	25,814	99,942	50,633	49,309	11,484	11,349	5,685	5,664	34,797	17,892	16,905

Source: Primary census abstract 2011, Nalgonda & Guntur district, Andhra Pradesh

Note: No_ HH: Number of household, TOT_P: Total population, TOT_M: Total Male, TOT_F: Total Female, P_06: Population Under 0-6, M_06: Male under 0-6, F_06: Female Under 0-6, P_SC: Population SC, P_ST: Population ST



The details of population and cast wise population details in 10 km radial map are presented in **Table 3.42**.

- Total households were 25,814, with an average family size of 4 persons
- Total population in the study area was 99,942
- Out of total population, male population was 50,633 and female population was 49,309
- 0-6 child population was 11,484(11.57%)
- Out of total 0-6 child population, male child population was 6,061 and female child population was 4,423
- Total SC population was 11,349(11%) and total ST population was 34,797 (35%).

SEX RATIO

The sex ratio is the ratio of males to females in a population. Average sex ratio was 974 female to 1000 male and in 0-6 child sex ratio was 895 children female. In SC and ST sex ratio was 996 and 945 respectively.

POPULATION DENSITY

Population density is the number of people per sq. km of area. Total geographical area of 26 villages was 460.33 sq. km. According to census 2011 population, average population density in the study area was 217 people to per sq. km area. Village wise population density is presented in **Table 3.43**.

Table 3.44: Population Density in Year 2011

Village Name	Total Geographical Area in sq. km	Population density
Veerla Palem	25.26	167
Narsapur	7.74	212
Thalla Veerappa Gudem	5.72	415
Thunga Pahad	24.69	272
Donda Padu	28.64	317
Irkigudem	7.76	186
Ulshayapalem	12.61	123
Mudimanikam	18.89	71
Kalle Palle	18.94	113
Bothalapalem	10.2	221
Gottimukkala	23.99	117
Daida	27.94	145
Telukutla	9.81	311
Kondrapolu	19.86	257
Vadapalle	29.65	273



Village Name	Total Geographical Area in sq. km	Population density
Dilawarpur	16.79	316
Dameracherla	46.49	273
Ragadapa	19.95	287
Matur	11.87	462
Anjana Palle	19.52	221
Annaram	7.71	119
Borrai Palem	12	300
Sunya Pahad	6.62	255
Tettekunta	1.23	170
Mittagudipadu	12.72	137
Pondugula	33.73	67

Source: Primary census abstract and DCHB 2011, Andhra Pradesh

Comparative population details in census 2001 & 2011

From below given **Table 3.44**, comparatively population details of all villages is indicates that average growth of population in one decade was 7,271. Out of 26 villages, total 21 village population increased during 10 years.

Table 3.45: Population Details in Census 2001 & 2011

Village	2001- Population	2011- Population	Increased	Decreased
Veerla Palem	3824	4220	396	-
Narsapur	1475	1643	168	-
Thalla veerappa gudem	2325	2372	47	-
Thunga pahad	6134	6719	585	-
Donda padu	8571	9093	522	-
Irkigudem	1360	1446	86	-
Ulshayapalem	1415	1555	140	-
Mudimanikam	1404	1345	-	-59
Kalle palle	1715	2150	435	-
Bothalapalem	2169	2254	85	-
Gottimukkala	3034	2811	-	-223
Daida	2839	4062	1223	-
Telukutla	2505	3048	543	-
Kondrapolu	4841	5115	274	-
Vadapalle	7062	8108	1046	-
Dilawarpur	5240	5314	74	-
Dameracherla	11049	12710	1661	-
Ragadapa	5429	5725	296	-
Matur	5060	5481	421	-
Anjana palle	5030	4324	-	-706
Annaram	983	920	-	-63
Borrai palem	3514	3607	93	-
Sunya pahad	1420	1690	270	-

Tettekunta	208	209	1	-
Mittagudipadu	1691	1746	55	
Pondugula	2374	2275	-	-99

Source: Primary census abstract 2001 & 2011, district Nalgonda & Guntur, Andhra Pradesh

- Literacy Details**

Table 3.46: Literacy Details

Zone in km	Total Literate	Male Literate	Female Literate	Total Illiterate	Male Illiterate	Female Illiterate
0-2 km	12,704	7,688	5,016	11,343	4,540	6,803
2-5 km	8,661	5,304	3,357	10,010	4,042	5,968
5-10	29,702	18,087	11,615	27,522	10,972	16,550
0-10 km	51,067	31,079	19,988	48,875	19,554	29,321

Source: Primary census abstract 2011, Nalgonda & Guntur district, Andhra Pradesh

As per census 2011, Nalgonda district literacy rate was 57.35% and Guntur district literacy rate was 60.56%. In the study area average literacy rate was 51%. Literacy details are presented in **Table 3.45**.

- Total literate population was 51,607 (51%) and total illiterate population was 48,875 (49%)
- Total male literates were 31,079 (61%) and female literates were 19,988 (39%) Total male illiterates were 19,554 (40%) and female illiterates were 29,321 (60%)

Employment Pattern

The identification of the current economic characteristics of the study area is also an important part of defining the employment pattern of the study area. There are different types of employment pattern that may be classified as:

- Those persons who had worked for at least six months or 183 days are treated as main workers
- on the other hand if persons categorized as workers participated in any economic or productive activity for less than six months or 183 days during the last one year are treated as marginal workers
- Non- workers are those who have not worked any time at all in the year. In main worker employment pattern there were classifications of main workers

Details of employment pattern, is presented in **Table 3.46**.

Table 3.47: Employment Pattern

Zone in km	Total Workers	Male Workers	Female Workers	Main Workers	Marginal workers	Non Workers
0-2 km	12719	6782	5937	11535	1184	11328
2-5 km	11134	5545	5589	9861	1273	7537
5-10	30098	16184	13914	25212	4886	27126
0-10 km	53,951	28,511	25,440	46,608	7,343	45,991

Source: Primary census abstract 2011, Nalgonda & Guntur district, Andhra Pradesh

- Out of total population, 53,951 (54%) population were comes under working population
- Total male workers were 28,511(53%) and female workers were 25,440(47%)
- Total main worker population was 46,608(47%) and marginal workers population was 7343(7%)
- Non-working population was 45,991(46%)

Table 3.48: Main Worker Employment Pattern

Zone in km	Cultivator workers	Agricultural workers	Household industry workers	Other workers
0-2 km	2712	6658	89	2076
2-5 km	3036	6045	55	725
5-10	5795	13675	255	5487
0-10 km	11,543	26,378	399	8,288

Source: Primary census abstract 2011, Nalgonda & Guntur district, Andhra Pradesh

There were 4 types of category in main worker population; these are cultivators, agricultural workers, household industry workers and other workers. Details of main worker employment pattern, is given in **Table 3.47**.

- Out of total main workers, cultivator population was 11,543(25%) and main agricultural workers were 26,378 (56%)
- Household industry workers were 399(1%) and other workers were 8,288(18%)

Above given data indicates that 81% population engaged in cultivation and agriculture related activities.

	Environmental Impact Assessment for the proposed 5 x 800 MW Supercritical coal based Yadadri Thermal Power Station at Veerlapalem village, Damarcherla mandal, Nalgonda district, Telangana by M/s Telangana State Power Generation Corporation Limited Chapter-3: Description of the Environment

Infrastructure facilities

Over 70% of the Indian population is living in rural areas, with a dependency on agriculture. In present days most of the villages are facing lack of infrastructure facilities. Safe water, sanitation, health facilities are major concern in the villages. To know the infrastructure facilities in the study area, DCHB 2011 details were used. Details of infrastructure facilities are shown below.



Table 3. 49: Education facilities

Zone in km	Private Pre - Primary School (Nursery/LKG/UKG) (Numbers)	Govt. Primary School (Numbers)	Private Primary School (Numbers)	Govt. Middle School (Numbers)	Private Middle School (Numbers)	Govt. Secondary School (Numbers)	Private Secondary School (Numbers)
0-2	5	17	9	6	3	3	3
2-5	1	11	2	6	1	2	0
5-10	3	47	11	16	5	8	4
0-10 km	9	75	22	28	9	13	7

Source: DCHB, district Nalgonda & Guntur, Andhra Pradesh

Table 3. 50: Medical facilities

Zone in km	Primary Health Centre (Number s)	Primary Health Sub Centre (Numbers)	Veterinary Hospital (Numbers)	Mobile Health Clinic (Numbers)	Non -Government Medical facilities Traditional Practitioner and Faith Healer (Numbers)	Non - Governme nt Medical facilities Medicine Shop (Numbers)
0-2	0	3	2	1	0	2
2-5	0	6	2	0	0	2
5-10	1	12	5	1	1	6
0-10	1	21	9	2	1	10

Source: DCHB, district Nalgonda & Guntur, Andhra Pradesh



Table 3.51: Drinking water facilities

Zone in km	Tap Water-Treated (In villages)	Tap Water Untreated(In villages)	Covered Well (In villages)	Uncovered Well (In villages)	Hand Pump (In villages)	Tube Wells/Borehole (In villages)	Spring (Status A(In villages)	River/Canal (In villages)	Tank/Pond/Lake (In villages)	Others(In villages)
0-2	3	4	3	2	5	5	0	4	3	1
2-5	2	6	4	4	7	4	1	2	2	4
5-10	10	5	6	8	13	6	4	6	6	0
0-10	15	15	13	14	25	15	5	12	11	5

Source: DCHB, district Nalgonda & Guntur, Andhra Pradesh

Table 3.52: Communication Facilities

Zone in km	Post Office (Total)	Sub Post Office (Total)	Telephone (landlines) (Total)	Public Call Office /Mobile (Total)
0-2 km	0	4	5	3
2-5 km	0	4	7	1
5-10 km	1	12	10	7
0-10 km	1	20	22	11

Source: DCHB, district Nalgonda & Guntur, Andhra Pradesh



Table 3.53: Transportation facilities

Zone in km	Public Bus Service (number of villages)	Private Bus Service (number of villages)	Railway Station (number of villages)	Auto/Modified Autos (number of villages)	Taxi (number of villages)	Vans (number of villages)	Tractors
0-2 km	3	0	0	5	0	0	4
2-5 km	8	0	0	8	0	0	5
5-10 km	10	5	4	12	1	1	10
0-10 km	21	5	4	25	1	1	19

Source: DCHB, district Nalgonda & Guntur, Andhra Pradesh



- **Road facilities:** Almost all villages availing road connectivity in the form of black topped pucca road, gravel kachha road. All villages connected with all-weather road facility.
- **Market:** Out of 26 villages, only two villages availing regular market facilities and weekly market was in three villages.
- **Nutritional Centres - Anganwadi Centre:** Out of 26 villages, 25 villages availing nutritional centres in the village.
- **Accredited social health activist:** Total 25 villages availing ASHA worker facility in village.
- **Recreation facility:** All 26 villages had access to news paper facility, 3 villages availing public reading room facility. 7 villages availing sports field in the village.
- **Banking facility:** Out of 26 villages, only 4 villages were availed banking facility in the form of commercial and cooperative banks. No village availing ATM facility. 03 agricultural credit societies were exist in the study area
- **Power/electricity:** All 26 villages were connected with power facility. Almost all villages were using power for agriculture purpose.

Salient Observation in the Study Area

- **House pattern:** It is notable that nearly 50% of the house type were semi-pakka and 20% houses were observed in pakka structure and 30% houses were in kaccha form in **Employment:** Main occupation in the study area was agriculture and its allied activities. The agricultural labours were getting daily wage in the range of 100-150 Rs, depending on type of work they set.
- **Main crops:** The principal crops grown in agricultural farm were paddy, cotton, chili etc. Average crop productivity of paddy was 15-20 quintal per acre, cotton 10-15 quintal and chili 20-30 quintal per acre. Agricultural activities provide a major contribution to village economy. 50% farmers had access to irrigation facility for agriculture purpose
- **Language:** Official language as well as mother tongue of the villagers was Telugu. During survey it was observed very few respondents know/understand Hindi language.
- **Migration from other states:** During survey it was found that local population were migrating for employment purpose only in district place, they prefer only local employment.
- **Sanitation:** Toilet facility is one of the most basic facilities required in a house. The findings of the survey showed that more than 60% of the households were not having toilet facilities in their houses. Open defecation was in practice in most of the villages. There was no proper drainage line



in the villages, open and kachha drainage which was not working properly seen in most of the villages. The overall position of cleanliness was not satisfactory



- **Drinking water Facilities:** During the survey it was observed diverse sources of drinking water supply in villages. Major source of drinking water in the study area were ground water (hand pumps, bore well). During discussion it was revealed that in summer season water shortage occurred in most of the villages
- **Education facilities:** Most of the villages had education facilities in the form of anganwadi and primary schools. Higher education facilities were available in the range of 10-15 km. Colleges and other diploma courses were available at Nalgonda or Guntur city. Most of the students prefer Hyderabad city for higher studies
- **Transportation facility:** For transportation purpose auto, private bus services were available in the study area; transportation facilities were not frequently. Private motor cycles were mostly used by villagers for transportation purpose
- **Road connectivity:** Most of the roads were pucca and connecting fair enough to villages. SH 2 passes in the study area and connecting Andhra Pradesh.
- **Communication facilities:** For communication purpose mainly mobile phones, news- papers & post offices were used by villagers
- **Medical facilities:** There were few healthcare facilities available in the study area. In some of the villages primary health sub centres were available. Hospitals and other better medical facilities were available in the range of 10-20 km at town/city place. Damacherla PHC was serving medical facilities to more than 7,000 population by 13 sub centres with ambulance facility.
- **Fuel:** The primary sources of cooking fuel were wood chips & cow dung cake
- **Electricity:** All villages were availing electricity facility for domestic use. Most of the farmers were using electricity for irrigation purpose
- **Market facility:** Study area was predominantly rural. Weekly market facility was available in some villages.
- **Recreation facilities:** Main recreation centres in the villages were Temples, community halls and televisions.



Table 3.54: List of Surveyed Villages

Sr. No	Name of the village/town	Type
1.	Veerla Palem	Veerla Palem
2.	Thalla Veerappa Gudem	Thalla Veerappa Gudem
3.	Pondugula	Pondugula
4.	Dameracherla	Dameracherla



4.0 ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

4.1 Preamble

This chapter presents identification and appraisal of various impacts from the proposed 5x800 MW Supercritical Coal fired Yadadri Thermal Power Station at Veerlapalem village, Damarcherla mandal, Nalgonda district in Telangana.

Relevant important aspects of environment are selected which will be having impacts due to project activities. Environmental parameters are broadly classified into three groups:

1. Physical Environment
2. Biological Environment
3. Human Environment

The parameters selected for impact identification are site and project specific.

Physiography Hydrology Water quality Air quality: Noise and Odour Soil quality Solid waste generation	Physical Environment
Forest & Vegetation Fauna Aquatic Biology Agriculture	Biological Environment
Occupation Displacement Health Services Immigration	Human Environment

Final assessment of impacts is done taking account of the operational phase and all pollution control measures to be implemented during project work. Some of the impacts are temporary & localized and some impacts have permanent effect. Thus the impacts are marked as T for temporary & P for permanent in the matrix.

The environmental impacts are categorized as primary or secondary. Primary impacts are those, which are attributed directly to the project and secondary impacts are those, which are indirectly induced and typically include the associated investment and changed pattern of social and economic activities by the proposed action.

The impacts have been assessed for the power plant assuming that the pollution due to the existing activities has already been covered under baseline environmental monitoring and continue to remain same till the operation of the proposed project.

The construction and operational phase of the proposed project comprises various activities each of which may have an impact on some or other environmental

parameters. Various impacts during the construction and operation phase on the environment have been studied to estimate the impacts on the environmental attributes and are discussed in the subsequent sections:

- Impacts during Construction Phase; and
- Impacts during Operational Phase.

4.2 Impacts during Construction Phase

During the construction period, the impact on environment will be of temporary in nature, localized and short term with changes in the surrounding land use as compared to the current conditions. The potential impacts on water environment will arise due to discharge of washing of construction materials stockpiled, washing of concrete batching plant and discharge of untreated sewage of construction laborers. Similarly, potential impact on air environment will arise due to emission of fugitive dusts and vehicular emissions at the construction site. Mitigation measures will be required to minimize the adverse impacts on the surrounding environment. The beneficial impacts during construction period will however be on the local people due to job prospectus and opportunities for local traders, suppliers and service providers. The impact during construction phase has been shown subsequently in the impact matrix. The following activities among others are likely to contribute towards impact on the surrounding environment during the construction phase:

- Site clearance including removal of bushes, boulders and obstruction to construction;
- Levelling of ground, digging of foundation, piling etc;
- Construction of roads, boundary walls, buildings, etc;
- Erection of structures, plants and machinery;
- Construction of storage areas;
- Laying ducts, pipelines etc;
- Auxiliary and service centres; and
- Transportation of raw materials to the site for construction

The environmental matrix points out each activity and its impact on specific environmental parameters. Environmental Impact Matrix for the construction phase is shown in **Table 4.54**.

Table 4.55: Environment Impact Matrix For Construction Phase

Environment Parameters Activities	Topography	Land-Use	Water Quality	Hydrology	Air Quality	Noise & Odour	Flora & Fauna	Soil	Employment	Housing	Health/ Education
Civil Construction Works	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Material Storage & Handling					✓	✓		✓	✓		✓
Water Supply				✓							
Mechanical & Electrical Erection					✓	✓			✓		✓
Transport					✓	✓			✓		✓
Accommodation of Labour		✓	✓							✓	✓

4.2.1 Impact on Topography and Land-use

The site selected for the project and its surroundings study area are not much developed in terms of built-up properties. The project site is an undulating land. Prior to construction, land will be developed through leveling and grading.

Total 2800 Acres land is required for proposed 5x800 MW Yadadri Thermal Power Station, Including 100 Acres for Colony. (Forest land is Ac. 2095.28 Gts, Patta Land, Government Land, Udfa patta Land and D-Patta Land etc is Ac. 704.12 Gts).

A stream (Tungapadu vagu) is passing through the project site and ultimately meets Krishna river in the south of the project area. The stream has little water for 8 to 9 months in an year. The stream will be strengthened in consultation with the Irrigation Department, Government of Telangana. The stream will not be diverted under any circumstances.

The project area is having certain hillocks, certain amount of cutting and filling will be required. Land grading will be done for erecting the proposed plant units.

The muck generated during excavation and construction phase will be used in plant area for grading purpose, back filling of the foundations, filling of the low laying areas and green belt development etc.,



The construction activities usually attracts a sizeable population and influx of population is likely to be associated with construction of temporary hutments for construction work force, having an effect on land use pattern of the areas surrounding the project. However, this impact is envisaged to be insignificant due to the following reasons:

- Most of the labor will be locally sourced, therefore less negative impact on resources.
- Temporary labour colonies shall be situated in the with in the project boundary.
- It will be only a temporary change (restricted to construction period). After construction phase, the areas acquired by labour colonies shall be reverted back as per the requirement of the plant/green belt/ afforestation.

The land use of site which is mostly degraded forest will be converted to industrial land use category. This will be an irreversible impact.

4.2.2 Impacts on Ambient Air Quality

The main source of emission during the construction phase is the movement of equipment and vehicles at site. Equipment deployed during the construction phase is also likely to result in marginal increase in the level of Particulate matters. However, the impact will be reversible, marginal and temporary in nature. Proper upkeep and maintenance of vehicles, sprinkling of water on roads and construction site, providing sufficient vegetation wherever possible would significantly reduce the dust emission during the construction phase.

The impact will be for short duration and confined within the project boundary and is expected to be negligible outside the plant boundaries. Also as the plant site will be cordoned off by a high boundary wall and planned green belt, particulate impacts will be mostly confined within the plant site.

4.2.3 Impact on Water Environment

The generation of domestic sewage discharge from labour colonies and washing of construction materials stockpiled and concrete batching plant will have some impact on surface water and to a smaller degree on groundwater. The main pollutants are organic components and micro-organisms with the potential to cause contamination of surface water and groundwater. To address potential impacts on water quality, disinfected latrines (with regular liming) will be used as main component of the sanitation system.

Construction process would include fabrication of steel structures, concrete and related water usage. The potential impact is considered minor as it will be mostly occurring during construction period and will have no long-term impact with view to persistent pollution. Alkaline wash water containing excessive amounts of cement will be settled and neutralized before discharge.

The overall impact on water environment during construction phase due to the proposed project would be short term duration and insignificant.

4.2.4 Noise Impact

Heavy construction traffic for loading and unloading, fabrication and handling of equipments and material are likely to cause an increase in the ambient noise levels. To minimize the impact on nearby communities, construction schedules would be optimized to daytime working and scale down activities in night. Extensive earthmoving and movement of heavy equipment would be conducted only during regular working hours (day time).

Overall, the impact of generated noise on the environment is likely to be insignificant, reversible, localized in nature and mainly confined to the day hours. The noise level will drop down to the acceptable level, once construction period will be over.

4.2.5 Topsoil and Ecological Impact

The initial construction work at the project site involves land clearance, will result in loss of vegetation cover (grass and shrubs) and topsoil to some extent in the plant area. The removal of vegetation from the soil and loosening of the topsoil generally causes soil erosion. However, such impacts will be primarily confined within the project site during initial periods of the construction phase and will be minimized through adoption of imitative measures like paving and surface treatment, water sprinkling etc. The project site will be extensively landscaped with the development of green belts consisting of a variety of plants, which would enrich the ecology of the area and add to aesthetics. The transplantation of existing matured trees will also be taken up to save them by replanting them in the area earmarked for green belt development.

4.2.6 Socio-economic Impact

The non-workers in the study area constitute more than 40%. This indicates the availability of sizeable manpower required for the construction activity in the locality. The project will provide either direct or indirect job opportunities to the local population as far as possible.

There will be some migration of labour force from outside the study area during construction phase, which may put some pressure on the local settlements and resources. So, the demographic impact is envisaged to be marginal and temporary in nature.

However, the flow of men, money and material will affect the socio-economic status of the people in the area. The positive impact may be the increase of employment opportunities for un-skilled and semi-skilled workers. Growth of shops, hotels and other allied services will also open up avenues for employment. The subsequent improvement in the status of the people will also help in increasing the health and education status of the people.

4.2.7 Labour Influence

Most of the construction labor will be on contractual basis. As most of the labours during construction phase will be recruited locally, the workers camp will not be large. Therefore, conflict of the migrating labor with local community will not take place

during the construction phase. Diseases corresponding to labour influx and their impact on local community will be regularly monitored. Health status monitoring of labours and its surrounding population shall be carried out with the mobile health care facilities.

4.2.8 Traffic Congestion

During construction of any large project, there is always chance of traffic congestion on nearby roads due to heavy vehicular movement. However it was observed that the road network adjacent to the proposed plant has medium traffic and have a mix of fast moving and slow moving traffic. Thus addition of the anticipated vehicles during construction phase will not have much impact on the traffic scenario.

4.2.9 Construction facilities

The project will require comparatively large mobilization of construction facilities, in various stages for timely and unhindered implementation of the project. Adequate construction facilities will therefore, need to be developed in view of the above and taking into consideration the location in order to provide the basic infra-structural requirement like roads, power, water, etc.

The plant layout has been prepared in such a manner that adequate space is available for offices, covered and open storages, fabrication and pre-assembly yard, etc., required during construction period. In view of different agencies likely to be involved in implementation of this project, the station layout has also taken into account the need for segregation of the permanent facilities.

- **Construction of Roads**

The proposed plant site at Veerlapalem village, Damercherla Mandal, Nalgonda District is connected by SH -2 connecting Narketpally and Addanki. The Arterial roads from SH -2 to the plant will be developed which facilitate the movement of materials and equipment during construction / erection and operation of 5 X 800 MW super critical thermal power plant.

- **Construction Buildings**

Adequate space for construction office, covered sheds is available as shown in plot plan drawing and shall be further augmented as per the requirement. Existing facilities like canteen, car shed, fabrication yard, toilets will be utilized and no separate housing facility for constructional workers is required.

- **Construction Water**

The water would be supplied through storage reservoir and distribution network will be provided temporary water pipeline system. Water for construction purpose will be available at site at single point.



4.3 Impacts during Operational Phase

The plant operation will involve 5 X 800 MW of power generation. The following activities related to the operational phase will have varying impacts on the environment and are considered for impact assessment:

- Land use;
- Soil quality;
- Topography and climate;
- Air quality;
- Water resources and quality;
- Solid waste;
- Noise levels;
- Terrestrial and aquatic ecology;
- Demography and socio-economics; and
- Infrastructural facilities.

Environmental Impact Matrix for the operation phase is shown in **Table 4.55**.

Table 4.56: Environment Impact Matrix for Operation Phase

Environmental Component	Project Activity								
	Transport of raw materials	Coal Handling	Coal burning	Water intake	Effluent discharge	Solid waste	Fugitive & source Emissions	Constructed TPP	Employment
Surface water quality				✓	✓				
Surface Hydrogeology								✓	
Water resources				✓					
Air quality		✓	✓			✓	✓		
Topography & climate								✓	
Terrestrial Wildlife	✓						✓	✓	
Land use pattern								✓	
Highways/ railways	✓								
Soil & Ground Water					✓	✓			
Agriculture					✓	✓	✓		
Housing								✓	✓
Public Health & safety							✓		
Socio-									✓



Environmental Component	Project Activity								
	Transport of raw materials	Coal Handling	Coal burning	Water intake	Effluent discharge	Solid waste	Fugitive & source Emissions	Constructed TPP	Employment
economics									

4.3.1 Impact on Land Use

The present land required for the proposed a 5 X 800 MW Super Critical Coal Based Yadadri Thermal Power Station at Veerlapalem Village, Damarcherla Mandal, District Nalgonda, Telangana is under the possession of TSGENCO.

The general elevation of the site is varying from 72 m to 93 m above MSL. The site is almost plain gently sloping towards north to south.

4.3.2 Impact on Soil

Impacts on soils will be restricted during constructional phase, which will get stabilized during operational phase. The impact on the topsoil will be confined to the proposed main plant area. The probable sources of degradation of soil quality in the proposed TPP will be only due to generation of Ash.

The air borne fugitive dust from the plant is likely to be deposited on the topsoil in the immediate vicinity of the plant boundary. However, the fugitive emissions are likely to be controlled to a great extent through proposed control measures like highly efficient electrostatic precipitators and installation of bag filters in each and every transfer points in coal handling plant and water sprinkling system shall be installed at coal yard. High concentration slurry disposal system for ash disposal will be implemented.

4.3.3 Topography and Climate

The site is slightly undulated to plain gently sloping with certain hill locks. The land will be levelled during the construction phase of the project. There will not be any topographical changes during operation of the project.

Heat loss through the stack will be 6 to 7 % of the total heat input to the furnace. The quantum of heat so lost to the atmosphere is not significant. The greenbelt at the project site will help to manage thermal balance.

Further, as no major changes in topography are expected due to the construction of power plant, no impacts on climatic are envisaged other than some insignificant climatic changes.

4.3.4 Impact on Air Quality

- **Prediction of Impacts on Air Quality**

The proposed project would be firing indigenous coal, resulting in emission to ambient air from coal preparation to coal combustion. The emissions have been classified in the following sections.

Coal Crusher & Bunkers: Coal received at power plant shall be conveyed to the crusher house for sizing of coal to (-) 20mm. From the crusher house the crushed coal can either be conveyed directly to the coal bunkers through a series of conveyors or stacked on to the crushed coal stockpiles by means of stacker reclaimers. Motorized traveling trippers shall be provided to feed crushed coal into the raw coal bunkers of the boilers.

The main pollutant emitted in the crushing and its storage process is fine coal dust (Suspended Particulate Matters). Though crushing operation is not a continuous one, but during its operation, large amount of coal dust is generated which will spread in the vicinity.

Similarly, while transferring the coal from crusher to bunkers through conveyor belt, coal dust becomes primary at the transfer points.

The various measures proposed to minimize the pollution from the power plant are as follows:

- Electrostatic Precipitators with 99.9% efficiency will be installed to limit the particulate (PM) emission within statutory limit
- To facilitate wider dispersion of pollutants, high stack with twin-flue (Two stack with twin – flue and one stack with a single flue) will be provided
- The NOx emission from the boilers will be controlled by controlling combustion measures, which will be approached by way of low NOx burners. And addition of By Pass Over Fire Air in furnace and dynamic classifiers in the mills in the place of static classifiers. Further, NOX control will be effected duly incorporating SCR(Selective Catalytic Reduction).Further ammonia gas induction in to the flue gas duct will bring down NOX levels to the prescribed levels.
- The fugitive emissions will be controlled to a great extent through proposed control measures like highly efficient ESPs and installation of bag filters in each and every transfer points in coal handling plant and water sprinkling system shall be installed at coal yard.



- FGD system will be installed to comply with new Thermal Power Plant Emission Standards in respect of Sulphur dioxide. The design and layout of steam generator and its auxiliaries will be such that a wet/dry flue gas desulphurisation system can be installed, taking suction from duct after ID fan and feeding the desulphurised flue gases back to the chimney.

- **Air Pollution Modeling**

Prediction of impacts on air environment has been carried out by air dispersion modelling employing mathematical model based on a steady state Gaussian plume dispersion model designed for multiple point sources.

The assessment methodology for the air dispersion modeling is done based on document "Assessment of Impact to Air Environment: Guidelines for Conducting Air Modeling" by Central Pollution Control Board.

The detailed model recommended is **AMS/EPA Regulatory Model (AERMOD)**. The model of selection was the commercially available AERMOD Ver 8.0 View dispersion model, developed by Lakes Environmental. This model is used extensively to assess pollution concentration and deposition from a wide variety of sources. AERMOD View is a true, native Microsoft Windows application and runs in Windows applications. The AMS/EPA Regulatory Model (AERMOD) was specially designed to support the EPA's regulatory modeling programs.

AERMOD is a regulatory steady-state plume modeling system with three separate components:

- AERMOD (AERMIC Dispersion Model)
- AERMAP (AERMOD Terrain Preprocessor), and
- AERMET (AERMOD Meteorological Preprocessor).

The AERMOD model includes a wide range of options for modeling air quality impacts of pollution sources, making it a popular choice among the modeling community for a variety of applications.

Modeling capabilities of AERMOD include the following:

- The model can be used to analyze primary pollutants and continuous releases of toxic and hazardous waste pollutants.
- Source emission rates can be treated as constant or may be varied by month, season, hour-of-day, or other optional periods of variation. These variable emission rate factors may be specified for a single source or for a group of sources. For this project all emission rates were treated as constant.
- The model can account for the effects of aerodynamic downwash due to buildings that are nearby point source emissions.
- Receptor locations can be specified as gridded and/or discrete receptors in a Cartesian or polar coordinate system.
- For applications involving elevated terrain, the U.S. EPA AERMAP terrain preprocessing program can be incorporated into the model to generate hill height scales as well as terrain elevations for all receptor locations.



- The model contains algorithms for modeling the effects of settling and removal (through dry and wet deposition) of large particulates and for modeling the effects of precipitation scavenging for gases or particulates.
- AERMOD requires two types of meteorological data files, a file containing surface scalar parameters and a file containing vertical profiles. These two files are provided by the U.S. EPA AERMET meteorological preprocessor program.

- **Model Input Data**

Source Emissions

A critical step for conducting air dispersion modeling is to quantify the emissions from the various sources at the facility. The emission rates from the sources identified were estimated in accordance with the recommendation outlined in the CPCB document. **Table 4.56** shows the source information and emission data determined for the proposed project activity, that were calculated based on the use of boiler manufacturer's emission specifications. These emission rates were based on the maximum emission rates as stipulated.

Meteorological Data

The AERMOD model requires hourly surface data values for wind speed, wind direction, temperature, rainfall, relative humidity, pressure, cloud cover and ceiling height and solar radiation and at least once daily mixing height data. Wind data (direction and speed), rainfall, temperature relative humidity and cloud cover information for the monitoring period was utilized from the weather station installed at the proposed site. Upper air data was obtained from the AERMOD model and were utilized to generate the required mixing heights.

Both data files for the surface and mixing heights were then used to generate the meteorological file required by the AERMOD dispersion model using the AERMET meteorological preprocessor program. This AERMET program has three stages to process the data. The first stage extracts meteorological data and assesses data quality through a series of quality assessment checks. The second stage merges all data available for 24-hour periods and writes these data together in a single intermediate file. The third and final stage reads the merged meteorological data and estimates the necessary boundary layer parameters for dispersion calculations by AERMOD.

The meteorological preprocessed data was used to determine its corresponding Wind Rose. The Wind rose show that the most predominant wind direction blows from south west direction . This means that the emissions plume will be dispersed mainly in the north east direction.

Receptor Network

The selection and location of the receptor network are important in determining the maximum impact from a source and the area where there is significant air quality impact. Impacts were assessed at locations upto 10 km radius from the project boundary. Consequently, the receptor locations were selected as a multi-tier grid that is defined by discrete Cartesian receptors, square in shape, and with origin at the center of the proposed project. The entire receptor network locations include a 500-meter



spaced grid within 10 km from the subject source. A total of 621 receptors were considered for point sources.

Terrain Considerations

The terrain classification of the land in the vicinity of the proposed power plant facility is needed because dispersion rates differ based on the terrain. The topography in the region of the proposed facility is simple terrain (terrain lying below the stack top elevation). Measurements of the terrain in the area surrounding the proposed facility were made using terrain data obtained from Digital Elevation Maps of Shuttle Radar Topography Mission (SRTM). It was determined that the topography from the south to the north eastern directions up to 10 km have terrain elevations above 30 m and is represented in the **Figure 4.20**. The areas from north west through to the south west direction are for the most part flat, and include the marine environment. Therefore, since terrain elevations doesn't extend above the facility's highest top stack elevation, complex terrain algorithms were not included as part of the dispersion modeling analysis.

Model Input Data

For the modeling purpose pollutants like, Sulphur dioxide, Oxides of Nitrogen, Mercury and Particulate Matter are considered. The details of stack emissions envisaged from the project are given in **Table 4.56**.

Table 4.57: Stack Emission Details (Worst Case Scenerio)

Sr. No.	Parameters	Units	2 X 800 MW (Unit 1 & 2)	2 X 800 MW (Unit 3 & 4)	1 X 800 MW (Unit 5)
1	Stack Height	m	275	275	275
2	No. of flue	No.	2	2	1
3	Top diameter of flue	m	7.7	8	8
4	Flue gas velocity in each flue	m/s	22	22	22
5	Flue gas temperature	°K	413	413	413
6	Flow rate of gas in each flue	Nm ³ /s	751.22	751.22	751.22
7	Emission rates				
A	Sulphur dioxide (SO ₂) (emission rate based on 100 mg/Nm ³ emission standard)	g/s/flue	75.12	75.12	75.12
B	Particulate matter (PM) (emission rate based on 30 mg/Nm ³ emission standard)	g/s/flue	22.54	22.54	22.54



Sr. No.	Parameters	Units	2 X 800 MW (Unit 1 & 2)	2 X 800 MW (Unit 3 & 4)	1 X 800 MW (Unit 5)
C	Oxides of Nitrogen (NO _x) (emission rate based on 100 mg/Nm ³ emission standard)	g/s/flue	75.12	75.12	75.12

- Cumulative Impacts of Implementation of Proposed Project**

For the short-term simulations, the concentrations have been estimated around 621 receptors to obtain an optimum description of variations in concentrations over the site in 10 km radius covering 16 directions. The incremental ground level concentrations for PM, SO₂ and NO_x are given in **Table 4.57**.

Table 4.58: Predicted 24-Hourly Short Term Cumulative

Pollutant	Incremental Concentration (µg/m ³)	Distance (km)	Direction
PM ₁₀	2.62	Within the project boundary	NW
SO ₂	8.22		NW
NO _x	8.22		NW

- Comments on Predicted Concentrations**

A perusal of **Table 4.57** reveals that the maximum incremental short term 24 hourly ground level concentrations for Particulates, SO₂, NO_x and PM likely to be encountered during winter season are 8.22, 8.22 and 2.62 µg/m³ respectively.

- Resultant Concentrations after Implementation of the Project**

The maximum incremental GLCs due to the proposed project for PM, SO₂ and NO_x are superimposed on the 98th percentile baseline concentration of PM, SO₂, and NO_x recorded during the study period. The cumulative concentrations (baseline + incremental) after implementation of the project are tabulated below in **Table 4.58**. The predicted ground level concentration isopleths for various parameters during study period is given in **Figure 4.21 to 4.23**.

Table 4.59: Resultant Cumulative Concentrations due to Incremental GLCs

Pollutant	Concentration (µg/m ³)		
	Baseline	Incremental	Resultant
PM ₁₀	66.4	2.62	69.02
SO ₂	24.6	8.22	32.88
NO _x	28.1	8.22	36.32

The predictions indicate that the PM, SO₂, NO_x concentrations are likely to be well within the prescribed limit for residential and rural zone.

It may be observed that the above incremental concentrations have been worked out based on the latest norms of Thermal Power Plants by MoEF&CC.



Environmental Impact Assessment for the proposed 5 x 800 MW Supercritical coal based Yadadri Thermal Power Station at Veerlapalem village, Damarcherla mandal, Nalgonda district, Telangana by M/s Telangana State Power Generation Corporation Limited

Chapter-4: Anticipated Environmental Impacts and Mitigation Measures

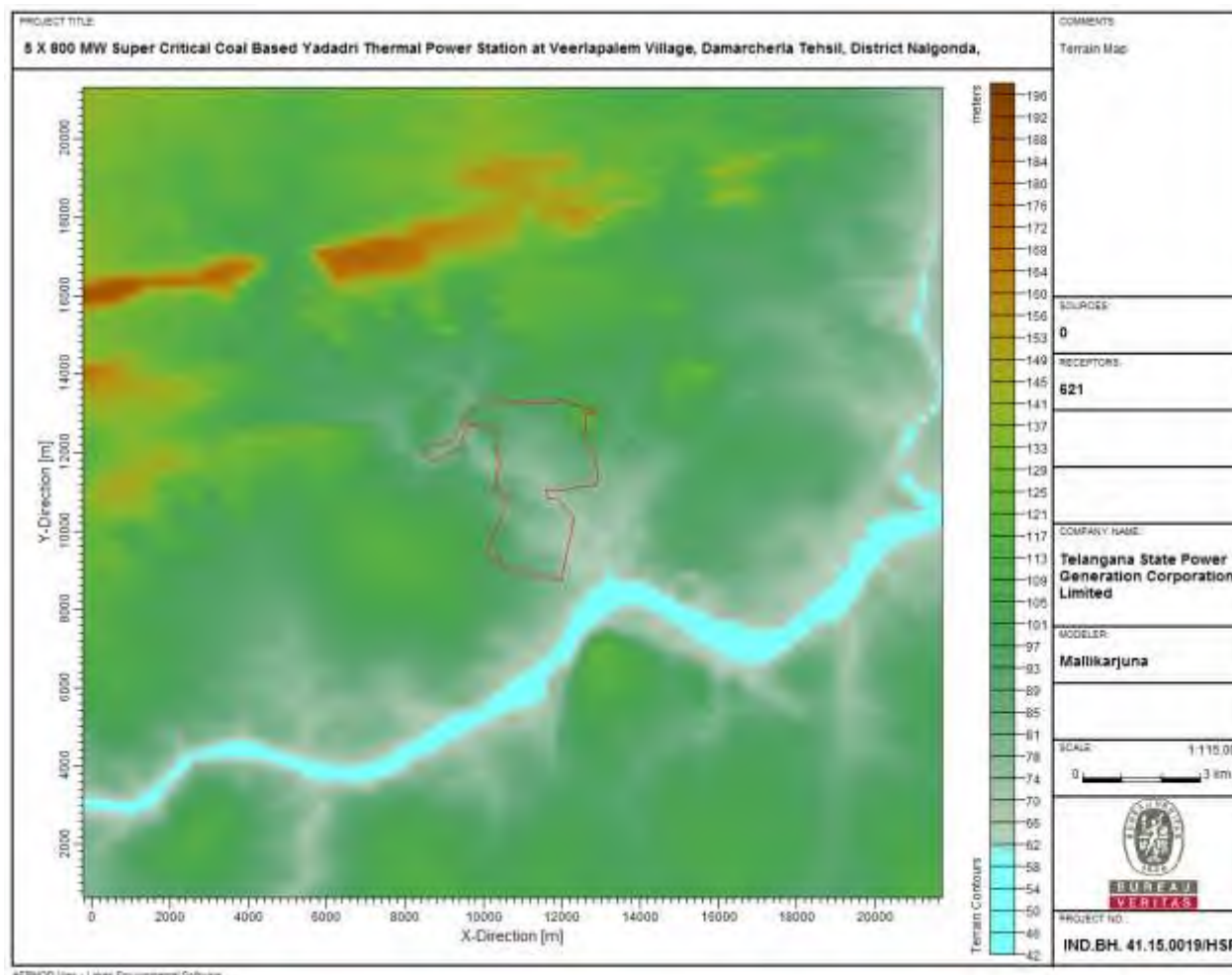


Figure 4.21: Terrain Map





Environmental Impact Assessment for the proposed 5 x 800 MW Supercritical coal based Yadadri Thermal Power Station at Veerlapalem village, Damarcherla mandal, Nalgonda district, Telangana by M/s Telangana State Power Generation Corporation Limited

Chapter-4: Anticipated Environmental Impacts and Mitigation Measures

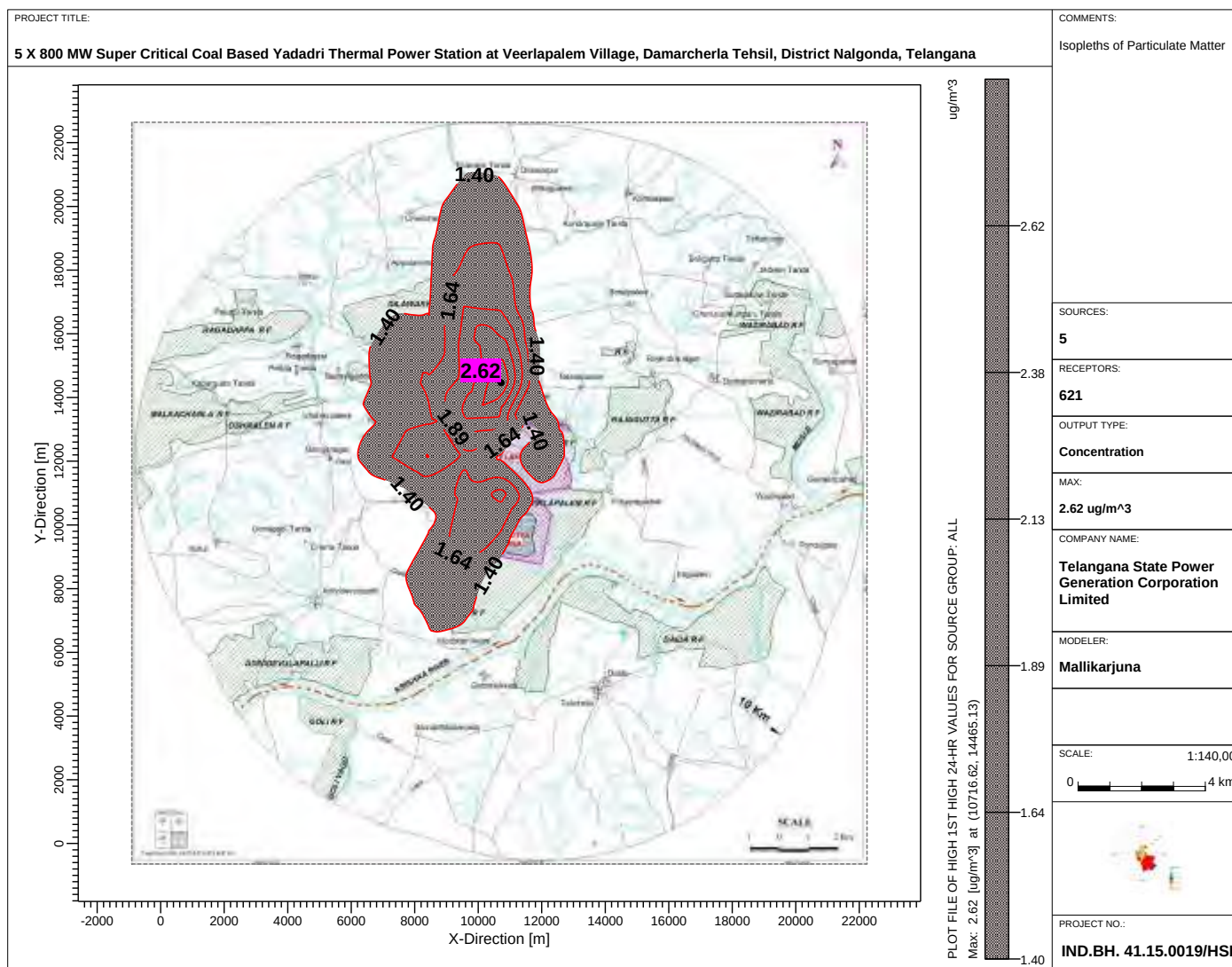


Figure 4.22: Cumulative Incremental GLCs of PM





Environmental Impact Assessment for the proposed 5 x 800 MW Supercritical coal based Yadadri Thermal Power Station at Veerlapalem village, Damarcherla mandal, Nalgonda district, Telangana by M/s Telangana State Power Generation Corporation Limited

Chapter-4: Anticipated Environmental Impacts and Mitigation Measures

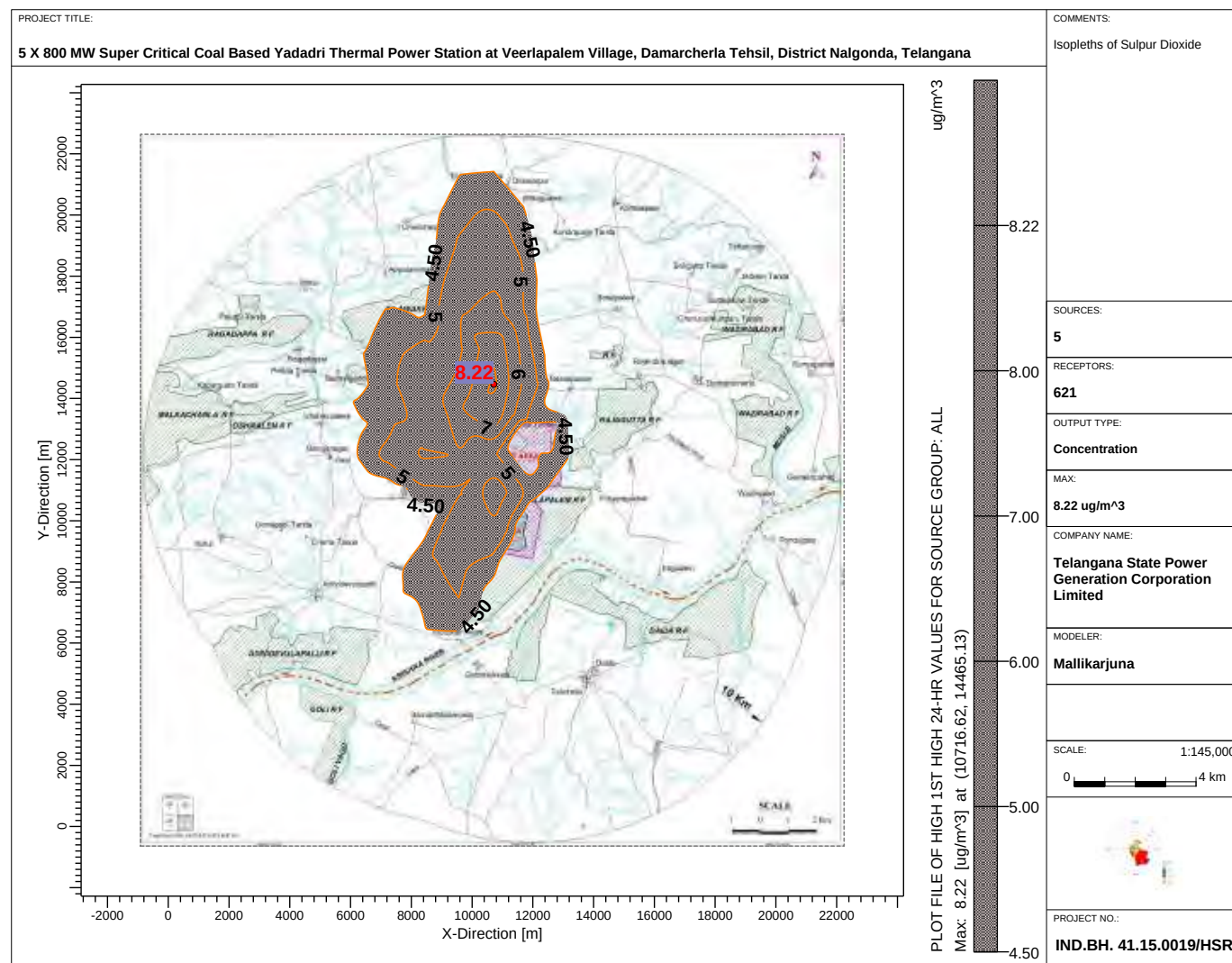


Figure 4.23: Cumulative Incremental GLCs of SO₂





Environmental Impact Assessment for the proposed 5 x 800 MW Supercritical coal based Yadadri Thermal Power Station at Veerlapalem village, Damarcherla mandal, Nalgonda district, Telangana by M/s Telangana State Power Generation Corporation Limited

Chapter-4: Anticipated Environmental Impacts and Mitigation Measures

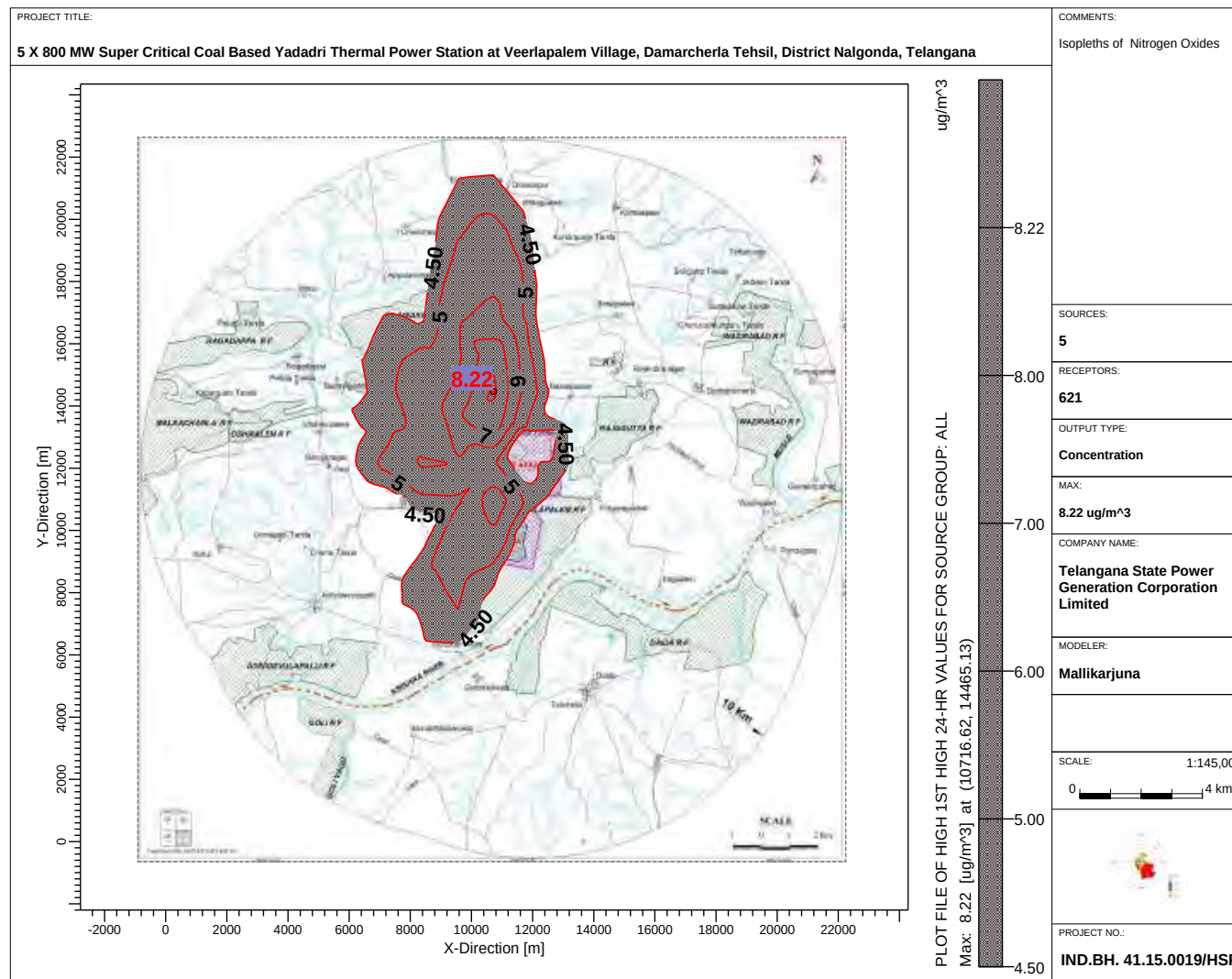


Figure 4.24:Cumulative Incremental GLCs of NO_x



• Impact of Off-Site Traffic on Air Quality

The proposed plant activities will involve transport of ash to near by cement industries. The transportation of ash will involve generation of additional traffic. An average of 11 trucks per hour are expected to transport the fly ash to the near by cement industries.

The traffic contribution to the highway from the proposed plant will be due to the transportation. As worst case transportation by road has been considered for these materials. Compared to the existing traffic on highway, the incremental traffic density due to the proposed plant will be negligible. Hence, insignificant impact on the adequacy of the highway is envisaged.

The concentrations of CO and NO_x due to the present traffic have been accounted in the baseline ambient air quality monitoring. Hence, the impacts on air quality have been predicted only for the additional traffic from the proposed project.

The air quality predictions have been carried out by using the air quality model CALINE-4 developed by California Department of Transportation. The model is based on Gaussian diffusion equation and uses a mixing zone concept to characterize pollutant dispersion over the roadway.

• Details of CALINE-4

CALINE-4 is a dispersion model that predicts pollutant impacts near roadways. Its purpose is to help planners protect public health from the adverse effects of excessive CO exposure.

CALINE-4 is a simple line source Gaussian plume dispersion model. The user defines the proposed roadway geometry, worst-case meteorological parameters, anticipated traffic volumes, and receptor positions. The user must also define CO emission factors for each roadway link.

CALINE-4 is a graphical windows-based user interface, designed to ease data entry and increase the on-line help capabilities of CALINE-4. The CALINE-4 setup program is self-contained with both programs (the CALINE-4 interface and the CALINE-4 dispersion model), so the user only needs to complete a single installation step.

• Details of Pollutants

To account for the effect of the diurnal variations in model inputs (vehicular emissions and meteorological conditions), the averaging time for model predictions has been restricted to 60 minutes. The averaging time is so selected because the primary meteorological factors that influence the air quality predictions i.e. wind speeds and directions do not remain steady for longer time periods. Also, during the peak traffic hours, the traffic volumes typically show significant variations over periods longer than one hour.

Due to averaging time of 60 minutes, the project impacts on air quality are essentially assessed based on one hourly standard for CO. NO_x levels however have been developed for peak traffic conditions and compared with WHO standard of 400 µg/m³ for hourly average.

HC was not modelled since its limits are not specified for ambient levels in the Environment Protection Act. In the absence of Indian standards for HC, the predictions could not have been interpreted meaningfully.

- *Emission Standards*

The emission standards for Indian vehicles as proposed by the Indian Institute of Petroleum (IIP) have been used to provide the emission factors for the different vehicle types. Emission factors after accounting for the vehicle speeds are as specified in **Table 4.59**.

Table 4.60: Emission Factors for Vehicular Impact Predictions

Vehicle -->	Trucks	
	CO	NOx
Emission rate	10.67	18.97

*: to be multiplied by 1.6 for converting into gm/mile for use in CALINE-4
All values are given in gm/km/vehicle*

For model computations, Right Of Way (ROW) of 7 m excluding 0.5 m shoulders on either side of the road has been considered for perusal of violations of standards and accordingly receptor locations have been chosen to account for its location with respect to edge of ROW.

- *Results and Discussion for Traffic Impact*

The predicted CO and NOx concentrations from vehicular traffic are presented in **Table 4.60**.

The general observation from the results reveals that the maximum NOx and CO concentration of 8.8 $\mu\text{g}/\text{m}^3$ and 5.5 $\mu\text{g}/\text{m}^3$ occurs at 20 m from the edge of the road for Stability Class-A. The concentrations for other stability classes are observed to be less. The concentrations of NOx and CO are observed to be well within the permissible limit. Hence, it is assessed that the impact on the present ambient air quality will be negligible due to the additional traffic from the proposed cement complex.

Table 4.61: Peak Hourly Predicted Incremental Concentrations

Distance from the Edge of the Road (m)	Incremental Pollutant Concentrations ($\mu\text{g}/\text{m}^3$)	
	NOx	CO
20	8.8	5.5
40	4.9	3.4
60	3.1	3.1
80	3.1	2.0
100	2.0	1.6
125	1.5	0.8
150	1.2	0.7

➤ Adequacy of existing road network

With the proposed project, the traffic is likely to increase on the existing road network during the operation phase. The impact of the traffic is assessed on the basis of adequacy of the existing road network.

It has been considered that the additional peak daily vehicle traffic due to proposed project would be almost insignificant as the transport of the basic raw material coal will be by rail.

The additional traffic will be due to transport of fly ash, construction material and staff. The level of traffic has been converted to Passenger Car Units (PCU) as per the conversion factors stipulated by Indian Road Congress (IRC). With present level of traffic and the increase in existing traffic due to the project during operational phase by comparison with the recommendations stipulated by Indian Road Congress (IRC) on traffic capacity presented below in **Table 4.61** the road network is adequate for the additional traffic.

Table 4.62: Recommendations on Traffic Capacity - IRC

Sr. No.	Category of Road	Maximum PCU/day
1	Two lane roads (7-m) with earthen shoulders	15,000
2	4-lane highway with earthen shoulders	35,000

As per the above standards the two lane roads have maximum capacity of 15000 PCU/day. The two lane roads around the project are adequate for the present traffic volume and the traffic contributed from the proposed project. Hence, the impact on the existing road due to the traffic contribution from the project will be insignificant.

• Heat Impact

The temperature of the flue gas at the exit will be ranging between 120 - 150°C (at the ESP outlet). This amounts to about 6-8% of total heat input to the boiler. The hot flue gases will be released at 275 m into the atmosphere through the stack. This heat radiation will get dissipated into the atmosphere due to the moderate wind speeds and atmospheric humidity. The heat radiation reaching ground level will not be able to cause any impact on the surrounding areas. Also, the emission of stack gas is not likely to cause any adverse thermal imbalance in impact zone.

4.3.5 Impact on Water Resources

The project will source its entire water requirement from the Krishna river. The total water requirement for the project is 9755 m³/hr. The project will not extract groundwater and hence there will be no impact on ground water.

The wastewater generated in the plant area will be treated in the guard pond system and part of the wastewater will be utilized in various activities such as cooling water make up, ash/coal handling, ash disposal, service water and greenbelt development.

No discharge is envisaged into any surface river water bodies; hence, no impact is envisaged on surface river water quality.

- **Impact on Water Quality**

Being a coal-based plant; project requires enormous quantity of water mainly for cooling and operation purpose. The proposed Thermal Power Plant including all facilities will require around 9755 m³/hr of water. This will include cooling water requirement, which has been planned to have re-circulating type Cooling Water (CW) system with Natural Draft cooling tower.

Operation of the Thermal Power Project will not have any long-term impact on water quality as it is proposed to be a minimum discharge plant. The water system of the proposed project has been developed with maximum recycle and reuse of water, so as to reduce the quantity of effluents generated from the plant.

Steam generator blow down water would be flashed in an atmospheric flash tank. It is proposed to lead steam generator blow down after quenching with service water to a recovery pond.

- **Wastewater Treatment for Individual Sections**

The following are various streams of waste water that are expected from the proposed power plant:

- **Demineralization (DM) Plant Effluent:** During treatment, acidic and alkaline effluent will be generated periodically. The effluents need be collected in a neutralizing pit where the acidic and alkaline effluents will be neutralized with each other. This will be pumped and mixed with other effluents in the polishing pond after filtration.
- **Boiler Blow-down:** The boiler blow down does not require treatment to achieve the limits but relies on operating at sufficient blow down levels to prevent the build-up of contaminants. Also, by operating with proper chemistry in the condensate and feed water systems, copper and iron are not present in significant quantities in the blow downstream. The boiler blow down is also directed to the guard pond.
- **Effluent from Oil Handling Areas:** The effluent carrying oil spillage etc. should be taken to oil/water separation. The decanted oil (containing small amount of water) should be taken to an oil separation tank for further separation. The decanted oil may be stored in a tank for reuse. The supernatant water need be sent to the polishing pond.
- **Effluent from Ash Pond:** The drain and overflow water from the ash pond would flow from settling pond to stilling pond and from stilling pond to the clarifier where the suspended solids will be reduced by addition of alum/electrolyte. The clarified water will be pumped to the ash handling system.
- **Domestic Waste from the plant:** Domestic wastewater will be treated in Sewage Treatment Plant. The treated sewage from the plant will meet stream standards and would be used for plantation and secondary uses.



- Air Pre-heater Wash Water Effluent: Frequently, the air pre-heaters of the boilers need to be washed. The washed water would be led to the respective settling basins located near the boilers. From the settling basins, dust-laden water would be pumped at suitable intervals, to the guard pond.
- Rain (Storm) Water Drainage: Rain harvesting structures will be constructed on top of all available structures so that the rain water can be recycled for plant requirements. The rain (storm) water removed from the building roofs and yard area grade level surfaces would be directed through the open ditches and culverts to the storm drainage piping. All ditches would be concrete lined and located along the roads. All drainage ditches would be located to provide the shortest practical drainage path while providing efficient drainage for the yard. Grade level would be contoured such that storm water run off is directed on the ground by sheet flow, to well defined drainage paths leading to the ditches.
- Monitoring of Waste from the Plant: All the treated effluent will be monitored regularly for the flow rate and identified parameters of quality, so that performance efficiency of treatment systems are evaluated and necessary changes recommended from time to time.

The water balance diagram for the proposed project has already been given in **Chapter 2**.

• Effluent Treatment System

The liquid effluents will be collected and treated / recycled generally as per the following design philosophy.

- The ash water from the ash dyke will be fully re-circulated.
- In practice the pH of the ash water is either neutral or alkaline and hence the leaching of heavy metals is unlikely to occur.
- The project will have natural draft cooling system with cooling towers. Almost entire cooling tower blow down will be used for service water requirement and Ash Handling System.
- The sludge from clarifiers of Water Pretreatment plant will be pumped to ash Pond.
- The waste effluents from neutralization pit of DM plant and will be collected in the neutralization pits where it will be neutralized.
- The oily waste from different areas, waste from CPU, waste from floor wash and neutralized water from DM plant neutralization pit will be led to the tube settler and recovered water from tube settler shall be led to CMB.
- Blow down from ash water re-circulation system and tube settler will be led to thickener. Recovered water from thickener will be led to CMB, and blow down of thickener will be led to Centrifuge.
- Recover water from centrifuge will be led to CMB and blow down from centrifuge will be used for land filling.
- A coal settling pond shall be provided to remove coal particles from coal handling plant waste. Decanted water will be pumped to the CMB.
- From CMB, the recovered water will be used for Ash handling plant, CHP dust suppression system and Gardening. 3 x 100 % pumps will be used for pump the water from CMB to Ash Handling Plant, 3 x 100% pump will be used to pump

water from CMB to Coal Handling area and 2 x 100 % pumps will be used for pumping the water from CMB for gardening and horticulture purpose.

- The sanitary sewage from plant and township will also be treated in sewage treatment plant (STP) to meet the regulatory standards. The treated wastewater conforming to prescribed standards would be utilized for green belt. The sludge from the STP would be utilized as manure in the green belt.

• Impact on Surface Water Quality

The water balance and wastewater generation details have been described in Chapter-2. The wastewater generated in the plant area will be utilized in various activities such as ash/coal handling, fly ash conditioning, ash disposal, service water and greenbelt development. Plant will be operated on zero discharge concept. RO system will be installed to treat waste water for reuse. Garland drains around the ash pond site will be provided for the collection of run-off water during monsoon season.

The storm water in the project area will be collected through storm water drains and collected in the storm water tank, which is lined to prevent any contamination of ground water. The stored storm water will be utilized in the plant operation resulting in conservation of fresh water. Suitable rain water harvesting pits will be provided along the storm water drain to recharge the ground water table. In case the storm water tank starts overflowing, the same will be discharged into nearby nala.

Various types of wastewater to be generated in the proposed project with their quantity, expected pollutants and treatment proposed are given in **Table 4.62**.

Table 4.63: Water Requirement and Wastewater Generation and Treatment Details

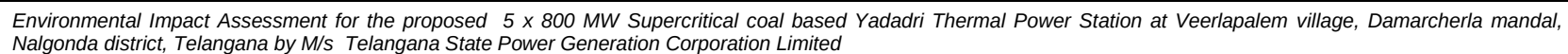
Sr. No.	Water Usage Description	Quantity (m ³ /hour)			Remarks
		Water Requirement	Loss	Wastewater Generation	
7	Make-up water for cooling tower	8250	6610	1640	(1540) to ash water pond/ CHP; (100) to CMB
8	DMF feed pump	290	-	240	(15) Silting chamber of PTP (20) CMB (205) Make-up to Boiler CST
9	Service water	215	205	10	to CMB
10	HVAC Makeup	275	275	-	
11	Potable water	25	5	20	Treated in STP
12	AHS compressor cooling, makeup for wastage from Clarifier, AHP Water sump, Coal Handling Plant, Miscellaneous	700	-	30	Sludge handling system, CMB
	Total	9755	7095	1940	

All values are given in m³/hr

The flow sheet showing waste water balance is given in **Figure 4.24**. The expected quality of raw and treated wastewater from the power plant including sewage water and discharge limits as specified by environment protection rules is given in **Table**

	Environmental Impact Assessment for the proposed 5 x 800 MW Supercritical coal based Yadadri Thermal Power Station at Veerlapalem village, Damarcherla mandal, Nalgonda district, Telangana by M/s Telangana State Power Generation Corporation Limited Chapter-4: Anticipated Environmental Impacts and Mitigation Measures

4.63.



The flow diagram for the Effluent Treatment Plant (ETP) illustrates the following process:

- Central Monitoring Basin:** Receives influent from three sources: REGEN WASTEL FROM DM AND CPU, COOLING WATER BLOWDOWN (EXCESS), and SSF BACKWASH. The total flow is 550 M³/HR.
- Clarifier (1x100 M):** Receives 156 M³/HR from the Central Monitoring Basin. It includes a CHLORINE DOSING point and a SLUDGE TO AHP outlet.
- Clarified Water Storage Tank:** Receives water from the Clarifier. It has a (RO PLANT SUPPLY (2X100%)) pump and a (CLARIFIED WATER SUPPLY PUMP).
- Pressure Sand Filter:** Receives water from the Clarified Water Storage Tank.
- Basket Strainer Filter:** Receives water from the Pressure Sand Filter.
- Ultra Filtration:** Receives water from the Basket Strainer Filter.
- UF Product Water Storage Tank:** Receives water from the Ultra Filtration.
- RO System (2X50 % Stream):** Receives 165 M³/HR from the UF Product Water Storage Tank. It includes a DECLASSER and a RO PERMEATE TANK.
- RO Permeate Tank:** Outputs 385 M³/HR to three destinations: TO SERVICE WATER, TO FGD, and CW MAKE UP.
- Decasser:** Receives water from the RO PERMEATE TANK.
- RO System (2X50 % Stream):** Receives water from the DECLASSER.
- MCF (Micron Cartridge Filter):** Receives water from the RO System. It has a 150 M³/HR (HIGH PRESSURE RO FEED PUMP) (2X100%) pump.
- Pretreatment:** Receives water from the MCF.
- Transformer Area Oily Waste:** Receives 1 M³/HR from the MAIN PLANT AREA WASH WATER and 1 M³/HR from the FUEL OIL AREA WASTE.
- OWS Feed Tank:** Receives water from the Transformer Area Oily Waste.
- OWS Feed Pump:** Receives water from the OWS Feed Tank. It has a RECOVERED OIL IN DRUMS outlet.
- OWS:** Receives water from the OWS Feed Pump. It has a SLUDGE SUMP (CAPACITY: 1 M³) outlet.
- RO Reject Sump:** Receives water from the OWS and the RO System. It has a TO AHP outlet.



Table 4.64: Expected Quality of Wastewater

Sr. No.	Parameter	Unit	Raw wastewater	Treated Wastewater	Permissible Limits as per GSR 422 (E) for On-land Discharge (Irrigation)
1	pH	-	5.5 to 9.0	6.0 to 8.5	5.5 to 9.0
2	Suspended Solids	mg/l	100 to 500	<100	200
3	Oil & Grease	mg/l	10 to 200	<5	10
4	Total Dissolved Solids	mg/l	500 to 10000	<1000	--
5	BOD	mg/l	250 to 350	<30	100
6	COD	mg/l	450 to 600	<100	-

Total wastewater (including domestic wastewater) generation of entire project will be about 1940 m³/hr, in that treated water will be used for Ash handling plant, coal handling plant and green belt.

4.3.6 Impact on Noise Levels

The main sources of noise and vibration during operations will be:

- Delivery of equipment and raw materials by trucks
- Transfer of coal through railway line
- Operation of generators and turbine inside the power house
- Operation of various pumps, fans and motors

Scheduling deliveries to daytime as much as possible would minimize noise generation by truck movement. Turbines, cooling towers, transformers, compressors, pumps, vehicles and miscellaneous equipments during plant operation, will generate noise. However, proper acoustic enclosures would be provided to control the noise level within 80dB, as per the requirement of Operational and Safety and Health Administration Standard (OSHA).

Also the adoption of modern building design and the use of sound-absorbing materials will minimize noise and vibration from the powerhouse.

The noise levels at the source for these units will be in the range of 80-90 dB(A). The noise dispersion from the plant units has been computed based on the mathematical model.

Noise Modeling for Plant Machinery

The impact from a continuous stationary noise source at observer's place, considering the hemispherical propagation of sound waves is represented by the following equation:

$$LR = LS + DI - 20 \log(r) - Ae - 8$$

Where,



LR: Sound pressure level at a receptor located at radial 'r', dB (A)

LS: Sound pressure level at the source, dB (A)

DI: Directivity index of the source (for hemispherical radiation DI = 3dB (A)

R: Radial distance of the receptor from the source, m

Ae: represents excess attenuation of sound caused by the environmental conditions such as:

- Absorption in Air
- Effect of rain, snow and fog
- Reflections and refractions at barriers and buildings
- Effect of the terrain, grass, shrubs, trees etc.
- Effect of wind and temperature gradient

The absorption of the sound is generally a complex phenomenon. In general, for homogeneous loss free atmosphere $A_e = 0$

The cumulative impact of multiple stationary noise sources (through hemispherical wave propagation) at a particular place can be calculated by:

N

$$L_p(\text{Total}) = 10 \log \left[\sum_{i=1}^N 10^{(L_{pi}/10)} \right]$$

i=1

$L_p(\text{Total})$ is the resultant cumulative sound pressure level due to N separate sources. The cumulative impact from different stationary noise sources at proposed project site has been predicted at 1m distance using the above model.

Presentation of Results

The noise levels at the plant boundaries are given below in **Table 4.54**. The expected noise levels at the plant site and boundary are shown in **Figure 4.25**.

Table 4.65: Predicted Noise Levels at the Plant Boundaries

Sr. No.	Direction	Baseline dB(A) Ldn	Incremental Noise level in dB(A)	Resultant dB(A)
1	N	47.7	44	49.2
2	NE	49.5	38	49.8
3	E	51.0	38	51.2
4	SE	46.7	40	47.5
5	S	50.5	33	50.7
6	SW	48.2	36	48.5
7	W	47.7	38	48.1
8	NW	47.7	44	48.1

The predicted noise levels at the boundary due to various plant activities will be ranging in between 48.1 to 51.2 dB(A). The increment noise levels will be in the range of 33 dB (A) to 44 dB (A) at all of the surrounding habitations.

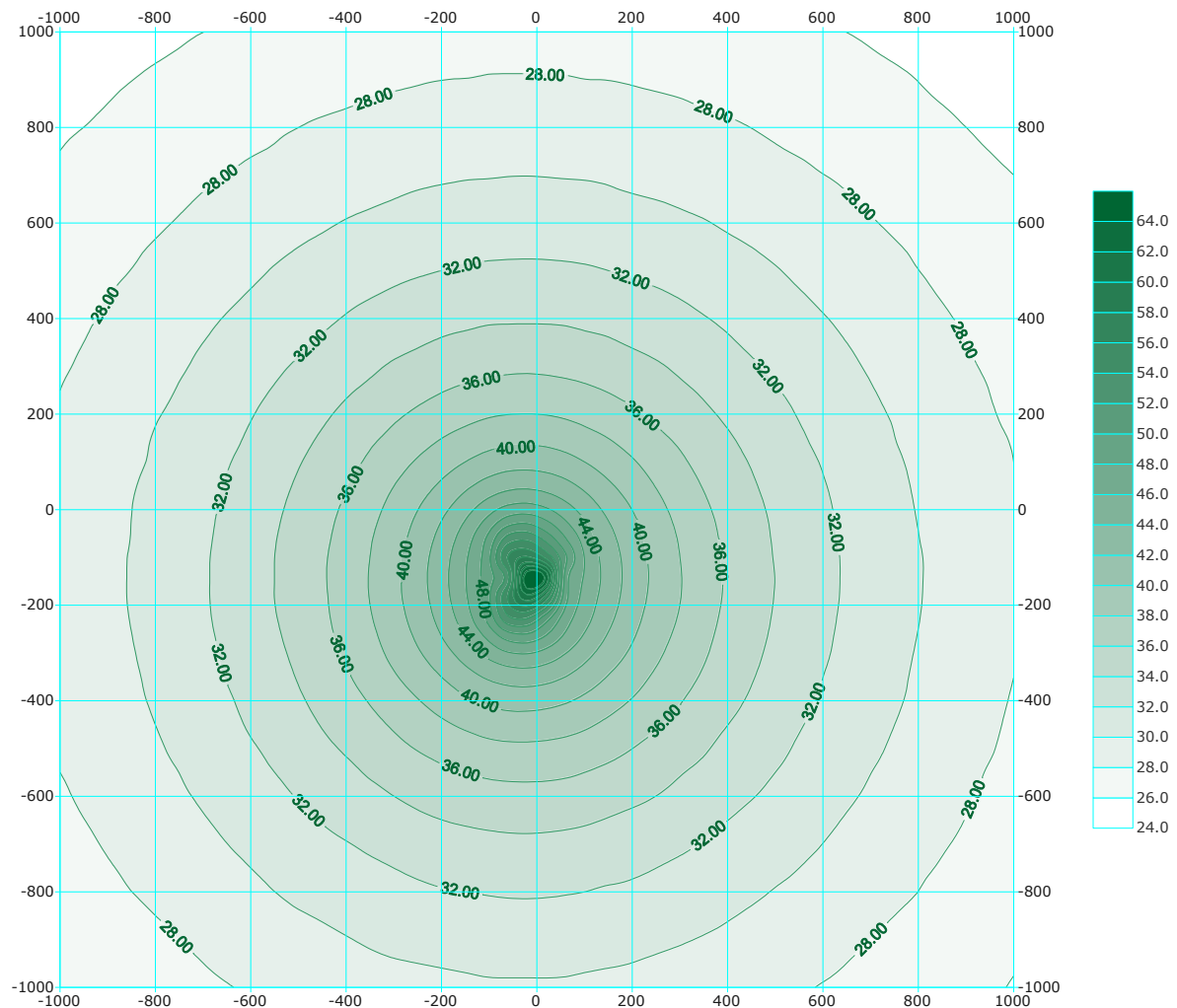


Figure 4.26: Noise Dispersion Contours

➤ **Impact on Work Zone**



There are no high noise equipments in the proposed power plant, except boilers. However, impacts on the working personnel are not expected to be significant on account of the high level of automation of the plant, which means that workers will be exposed for short duration only that too intermittently.

➤ **Noise Impacts due to Transportation**

The major noise generating sources that should be given high priority are those with annoying characteristics (e.g. tonality, impulsiveness), such as wheel squeal, brake squeal, and the noise from track joints and turnouts as they generally evoke a community reaction. The noise mitigation that reduces these annoying characteristics shall be followed to provide a noise free environment to the local community, even where there may be no measurable changes in measured noise levels.

The noise mitigation strategy will be as follows:

- **Track Measures:** rail grinding, welding to smooth discontinuities, lubrication, use of soft rail pads, and relocation of signals or turnouts
- **Rolling Stock Measures:** effective muffling of diesel locomotive exhaust noise, wheel truing, on-board wheel lubrication, use of disc brakes, dampening of wheels, and use of resilient wheels, wheel vibration absorbers and low-squeal brake blocks.

4.3.7 **Impact of Solid Wastes**

The details of the solid waste generated in the plant are given in **Table 4.65**.

Table 4.66: Expected Solid Waste From Power Plant (Worst Case Scenerio)

Sr. No.	Plant	Quantity	Remarks
1	Fly ash (MTPA)	3.1	Ash will be supplied to identified cement industries around the power plant. In case the ash could not be lifted, the same will be disposed in ash dyke using HCSD system
2	Bottom ash (MTPA)	0.8	Will be disposed off in ash dyke area through HCSD system
3	Sludge in STP (In TPA)	5	Will be used in greenbelt as manure
4	Solid kitchen waste from colony (in TPA)	600	Vermicomposted and used in gardening and greenbelt development
5	Used Oil(In KLPA)	9	Will be given authorized reprocessors of TSPCB

The ash generated in the plant will be supplied to identified cement industries for consumption. The Sludge from Sewage Treatment Plant will be dried and used as

manure for greenbelt maintenance. Canteen/sanitary waste will be composted and used as manure for greenbelt development.

With the implementation of above precautionary measures, the impacts due to solid waste disposal are insignificant on environment.

- **Impact of Ash dyke on Water Resources**

In ash disposal, HCSD method will be adopted. The ash will be conveyed by pipeline to ash dyke in High concentration slurry form. The wastewater from the guard pond will be sprinkled continuously to prevent fugitive dust. Under normal condition there will not be water discharge from ash pond.

The possibility of groundwater contamination due to the leaching of metals from the ash pond will be examined based on soil investigation study. The dykes around the pond will be constructed with proper compaction at maximum dry density. The co-efficient of permeability will be much less than the natural deposits to further reduce the drainability. However, with the passage of time, more and more fly ash particles will get deposited in the pore spaces of the top soil making it essentially non-porous and impervious and in view of the above, contamination through leaching is not envisaged. However, it is also proposed to provide the ash pond with an impervious bottom HDPE layers.

In view of the above mitigative measures, no surface water or groundwater pollution is anticipated from the ash disposal area. Similarly, as the other solid wastes also used properly, no impact of solid waste is envisaged.

- **Site Drainage**

Rain water from open area between the buildings and plant road will be drained by gravity to storm water ditches or gullies along plant road. Reinforcement cement concrete (RCC) covers will be provided for drain trenches within area of the route that surrounds main house and switch yard. The ditch will also be connected to the cutoff point for draining rainwater. The first one is arranged at the north of the coal stock pile yard. The second one is arranged at the south of the coal stock pile yard. The third one and fourth one are arranged between coal stock pile yard and main house. The ditch will be provided along the edge of coal stock pile yard to collect rainwater. The rainwater from ditch will be discharged into coal yard area rainwater settling pond. Hence no impact is envisaged on drainage of power area.

4.3.8 Impact on Ecology

Impact on Terrestrial Ecology

The impact on terrestrial ecology may occur due to emission of gaseous pollutants like SO₂, PM and NO_x.

➤ **Presentation of Modeling Results**

The impact of air pollutants on vegetation due to the proposed power plant is identified and quantified by using air dispersion modeling. The simulations have been done to evaluate PM, SO₂ and NO_x likely to be contributed by the proposed project activities, the resultant concentrations for study period are within the limits as per National Ambient Air Quality Standards.

➤ **Impact on Aquatic Ecology**

Since the unit will be operating on zero discharge process, no adverse impact on aquatic ecology is envisaged. The plant drainage system will be suitably designed such that the storm water does not carry any pollutants.

➤ **Impacts of Air Emissions on Reserved Forest and Eco-sensitive Areas**

Since 275 m stacks are planned for the proposed power project and adequate control measures are planned, the pollutants like particulate matter, SO₂ and NO_x will be minimum and well dispersed into the atmosphere and shall not have a significant impact on the surrounding residential and rural areas and also will not cause any significant impact or damage to the existing vegetation present near the plant.

However, the proposed development of about 50 m to 100 m wide greenbelt all along the boundary of the project site is expected to contribute positive impact towards improved soil stabilization, prevention of top soil erosion, increased vegetative cover, density and diversity of flora etc. It will also improve the aesthetic look of the surrounding area.

4.3.9 Impact on Socio-Economics

The requirement of unskilled manpower will be met from nearby villages during construction phase. There will be a general upliftment of standard of living in the region.

The project will also induce the development of up-stream and down-stream ancillary and related small-scale industries in the adjoining areas. It is obvious to assume that the activities of the proposed project operations will produce some improvements in the socio-economic levels in the study area.

The anticipated impact of this project on various aspects is described in the following sections.

This project will have an impact on the population growth, as it will provide some employment to the families in the nearby villages. It is assumed that half of the employees will be from the study area itself.

This project will also create many job opportunities for the local people. Local people will be given preference whenever found suitable for all the jobs in the plant. The employment of people will be both on permanent as well as on contract basis. Thus, the project will have a positive impact on the employment pattern of the region.

- **Impact on Literacy and Educational Facilities**

The literacy level of the project area is likely to increase as there will be influx of many educated people taking up jobs in the plant, which is likely to result in establishment of better educational facilities. Better literacy rates are possible due to assumed better economic conditions of the people. Better literacy means better social status and will improve the life style in the region. This will be a positive impact due to the proposed project.

- **Impacts on Infrastructure Development**

The availability of social infrastructure depends to a large extent on the industrialization of the area. The establishment of the power plant would aid in the overall social and economic development of the region. Apart from jobs, TSGENCO will provide medical and educational facilities to the employees, which can also be availed by the people around the plant. There will be significant growth in the infrastructure of the area. The company is also dedicated towards community development by organizing immunization programs and medical camps, mobile dispensary etc.

- **Impact on Economic Aspects**

The impact of the project activities on the economic aspects can be clearly observed. The proposed project activities will provide employment to persons of different skills and trades. The local population will have preference to get an employment on the basis of experience and qualification. The employment potential will ameliorate economic conditions of these families directly and provide employment to many other families indirectly who are involved in business and service oriented activities. These will in turn improve the socio economic conditions of the area.

- **Indirect Socio-economic Impacts**

The discharge of waste materials (stack emission, wastewater and solid wastes), from process operations can have potential impact on public safety and health. The impact from the discharge of waste products is not expected to be significant since, the adverse impacts on ambient air, water and soil quality are predicted to be low. It is predicted that the impacts on public safety will be very low, due to the effective safety system and safety management available in the plant. Overall, the impact on public safety and health from the proposed project activities are likely to be insignificant.

- **Impact on Other Sensitive Locations**

There are no buildings of public interest and monuments notified by archaeological department in and around the project area. Thus, there will not be any impact on the tourist/religious or historical important places due to proposed project.

4.4 Irreversible & Irretrievable Commitments of Environmental Components

This section describes the irreversible and irretrievable commitments of resources associated with implementation of the proposed project.

A commitment of resources is irreversible when primary or secondary impacts limit the future options for a resource. It applies primarily to the effects of use of nonrenewable resources, such as minerals or cultural resources, or to those factors, such as soil productivity or forest health, that are renewable only over long periods of time. An irretrievable commitment refers to the use or consumption of a resource that is neither renewable nor recoverable for use by future generations. It applies to the loss of production, harvest, or use of natural resources.

Both irreversible and irretrievable commitments of resources would occur with the implementation of the proposed project.

Due to implementation of the proposed project an irreversible commitment of land would occur within the project site where relatively waste land, with less productive single dry crop agricultural land would be converted into industrial use due the proposed project. The disturbed land may represent irreversible commitments of resources because they will never recover to their former vegetation cover and composition. Similarly, upliftment of socio-economic structure of people in study area, the productive and unproductive lands would be converted into non-agricultural use and also waste lands in study would be converted into agricultural and horticultural purposes.

4.5 Mitigation Measures

The Environment Management Plan (EMP) is required to ensure sustainable development in the study area (10 km) of the plant, hence it needs to be an all encompassing plan for which the plant authorities, Government, Regulating agencies like Pollution Control Board etc working in the region and more importantly the affected population of the study area need to extend their cooperation and contribution.

The Management Action Plan aims at controlling pollution at the source level to the extent possible, with the available technology, followed by treatment measures before they are discharged.

Sound Environment Management Plan by the plant authorities is required to mitigate the impacts of the proposed modernization of plant with its surrounding environment. The Management Action Plan aims at controlling pollution at the source level to the maximum possible extent with the available and affordable technology followed by treatment measures before they are discharged. Specifically, the EMP lays stress on key environmental aspects and issues of the project during operation phase by:

- Identifying potential environmental impacts;
- Recommending mitigation measures for the negative impacts;
- Identifying opportunities for enhancement measures;
- Providing an organizational framework for operating Environment Management System and other functions of the project by assigning roles and responsibilities for environmental monitoring and management;
- Formulating Environmental Action Plans (EAPs) which specify mitigation, periodic and annual monitoring activities during project implementation and operation.

The potential environmental impacts from the proposed project are identified and the magnitude of these impacts also predicted. The potential environmental impacts to be regulated from the proposed plant are summarized below:

- Air pollution due to the emission of particulate matter and sulphur dioxide;
- Noise pollution due to various noise generating equipment;
- Wastewater generation from TPP as well as from domestic activities; and
- Solid waste (STP sludge + Flyash) disposal.

In order to minimize these adverse impacts and to ensure that the environment in and around the project site as well as the neighbouring population is well protected, an effective Environment Management Plan is developed for construction phase as well as operational phase.

4.6 Summary of Anticipated Environment Impacts and Mitigation

The summary of anticipated adverse environment impacts and mitigation measures are given in **Table 4.66**.

Table 4.67: Anticipated Adverse Environmental Impacts and Mitigation

Discipline	Potential Negative Impacts	Probable Source	Mitigative Measures	Remarks
Constructional Impact				
Water Quality	Increase in suspended solids due to soil run-off during heavy precipitation	Loose soil at construction site	During monsoon season run off from construction site will be routed to a temporary sedimentation tank for settlement of suspended solids.	—
Air Quality	Increase in dust and NO _x concentration	Leveling activity and Heavy vehicular movement	Sprinkling of water in the construction area and on unpaved roads. Proper maintenance of vehicles will be done.	The impact will be low, as the main approach road will be tarred.
Noise	Increase in noise level	Construction equipment	Equipment will be kept in good condition to keep the noise level within 90 dB(A).	Workers will be provided necessary protective equipment e.g. ear plug, earmuffs.
Terrestrial Ecology	Clearing of Vegetation	Soil enabling activities	Landscaping and extensive plantation will be done.	Plantation will be done.
Socio-economics	Land oustees	Land Acquisition	Land being acquired is not inhabited. Hence, there is no displacement of people.	Land is being acquired on mutual basis after paying adequate compensation.
Operational Impact				
Water Quality	Deterioration of surface water quality	Discharge from various plant units	Adequate treatment facilities will be provided so that the treated effluents conform to the regulatory standards.	The plant effluent after treatment will be reused to maximum possible extent. All treated effluents will be brought to the guard pond for



Discipline	Potential Negative Impacts	Probable Source	Mitigative Measures	Remarks
				dilution and will be used for horticulture and greenbelt development, dust suppression.
Air Quality	Increase in PM, SO ₂ and NO _x levels in ambient air.	Stack emissions and coal stockyards and CHP.	99.9% efficient ESPs will be installed to control Particulates. Stack of 275 m will be provided for the proper dispersion of pollutants. Motorable roads in the plant area will be paved to reduce dust emission. Afforestation programs will be undertaken around the plant area. Dust suppression measures will be implemented in the coal Handling Plant and stock yards	The resultant air quality will conform to the stipulated standards. Particulate emission from stack will be kept below 50 mg/Nm ³ .
Solid waste	Fly ash and bottom ash	From the ESPs	Ash will be supplied to cement industries.	The unused ash will be stored in ash dyke, which will be provided with adequate lining to prevent contamination of ground water. Dust generation in ash dyke will be controlled by maintaining wet condition



Discipline	Potential Negative Impacts	Probable Source	Mitigative Measures	Remarks
				over ash pond.
Ecology				
a. Terrestrial	Impact on plant species	Emissions from stack	Emission will be controlled as well as dispersed through appropriate design.	As Ambient air quality will be within limits, no active injury to the vegetation is expected
b. Aquatic	Impact on water bodies	Treated waste water from plant	The wastewater will be provided with adequate treatment and diluted in Guard Pond and the treated wastewater will be used for Horticulture purposes.	As all the effluents will be treated to conform to prescribed limits, no significant impact on aquatic life is expected
Noise	Increase in noise levels in the plant area.	Equipment in main plant and auxiliaries.	Equipment will be designed to conform to noise levels prescribed by regulatory agencies. Provision of green belt and plantation would further help in attenuating noise.	Employees working in high noise areas would be provided earplugs/ earmuffs as protective device.
Demography and Socio-economics	Strain on existing amenities like housing, water sources and sanitation, medical and infrastructure facilities.	Influx of people of proposed power plant employees as well as contractor's employees/ laborers.	Local population will be given preference in awarding work. No significant impact is envisaged. Additional facilities will be developed by the project proponents.	Overall socio-economic status of the area is expected to improve.

4.7 Environment Management Measures during Construction Phase

The construction phase involves site preparation, transportation of construction materials, equipment and construction of the infrastructure. During this phase it is imminent that workers/labourers would be staying on site till the completion of construction. However, this is not a long term impact as this is a temporary phase. It is envisaged that there would be some effect on the existing environment. The project proponents, in order to minimize these impacts, would undertake the required preventive and remedial measures which are outlined hereunder.

4.7.1 Air Quality Management

No excavation of the area except for the purpose of foundation is envisaged. However, during dry weather conditions during construction phase, it is necessary to control the dust generated by excavation and transportation activities. Such activities will be carried out by continuous water sprinkling in the construction area. The activities like site development, grading and vehicular traffic contribute to increase in PM and NO_x concentration during construction phase.

However, these levels are expected to be insignificant since these emission sources will, in large part, only be operated intermittently. More over most of the items except for generators are movable. Hence there will not be concentration of emissions at any single point. It should be ensured that both gasoline and diesel powered construction vehicles are properly maintained to minimize smoke in the exhaust emissions.

Fugitive dust emission will occur due to construction activity, like handling of material and transportation within the plant premises. Extensive tree plantation will be carried out along the plant boundary to control spread of fugitive emission. During dry weather conditions, it is necessary to control the dust emission arising out of the excavation, leveling, and transportation and stockpiling activities by water sprinkling. Following care would be taken for management of air quality during construction phase.

- The storage and handling of soil, sub-soil, topsoil and materials will be carefully managed to minimize the risk of wind blow down material and dust.
- There will be no on-site burning of any waste arising from any construction activity.
- Dust masks should be provided to construction workers, while carrying out operations that may entails potential for dust generation.
- All vehicles delivering construction materials or removing soil will be covered to prevent escape of dust.
- Water sprinkling in construction area;
- Asphaltting the main approach road;
- Proper maintenance of vehicles and construction equipment; and
- Tree plantation in the area earmarked for greenbelt development.

4.7.2 Water Quality Management

The soil erosion at site during heavy precipitation contributes to the increase in suspended solids. The wastewater from vehicle and construction equipment maintenance centre will contribute to oil and grease concentration. The wastewater from labour colony will contribute to higher BOD levels.

During the construction of the proposed power plant there is not likely to be ground water contamination as there will be no discharge of wastewater. The only major source of potential impacts arises from uncontrolled runoffs from the construction site and labour camps into ground water bodies. The proponents should be obligated to follow the procedures so as not to pollute ground water.

Sufficient and appropriate sanitary facilities will be provided in order to maintain hygienic conditions in the camp of construction laborers. The wastes such as sanitary wastes should be treated in septic tanks followed by soak pits of appropriate size and technology. The solid waste generated should be collected and disposed in an appropriate manner either at a landfill site or used as compost for agriculture uses. Area for maintenance of vehicles should be so located that contamination of groundwater by accidental spillage of oil can be prevented.

The following pollution preventive measure will be under taken:

- Sedimentation tank to retain the solids from run-off water;
- Oil and grease trap at equipment maintenance centre;
- Septic tanks to treat sanitary waste at labour colony; and
- Utilizing the wastewater in greenbelt development.

4.7.3 Noise Level Management

Operation of construction equipment and vehicular traffic contribute to the increased noise level. Recommended mitigation measures are:

- Good maintenance of vehicles and construction equipment;
- Restriction of construction activities only to day time;
- Plantation of trees around the plant boundary to attenuate the noise; and
- Provision of earplugs and earmuffs to workers.

4.7.4 Waste and Hazardous Material Handling

Hazardous materials such as diesel, fuel oil, lubricating oil during construction phase should be stored properly as per the safety regulations. Combustible wastes should be burnt in a controlled manner and other category of wastes should be disposed off at identified dump site. Accidental spillages of oil from construction equipment and storage sites should be prevented.

4.7.5 Ecological Management

Primarily the land required for setting up Thermal Power Plant is agricultural lands and there are not many large trees. Thus, the floral significance at the proposed plant site is negligible and impact of construction on flora will be negligible. However, transplantation of existing matured trees will be undertaken and transplanted in the area earmarked for greenbelt development.

Green Cover: In order to prepare the site for the construction work, there might be cleaning of shrubs present at the site. To counter the said situation proper landscaping and tree plantation in advance would be advantageous. Tree plantation (large size species) should be undertaken at the time of preparation of site so that they would grow to considerable size by time of commissioning of the proposed project. Construction workers should be provided with domestic fuel so as to prevent cutting of trees for firewood.

4.7.6 Socio-economic Environment

Given that the project and related developments like construction camps will be dependent on local resources (power, water), during both construction and operations, the only likely impact on infrastructure would be on the roads. Considering the high traffic during construction phase an effective traffic management scheme will be developed to avoid congestion on the nearby and local roads.

The area is located with tribal families and the tribal issues will be taken care in consultation with the district administration.

Action will be taken to implement the resolutions made according to R&R committee for development of tribals of the area belongs to project dependent families.

4.7.7 Health and Safety

Medical care will be provided for the labourers in the camps. Awareness programs will also be conducted on communicable diseases and their spread. The movement of heavy equipment should be done with proper precaution to prevent any accidents on the road.

Occupational risk should be minimized at the project site through implementation of a full proof safety system. Speed limit set for movement of vehicles will be 20 km/hr on village roads to reduce risk of accidents or injuries.

Safety training should be provided to all construction workers on operation of equipment. Security should also be extended during non-working hours to ensure there is controlled access to the machinery and equipment.

4.7.8 Infrastructure for Labours

TSGENCO will engage reputed and registered construction contractors. TSGENCO will ensure that the construction contractors follow all the applicable rules and regulations.

The basic amenities for the labour force during construction phase are proposed as per the international standards and IFC guidelines. The facilities comprise of the following:

- Temporary shelters will be provided for labours for resting;
- The clinic with first aid facilities will be made available;
- Drinking water facilities;
- Shelters will be ensured with structural safety and reasonable levels of decency, hygiene and comfort;
- Adequate sanitary facilities;
- Measures will be taken to prevent the spread of diseases. Separate facilities will be provided for sick workers to prevent the spread of transmissible diseases among the occupants;
- Fire safety measures will be taken, including installing and maintaining fire equipment (alarms, extinguishers, etc.);
- Workers will be trained in fire procedures; and
- Strict ban on child labour

4.8 **Environment Management Plan during Operation Phase**

During operation phase, the impacts on the various environmental attributes should be mitigated using appropriate pollution control equipment. The Environment Management Plan prepared for the proposed project aims at minimizing the pollution at source.

4.8.1 Air Pollution Management

Fugitive and stack emissions from the power plant will contribute to increase in concentrations of PM, SO₂ and NO_x pollutants.

The control measures to combat air pollution due to proposed power plant have been formulated under two categories, i.e. for individual units as well as for the whole power plant in general. These are delineated hereunder:

Coal Handling System: Dust emission is mostly of fugitive type and necessities installation of close conveyor system along with suitable dust trapping/control facility at various transfer points. At coal yard, to prevent dust emission due to wind, frequent spraying of water is recommended. This also helps in preventing spot fires.



Coal Crusher and Bunkers: For the fine dust control, bag filters have been successfully tried in such operations. Better efficiency dry collection system shall prove to be long term cost effective because of possibility of coal recovery in the process.

Flue Gas: For high efficiency collection of fly ash in flue gas from the boiler, a high efficiency ESP is proposed to be installed in this plant and that would be designed to limit the emission of the particulate matter for permissible level. Sprinkling of water will be applied at the dust generating areas.

As far as gaseous pollutants namely NO_x and SO_2 are concerned, control measures will be taken by provision of 275 m stacks as per regulations in the EPA, 1986.

The general mitigative measures which will be followed to control the impact on air environment are:

- Installation of ESP followed by fabric filter of 99.9% efficiency to limit the PM concentrations below 30 mg/Nm^3 ;
- Provision of 275 m high stacks for wider dispersion of gaseous emissions;
- Provision of water sprinkling system at material handling and storage yard;
- Transportation of ash by closed bousers;
- Continuous water sprinkling at ash dyke to prevent generation of fugitive dust;
- Cement Concrete roads within the plant area; and
- Development of Greenbelt around the plant to arrest the fugitive emissions.
- The combustion units shall be maintained properly for obtaining optimum efficiency and to ensure that the emission rates remain within estimated levels; and
- The fugitive emissions of coal dust from storage facilities, from crushers and at coal transfer points shall be reduced by adopting appropriate measures like cyclones/ bag filters/ water sprinklers/ fog system.

4.8.2 Water Pollution Management

The wastewater will be generated from cooling towers in the power plant. Additionally, domestic wastewater from canteen and employees wash area will also be generated. The following measures will be followed to minimise the impacts and conservation of fresh water:

- Utilizing the wastewater from cooling towers for ash and coal handling systems;
- Utilizing wastewater for sprinkling over ash disposal area to arrest fugitive dust;
- Treating wastewater from ash dyke in ETP and utilizing in the process;
- Provision of RO to achieve zero discharge
- Provision of STP to treat domestic sewage from plant and colony;
- Treated domestic wastewater for greenbelt development;
- Lining of guard and ash dyke suitably to prevent any seepage into ground to avoid any groundwater contamination;
- Lining of ash dyke to prevent percolation of water into ground; and
- Suitable rainwater harvesting structures to be constructed.

The wastewater from various units of the plant shall be appropriately treated and disposed. The details are presented in the **Table 4.67**.

Table 4.68: Units and Type of Treatment Proposed

Sr. No.	Units	Type of treatment proposed
1	Cooling tower blow down	consumed as for Service water requirement and dust suppression and for Ash handling system
2	Clarifier Blow down	Centrifuged watered sent to ETP for partial recovery and rest to gardening.
2	Oily water from Floor Wash, Transformer yard and Fuel oil Tank	Treated in OWS, and sent to ETP for partial recovery and rest to gardening.
3	Waste Water from DM	Neutralized waste water will be sent to ETP for partial recovery and rest to gardening.
4	Back wash from Gravity filters	Sent to ETP for partial recovery and rest to gardening.
5	Auxiliary steam condensate from Fuel tank heating line tracing	Sent to for partial recovery and rest to gardening.
6	STP Waste water	Treated in the STP and directly sent for Gardening

Fuel oil storage areas will be provided with concrete embankments to contain spills. Regular oily wastewater shall be treated before discharge. Areas, prone to spillage shall be connected to a drainage system and will undergo adequate treatment before discharge.

A stilling pond will be provided by the side of ash pond to allow ash water to flow from settling pond where the suspended solids will be reduced by alum addition. The water thus clarified will be pumped to ash water tank for recirculation to ash handling system.

- ETP would be planned, completed and commissioned along with the commissioning of the Proposed Power Plant. Following measures are recommended for ETP:
- Evaluation of the ETP and STP for its performance after its commissioning should be undertaken at regular intervals to keep a check on the treated effluent quality.
- Trained personnel should be engaged for operating the effluent treatment plant.
- In-plant control measures should be implemented to minimize the quantities of Waste water generation.

In addition to the above, to keep control on biological treatment, regular monitoring of effluent quality is also recommended.

♦ **Wastewater Treatment - Sewage Treatment Plant (STP)**

The treatment given in the STP shall be both chemical and biological. The effluent will be treated adopting the following steps:



- Collection and Conveyance of sewage to STP;
- Screening;
- Grit removal;
- Aeration for biological treatment;
- Secondary settling (biological sedimentation);
- Coagulation and Clariflocculation;
- Filtration; and
- Drying of chemical and biological sludge.

- **Bar Screen Channel**

Two manually cleaned screens will be provided. One screen will be operated at a time and the other will be standby.

- **Grit Chamber**

Two manually cleaned grit channels will be provided for removal of grit from the effluent. One channel will be operated at a time.

- **Aeration System**

Sewage after screening and de-gritting waste will be fed into the aeration tank. In addition to this, return sludge from the clarifier will also be sent to the inlet of aeration tank. Here, the effluent will be aerated to oxidize the organic matter. Microorganisms present in the return sludge oxidize the organic matter and use it as food and form their own cell mass. Thus, microorganism cell mass concentration continues to rise. The cell mass when removed in subsequent stage of settling, reduces the oxygen demand considerably.

The aerators provided on the platform maintain the contents in aerobic conditions by maintaining adequate oxygen transfer rates. They also provide adequate mixing of the contents and thereby contents do not settle on the floor of the tank. The flow from the outlet launder goes to the secondary clarifier.

- **Secondary Sedimentation**

When liquid-containing solids in suspension is placed in a relatively quiescent state, those solids having a higher specific gravity than the liquid will tend to settle, and those with a lower specific gravity will tend to rise. These principles are used in the design of sedimentation tanks for treatment of wastewater. The objective of treatment by sedimentation is to remove, readily settleable solids and floating material and thus to reduce the suspended solids content.

The mixed liquor from aeration tank will be carried to the center of the tank in a pipe encased in concrete beneath the tank floor. At the center of the tank, the wastewater enters a circular well, designed to distribute the flow equally in all directions. The sludge removal mechanism revolves slowly and has arms equipped with scrapers. The hopper collects the sludge, which is sent to the sludge drying beds. The sludge produced is known as biological sludge.

- **Clarifloculator**



The working is similar to that of secondary clarifier described above, except that additional flocculator compartment is provided for formation of flocs with the help of coagulant viz. alum.

- **Pressure Filter**

The effluent from the clariflocculator will be subjected to tertiary treatment, in order to further reduce the suspended solids in the effluent. One filtration unit will be provided to remove colloidal flocs and turbidity carried over from clariflocculator. The filtration unit consists of filter feed pumps, dual media pressure filter, frontal piping and air blower for air scouring.

- **Drying of Chemical and Biological Sludge**

Sludge drying beds will be provided to de-water the sludge containing about 95-99% water. The dewatered sludge, in the form of dried cake, will be disposed off. Sludge is spread on the media containing gravel and sand. Simple physical straining of solid takes place. Water is partially evaporated at ambient temperature. At the bottom of the media, a collection system comprising of open jointed pipes will be provided to collect the filtrate. The entire system is enclosed by brick masonry. Filtrate is carried to influent sump.

- **Ash Dyke/Pond**

- *Philosophy of Design*

The ash storage mound will be built up by moistened furnace bottom ash and pulverized fly ash using Trucks, Bulldozers, Vibratory Roller Compactor, etc.

- **Rain Water Harvesting System**

There will be generation of surface run-off from the proposed plant facility during monsoon season. The run-off from the paved surfaces of the proposed facility will be routed through a carefully designed storm water drainage network and collected in storm water collection sump.

For augmenting the ground water resources in the proposed plant, a number of rainwater harvesting pits/bore wells will be constructed and surface run-off water will be diverted to these harvesting pits/bore wells. These structures will facilitate percolation of water into the ground, thus augmenting the groundwater sources. This will result in increase in groundwater tables.

To facilitate water harvesting, collection and storage of rainwater and also reduction in water consumption, the following measures will be adopted:

- The storm water treatment facility will be located at an appropriate location on the site keeping in view the slope contours and collection point;
- Use of low flow fixtures and appliances for reduced water consumption such as low flush water closets and cistern will be considered;
- Sewage generated will be treated in the sewage treatment plant and reused for green belt to reduce the fresh water requirement;

- The storm water from paved areas and rain water from the roof tops of various buildings will be treated for the removal of oil & grease, sediments and routed to the water harvesting structures to recharge the ground water table;
- The storm water from the pervious area will also be routed to the rainwater harvesting structures;
- The storm water in rainy season will be stored to the maximum extent and utilized in fire fighting facility and balance will be routed to Rain Water Harvesting structure after treatment; and
- In general, dry cleaning methods would be practiced in workshop and maintenance areas for cleaning. High-pressure hoses will be used for area cleaning, only where required.

The rainwater harvesting scheme for the project is provided in **Figure 4.26**.

• **Storm Water Management**

The plant water management system will be designed to minimize the potential for storm water contamination occurring at the site. This will be achieved by incorporating the following features into the storm water management system:

- Run-off from upstream areas will be diverted to river through garland drain around the plant site ;
- The quantity of contaminated run-off generated will be minimized by diverting run-off from areas external to the plant to storm water discharge points;
- Hazardous material and fuel storage areas will be bounded and drains will be provided to around these facilities to prevent entering of run-off water; and
- Run-off from area external to process areas of the plant will be contained within a storage system.



Chapter-4: Anticipated Environmental Impacts and Mitigation Measures

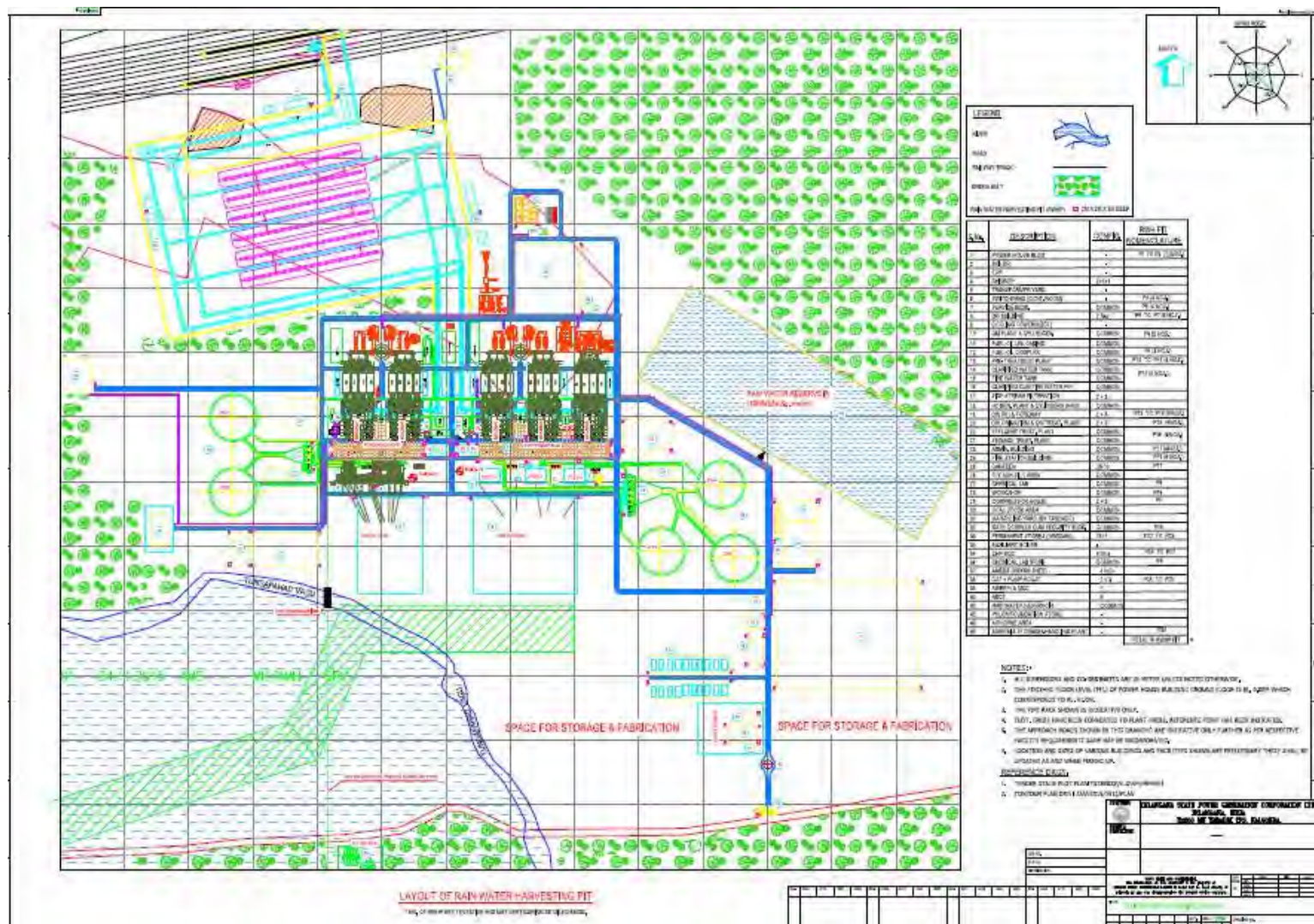


Figure 4.27: Rainwater Harvesting Scheme

4.8.3 Noise Pollution Management

Manufacturers and suppliers of noise generating devices/machines like steam turbine generator, compressors and other rotating equipment shall be asked to provide acoustic enclosures for noise control by adopting appropriate design and state of art technology for fabricating/assembling machines.

Proper noise barriers/ shields etc shall be provided around the equipment wherever required. Noise from equipment shall be adequately attenuated by providing soundproof enclosure and insulation to minimize the noise level.

- **Recommendations for Noise Management**

To reduce the impact of noise, shock absorbing techniques may be adopted

- Equipment will conform to noise levels prescribed by regulatory authorities (<85 dB (A));
- All opening like covers, partitions may be acoustically sealed
- The operator's cabin (control rooms) should be properly insulated with special doors and observation windows
- The operators working in the high-noise areas would be strictly instructed to use earmuffs/ ear plugs
- Noise levels will be reduced by the use of absorbing material on floors, walls and ceilings
- There will be thick vegetation in the plant premises to attenuate continuous noise.

4.8.4 Solid Waste Management

The main solid waste from the power plant complex will be the ash (fly ash and bottom ash). The total ash generation from the proposed power plant will be about 3.9 MTPA. Out of this, the bottom ash will be about 0.8 MTPA and balance 3.1 MTPA will be fly ash. As per fly ash Notification, will be utilized 100% of the fly ash generated from the proposed power plant is to be utilized with in four years from the date of commissioning of the project.

- **Fly Ash use in Cement Industries**

Cement mixed with fly ash is known as Portland Pozzolana Cement (PPC). As per the Indian standards, fly ash can be used to replace 30% cement. The fly ash cement is made by grinding with clinker. The fly ash generated from proposed power plant will be supplied to cement plants in the region. The fly ash can be utilized by these cement plants to manufacture PPC cement.

- **Fly Ash use in Road Construction**

Fly ash can be used as a component in a stabilized aggregate sub-base course. A blend of 84% dense aggregate, 11% pond fly ash and 5% hydrated lime gives maximum dry density, optimum moisture content and unconfined compressive strength.

There are about 12 cement industries within a radius of 50 kms and 10 more cement industries within the radius of 200 kms. It is proposed to issue fly ash to the above cement industries from the plant. Further it is also proposed to setup two fly ash brick manufacturing units in the plant premises for manufacturing fly ash bricks and utilize the same for construction of plant buildings, residential quarters and also issue to local builders for their requirement. Also many entrepreneurs are coming forward to setup their own manufacturing fly ash brick plants.

The fly ash will also be issued to other Government departments who ever come forward for utilizing fly ash in their construction activities.

The following cement industries have come forward to lift the Fly ash from the proposed project.

1. M/s Parashakti Cement Industries Ltd
2. M/s Nagarjuna Cements
3. M/s The India Cements Ltd
4. M/s Penna Cement Industries Ltd
5. M/s Andhra Cements Ltd
6. M/s Sri Chakra Cements Ltd
7. M/s Anjani Portland Cements Ltd
8. M/s Deccan Cements Ltd

The willingness letters are provided as **Annexure 13**.

- **Prospective Ash Utilization**

It is very much clear that the ash generated at the power plants can be effectively used for various products.

- **Ash Disposal Plan to Ash Storage Yard**

As per the MoEF&CC Notification, the ash utilization schedule is given below in **Table 4.68**.

Table 4.69: Ash Utilization Schedule

Year	Fly Ash Generation MTPA	Fly Ash Utilization		Fly Ash Diverted to Ash Pond, MTPA	Cumulative Total, MTPA
		Percentage (%)	MTPA		
1 st	3.9	25	0.975	2.925	3.9
2 nd	3.9	50	1.950	1.950	7.8
3 rd	3.9	75	2.925	0.975	11.7
4 th	3.9	100	3.9	0	15.6

• Policy on Fly Ash Utilization

Utilization of ash produced by coal based power stations as a thrust area of its activities and all possible actions will be taken to enhance level of ash utilization. In the proposed power plant, various avenues for ash utilization will be explored as delineated in the above sections. In particular, supply of quality ash for manufacture of cement will be taken as there are some cement units in the 100 km radius area.

TSGENCO has obtained commitment from major cement producers who are willing to give commitment to take fly ash generated. The process of agreements with cement units for lifting fly ash is under progress.

Some of the additional actions planned for utilization of ash are as given below:

- TSGENCO will make efforts to motivate and encourage entrepreneurs to set up units for manufacture of ash-based products such as fly ash bricks, lightweight aggregates, cellular concrete products etc as ancillary industries in the region. TSGENCO would be providing all possible infrastructure facilities to these entrepreneurs in accordance with its policy;
- TSGENCO would also continue to encourage utilization of available ash based products in all its construction activities; and
- TSGENCO will encourage the use of water treated fly ash as a soil ameliorator and as a source of micro-nutrients and secondary nutrients for improving agricultural productivity.

• Fly Ash Disposal

The balance ash after utilization shall be disposed in ash ponds. Ash disposal system proposed is High Concentrate Slurry Disposal (HCSD). Treated wastewater will be used in ash handling plant. The ash pond will be provided with LDPE liners. The area provided for ash pond is about 400 acre.

The major advantages of the HCSD method are:

- Very low water consumption;
- The slurry can be self-setting and self limiting so that ash will deposit and dry by itself to form a hard surface;
- Considerably less area is required for ash disposal;
- Specific energy consumption in pumping and transportation will be much lower;

- Pipeline diameter can be much smaller and transportation velocities could also be considerably lower due to the fact that the slurry is non-settling. This could also reduce wear in the pipeline;
- Both bottom ash and fly ash can be disposed together if needed; and

The trenches will be constructed along the periphery of the ash pond to collect the run-off water during rainy days. The run-off water will be routed through sedimentation tank before discharging into nalla.

The ash will be utilized in various construction materials to the maximum extent and 100% utilization will be achieved.

Used oil is the other solid waste generated in the plant, which is categorized as hazardous waste and will be supplied to authorized recyclers.

The major measures which will be followed to mitigate the impacts due to disposal of solid waste are:

- Whole fly ash generated in the plant shall be supplied to Cement Companies
- The bottom ash will be disposed off in ash pond, which will be provided with clay lining;
- Sufficient moisture content will be maintained in the ash dyke to prevent fugitive dust;
- The used oil will be given to authorized recyclers;
- The organic portion of sludge waste generated in the Sewage Treatment Plant (STP) will be used as manure in greenbelt development; and
- Maintaining the data base on solid waste generation.

• Literature on Fly Ash Utilization

• Conclusion

All efforts will be made for maximum utilization of ash. TSGENCO is committed to explore possibilities for ash utilization considering new technologies and avenues and try to achieve the target fixed by MoEF in this regard.

TSGENCO is committed to comply with the Fly Ash Utilization Notification and as amended thereof.

• Hazardous Waste Management

Hazardous solid waste in the form of waste oil, spent ion exchange material and water pretreatment clarifier sludge will be generated from the power plant. The oil will be collected in MS drums and will be sold to the recycler registered with TSPCB / Central Pollution Control Board. Sludge will be dried, bagged and sent for land-filling. Spent Ion exchange material will also be sent for land-filling.

4.8.5 Greenbelt Development

A 50-100 m wide greenbelt, consisting of at least 3 tiers around plant boundary will be developed as greenbelt and green cover as per CPCB/MoEF, New Delhi guidelines.

The plant density of 2,500 trees per hectare with local native species will be implemented. In the greenbelt area about **12,39,350** saplings will be planted with a density of 2500 trees/ha. The plantation schedule will be completed within five years from the construction period of the project. The plantation schedule is given in **Table-4.16(A)** and green belt area plan is given in Table- 4.15(B)

The greenbelt development plan is given in **Figure-4.27**.

TABLE-4.16(A)
GREENBELT DEVELOPMENT SCHEDULE

Sr. No.	Year	Area (ha)	No. of Saplings
1	1 st	99.15	247870
2	2 nd	99.15	247870
3	3 rd	99.15	247870
4	4 th	99.15	247870
5	5 th	99.15	247870
Total		495.75 (1225 Acres)	12,39,350

TABLE-4.16(B)
GREEN BELT AREA PLAN

Sr. No	Particulars	Extent of green belt (Acres)
1	South – West of vagu & road	545
2	Plant Area (North east of vagu)	680
3	Total area	1225

1. The total extent of the land proposed for the project - Ac 2800
2. Extent of area proposed for green belt -Ac 1225
3. Percentage of green belt area proposed - 43.75 (say 44 %)

The following will be designed and implemented as per the latest CPCB guidelines. The broad aspects to be covered are given below:

- Shrubs and trees will be planted in encircling rows around the project site;
- The short trees (<10-m height) will be planted in the first rows (towards plant side) of the green belt. The tall trees (>10 m height) will be planted in the outer rows (away from plant side);
- Planting of trees in each row will be in staggered orientation (triangular form);
- In the front row, shrubs species of native origin should be planted;
- Since the trunks of the tall trees are generally devoid of foliage, it will be useful to have shrubs in front of the trees so as to give coverage to this portion; and

- The spacing between the trees will be maintained slightly less than the normal spaces, so that trees may grow vertically and slightly increase the effective height of the green belt.

List of list of species showing high air pollution tolerance index (apti) is given in Table-4.17.

TABLE-4.17
LIST OF SPECIES SHOWING HIGH AIR POLLUTION
TOLERANCE INDEX (APTI)

Sr. No	Scientific Name	Common Name	Family	Air Pollution Tolerance Index levels
1	<i>Alstonia scholaris</i>	Saptaparni (Sanskrit), Edakula Ponna (Telugu)	Apocynaceae	For controlling Suspended Particulate Matter (SPM), SO ₂ , NOx and Noise
2	<i>Azadirachta indica</i>	Vepa, Neem	Meliaceae	For controlling Suspended Particulate Matter (SPM), SO ₂ , NOx and Noise
3	<i>Dalbergia sissoo</i>	Sisoo, Shisham	Fabaceae	For controlling Suspended Particulate Matter (SPM), SO ₂ , NOx and Noise
4	<i>Tamarindus indica</i>	Chinta, Imli	Cesalpiniaceae	For controlling Suspended Particulate Matter (SPM), SO ₂ , NOx and Noise
5	<i>Terminalia arjuna</i>	Arjuna	Combretaceae	For controlling Suspended Particulate Matter (SPM), SO ₂ , NOx and Noise
6	<i>Ficus bengalensis</i>	Marri	Moraceae	For controlling Suspended Particulate Matter (SPM), SO ₂ , NOx and Noise
7	<i>Pongamia pinnata</i>	Kanuga	Fabaceae	For controlling Suspended Particulate Matter (SPM), SO ₂ , NOx and Noise
8	<i>Madhuca indica</i>	Ippa, Mahua	Sapotaceae	For controlling Suspended Particulate Matter (SPM), SO ₂ , NOx and Noise
9	<i>Tectona grandis</i>	Teak	Verbenaceae	For controlling Suspended Particulate Matter (SPM), SO ₂ , NOx and Noise
10	<i>Melia azadirach</i>	Persian Lilac,	Meliaceae	For controlling

		Turka Vepa		Suspended Particulate Matter (SPM), SO ₂ , NO _x and Noise

All the above mentioned species are ideally suited for the ecological habitat of Dameracherla, Nalgonda district and they are all fast growing species of trees, ideal for taking greenbelt plantations.

4.8.6 Conservation Plan for Biodiversity

Plantation suggested in the buffer zone (with in 2 km. Radius from project site boundary - Likely Impact zone area) area in various habitats will act as a conservation plan to enhance population status faunal species and improve ecological conditions & associated biodiversity of the project study area. Moreover, following conservation measures will be implemented with consultation of forest department to strengthen biodiversity conservation in the project study area.

Conservation measures

Community and school level awareness programs will be carried out through organizing competitions during “Wildlife Week” and “Van Mahotsav” celebrations. Some provision of rewards to informers for the control of poaching and illegal trade in wildlife.

Carrying out census and research projects to know the potential threats and population status of the biodiversity.

Budget Allocation for Conservation of Biodiversity

- One awareness program for biodiversity conservation in various schools and villages: Estimated Expenditure of Rs 1,00,000/- every year
- 10 cash prizes of 1000 in a year will be awarded to the informer of poachers: Estimated Expenditure of Rs 10,000/- every year

4.8.7 Solar Power Harnessing

It is proposed to set up Solar PV panels on rooftop of all buildings of YTPS.

Technical Requirements for Rooftop Solar Power Panels

- Shadow free flat roof top area having proper drainage such as TG building, service building, Admin building, switchyard building, , CW pump house, ESP control room, Canteen building, raw water pump house, etc;
- Total distributed load of the roof top PV due to panels, supporting structures, equipment's and concrete blocks etc. and imposed load will not be more than 100 kg/m²;
- Proper approach to the roof top through lift / staircase; and
- Availability of water for panel washing.

• Recommended Technology

Crystalline Solar Photo Voltaic technology is recommended for the roof tops.

- The actual solar radiation available in the area of project will be measured to access the potential of power generation;
- Approx 10 m² area is required for generating 1 kW at roof top solar power generation. At YTPS effective area for utilization for roof top solar PV on rooftop building is about 31900 m². Considering 80% roof top area available for solar panel installations. The total solar power generation is estimated to be approx. 2552 KW;
- Solar PV panels will be mounted on the roof through non-corrosive module mounting structure. The support structure will not disturb the water proofing of the roof;
- Panel should be inclined at the angle equal to the latitude, facing towards south;
- The DC power generated by PV modules will be converted to AC voltage through string inverters or central inverter and will be injected to nearest available LT/HT switchgear assigned through isolation or step-up transformer. Accordingly provision of spare LT/HT module in the switchgear will be made available;
- Solar PV Plant on roof top of thermal power project to be developed as an EPC package which includes design, supply, erection and commissioning.

• Implementation Schedule and Methodology

Implementation schedule for "Roof Top Solar PV Plant" will be ranging from 6-9 months from the issuance of clearance, depending upon the size of the plant and will be commissioned before commercial operation of the unit.

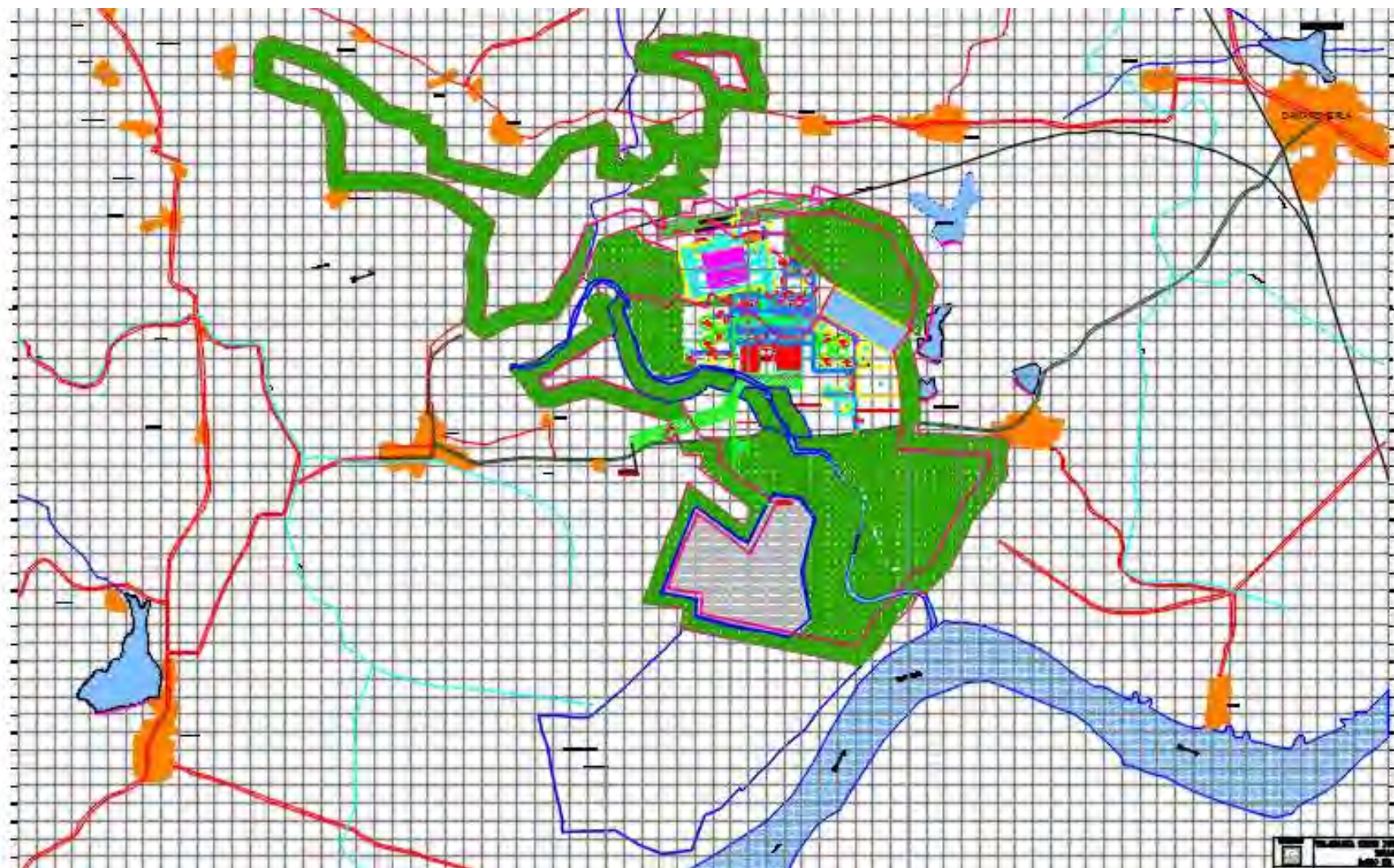


Figure 4.28: Proposed Greenbelt in Plant Area



4.9 Environment Management System

Environment policy at industry level is yet to be defined formally. Standards are stipulated by various regulatory agencies to limit the emission of pollutants in air and water. Similarly, a mandatory practice is recommended for preparing an Environment statement each year in order to encourage the industries to allow efficient use of resources in their production processes and reduce the quantities of waste per unit of product. This in itself is not sufficient since this does not provide an assurance that its environment performance not only meets, will continue to meet, legislative and policy requirements.

Hence, Environment Management Systems (EMS) are suggested at the industry level for ensuring that the activities, products and services of the region conform to the carrying capacity (supportive and assimilative capacity) of the environment. Since this is more in line with the quality systems, it is proposed to develop one as outlined in the following sub sections. The EMS - its set-up, role and responsibilities is given below.

• **Formation of an Environment Management System**

The environment management system for the power plant will enable it to maximize its beneficial effects and minimize its adverse effects with emphasis on prevention. It will:

- Identify and evaluate the environment effects arising from the plant's activities;
- Identify and evaluate the environment effects arising from incidents, accidents and potential emergency situations;
- Identify the relevant legislative and regulatory requirements;
- Enable priorities to be identified and pertinent environment objectives and targets to be set;
- Facilitate planning, control, monitoring, auditing and review of activities to ensure that the policy is complied with; and
- Allow periodic evaluation to suit changing circumstances so that it remains relevant.

• **Implementation of an Environment Management System**

The top management of the power plant is committed to development of its activities in an environmentally sound manner and supports all efforts in achieving this objective. In pursuance of this, formal environment management system shall be established during the operating phase of the plant which shall carry out periodic environment review, covering the following four areas:

- * Legislative and regulatory requirements;
- * Evaluation and registration of significant parameters and their environment impacts;
- * Review of environment management practices and procedures being proposed; and



- * Assessment of feedback from investigation of previous environment incidents and noncompliance with legislation, regulations or existing policies and procedures.

The environment review shall address the following:

- * The nature and extent of problems and deficiencies;
- * The priorities to be accorded to rectify them; and
- * An improvement program designed to ensure that the personnel and material resources required are identified and made available.

• **Environment Management Records**

The power plant shall establish and maintain a system of records to demonstrate compliance with the environment management systems and the extent of achievement of the environment objectives and targets. In addition to the other records (legislative, audit and review reports), management records shall address the following:

- * Details of failure in compliance and corrective action;
- * Details of complaints and follow up action;
- * Appropriate contractor and supplier information;
- * Inspection and maintenance reports;
- * Monitoring data; and
- * Environment training records.

• **Environment Management Reviews**

The senior management shall periodically review the EMS to ensure its suitability and effectiveness. The need for possible changes in the environment policy and objectives for continuous improvement shall be ascertained and revisions made accordingly.

4.10 Implementation Schedule of Mitigation Measures

The mitigation measures suggested in Chapter-4 shall be implemented so as to reduce the impact on environment due to the operations of the proposed project. In order to facilitate easy implementation of mitigation measures, the phased priority of implementation is given in **Table 4.69**.

Table 4.70: Implementation Schedule

Sr. No.	Recommendations	Time Requirement	Schedule
1	Air pollution control measures	Before commissioning of respective units	Immediate
2	Water pollution control measures	Before commissioning of the plant	Immediate
3	Noise control measures	Along with the commissioning of the Plant	Immediate
4	Ecological preservation and up gradation	Stage wise implementation	Immediate & Progressive



5.0 ANALYSIS OF ALTERNATIVES

5.1 Analysis of Alternative Sites for Location of Power Plant

Three (3) probable locations were assessed for site selection:

- Site #1: Village Punukulachilka of Kothagudem Mandal, Khammam District, Telangana State;

Coordinates: 17° 44' 41.53"N 80° 33' 44.84"E

- Site #2: Karukonda and Kunaram villages, Kothagudem mandal, Khammam district, Telangana State; and

Coordinates: 17° 36' 31"N 80° 34' 52"E

- Site #3: Veerlapalem village, Dameracherla mandal, Nalgonda district, Telangana State.

Coordinates: 16° 40' 19"N, 79° 35' 18"E

Site Selection Criteria

Site # 3 is chosen for the following reasons:

Based on the site selection team assessment, the site-III is selected for establishment of the thermal power station.

- The site-III is a Government forest land
- Good road connectivity
- Rail connectivity
- Availability of nearby water source in the form of Krishna river
- Availability of land
- Existence of many cement industries in vicinity of the proposed power plant for utilization of fly ash

Site #1 is not chosen for the following reasons:

- The land availability is 8800 acres. This land falls under Kinnarasani Wild Life Sanctuary and the area falls under eco-sensitive zone. Hence this site is not considered.

Site # 2 is not chosen for the following reasons:

- The site is endowment land to an extent of 4916.33 Acres available with pattedar passbooks and presently under the possession of Amba Satram under the



maintenance of Sree Seetha Ramchandra Swami vari Devasthanam, Bhadrachalam which was registered with endowment department Khammam district.

- A Writ Petition is pending in Honourable High Court and Honourable High Court has granted stay for all further proceedings in relation to the acquisition of lands belonging to the temples Hence this site is not considered

5.2 Analysis of Alternative Technologies for the Proposed Power Plant

For the proposed thermal power project the Sub Critical and Super Critical technologies were examined. Super critical boilers were selected due to the following advantages:

The main advantages of adopting higher unit size of 800 MW with supercritical parameters are brought out below:

From Plant Performance Point of View

- Reduction in coal consumption.
- Reduction in ash generation.
- Reduction in effluent gasses to atmosphere.
- Reduction in suspended particulate matters to environment.
- Better performance during off-design operation due to variable “Evaporate End Point”.

From Operation Point of View

- Better heat rate at full load as well as partial load.
- Lesser percentage of auxiliary consumption, hence increase in net power export.
- Lesser startup time and hence less consumption of startup fuel and power.
- Quicker load following capabilities i.e. better response to load rise / fall.
- Lesser consumption of cooling water.
- Boiler drum is eliminated hence no need of level control.
- More favourable for frequent start / stop even for two-shift operation.
- Lesser requirement of service like compressed air; water etc. because of reduction in number of units.

From Plant Upkeep Point of View

- Lesser requirement of manpower for the operation & maintenance.
- Lesser number of equipments to maintain, hence lesser inventory.
- Increase in cost due to expensive materials to withstand higher pressure and temperature is off-set for reduction in size of balance of plant as well as number of units.

Super Critical Pressure power plant is envisaged in view of above indicated benefits.

6.0 ENVIRONMENTAL MONITORING PROGRAM

6.1 Introduction

An environmental monitoring strategy is required to be planned to ensure that all environmental parameters are within the allowable limits. The main objective of environmental monitoring program is to check the efficacy of the EMP (Environmental Management Plan), implementation of mitigation measures, and take corrective action needed.

A well defined environmental monitoring program would be followed for the proposed project. Monitoring of the individual components of environment is necessary and may be required to set up a separate department “Environmental Management Cell” (EMC) to look after inspection / monitoring / compliance relating to environment. It would be ensured that trained and qualified staff supervises the monitoring of ambient air, stack gases, effluents, noise etc. to see that prescribed standards laid down are obtained.

6.2 Environmental Monitoring and Reporting Procedure

The environmental monitoring cell shall co-ordinate all monitoring programmes at site and data thus generated shall be regularly furnished to the State regulatory agencies. The frequency of reporting shall be on monthly basis to the local Telangana state Pollution Control Board officials located at Nalgonda District and six monthly basis to the regional office of MoEF&CC, GOI. The Environmental Audit reports shall be prepared for the entire year of operations and shall be regularly submitted to regulatory authorities.

Monitoring will confirm that commitments are being met. This may take the form of direct measurement and recording of quantitative information, such as amounts and concentrations of discharges, emissions and wastes, for measurement against corporate or statutory standards, consent limits or targets. It may also require measurement of ambient environmental quality in the vicinity of a site using ecological/ biological, physical and chemical indicators. Monitoring may include socio-economic interaction, through local liaison activities or even assessment of complaints.

6.2.1 Objectives of Monitoring

The objectives of environmental post-project monitoring are to:

- Verify effectiveness of planning decisions;
- Extent and severity of the environmental impacts against the predicted impacts;
- Measure effectiveness of operational procedures;
- Confirm statutory and corporate compliance;
- Identify unexpected changes;
- Performance of the environmental protection measures or compliance with pertinent rules and regulations;
- Trends in impacts; and
- Overall effectiveness of the project EMP.



6.3 Monitoring Schedule

Environmental monitoring schedules are prepared covering various phases of project advancement, such as constructional phase and regular operational phase.

6.3.1 Monitoring Schedule during Constructional Phase

The proposed 5 X 800 MW Coal Based Thermal Power Project envisages setting up boilers, turbines, generators, condensers, cooling water system, coal handling system, ash handling system, coal plant, ESPs, switchyard and other civil, mechanical and electrical plant and equipment. The construction activities involve clearing of vegetation, mobilisation of construction material and equipment. The construction activities are expected to last for over three years.

The generic environmental measures that need to be undertaken during project construction stage are given in **Table 6.70**.

Table 6.71: Environmental Monitoring During Project Construction Stage

S. No.	Potential Impact	Detailed actions to be followed as per EMP	Parameters for Monitoring	Frequency of Monitoring
1.	Air Emissions	All equipments are operated within specified design parameters.	Random checks of equipment logs/manuals	Periodic
		Vehicle trips to be minimized to the extent possible.	Vehicle logs	Periodic during Site clearance construction activities
		Any dry, dust borne materials shall be stored in sealed containers or prevented from blowing.	Stockpiles or open containers of dusty materials.	Periodic during construction activities
		Compaction of soil during various construction activities.	Construction logs	Periodic during construction activities
		Maintenance of construction DG set emissions to meet stipulated standards.	Gaseousemissions (SO ₂ , HC, CO, NO _x)	Periodic emission monitoring

S. No.	Potential Impact	Detailed actions to be followed as per EMP	Parameters for Monitoring	Frequency of Monitoring
		Ambient air quality within the premises of the proposed unit to be monitored.	The ambient air quality will conform to the standards for PM10, PM2.5	As per CPCB/SPCB requirement
2.	Noise	List of all noise generating machinery onsite along with age to be prepared.	Equipment logs, noise reading	Regular during construction activities

6.3.2 Monitoring Schedule during Operational Phase

During operational stage, continuous air emissions from power boilers, wastewater, non-hazardous waste such as ash, hazardous used oily wastes will be generated.

The following attributes which merit regular monitoring based on the environmental setting and nature of project activities are listed below:

- Source emissions and ambient air quality;
- Groundwater Levels and ground water quality;
- Water and wastewater quality (water quality, effluent & sewage quality etc);
- Solid and hazardous waste characterisation (fly ash, bottom ash, oily wastes, ETP sludge, used and waste oil);
- Soil quality;
- Noise levels (equipment and machinery noise levels, occupational exposures and ambient noise levels); and
- Ecological preservation and afforestation.

The following routine monitoring programme as detailed in **Table 6.71** will be implemented at site. Besides to this monitoring, the compliances to all environmental clearance conditions and regular permits from TSPCB/MoEF&CC will be monitored and reported periodically.

Table 6.72 : Environmental Monitoring During Operational Phase

S. No	Potential Impact	Action to be Followed	Parameters for Monitoring	Frequency of Monitoring
1	Air Emissions	Stack emissions from Power Plant	Gaseous emissions (PM, SO ₂ & NO _x)	Continuous monitoring using on-line equipment during operation phase



S. No	Potential Impact	Action to be Followed	Parameters for Monitoring	Frequency of Monitoring
		Stack emissions from DG sets	Gaseous emissions (SO ₂ & NO _x)	As per CPCB/ TSPCB
		AAQ within the project premises and nearby habitations (at 3 places as suggested by TSPCB) to be monitored.	PM ₁₀ , PM _{2.5} , SO ₂ , NO _x , CO, HC(Me), HC(nMe), VOCs, O ₃)	Continuous
		All vehicles to be PUC certificated.	Vehicle logs to be maintained.	
		Meteorological data	Wind speed, direction, temp., relative humidity and rainfall.	Continuous monitoring using automatic weather station
2	Noise	Noise generated from operation of Compressor power plant, cooling towers to be monitored	Spot Noise Level recording.	Periodic during operation phase
3	Wastewater Discharge	Compliance to wastewater discharge standards	pH, TSS, TDS, BOD, COD and Oil & Grease.	Periodic or as per CPCB/ TSPCB requirement
4	Solid Waste/ Hazardous Waste	Check compliance to HWM rules	Quality & quantity monitoring	Periodically
5	Ground Water Quality and Water Levels	Monitoring ground water quality, around plant site and water levels. Piezo meters to be installed in the plant surroundings	Comprehensive monitoring as per IS 10500 Groundwater level BGL	Periodically
6	Flora	Vegetation, greenbelt	Number of plants	Once a year

6.4 Monitoring Methods and Data Analysis of Environmental Monitoring

All environmental monitoring and relevant operational data will be stored in a relational database and will be able to link to GIS system. This will enable efficient retrieval and storage and interpretation of the data. Regular data extracts and interpretive reports will be sent to the regulator.

6.4.1 Air Quality Monitoring and Data Analysis

Stack Monitoring

The emissions from all the stacks will be monitored regularly. The exit gas temperature, velocity and pollutant concentrations will be measured. Any unacceptable deviation from the design values will be thoroughly examined and appropriate action will be taken. Air blowers will be checked for any drop in exit gas velocity. Corrections are made online and continuous basis in each hourly basis and any deviations are controlled on the spot and on line basis.

Workspace Monitoring

The concentration of air borne pollutants in the workspace/work zone environment will be monitored periodically. If concentrations higher than threshold limit values are observed, the source of fugitive emissions will be identified and necessary measures taken. Methane and non-methane hydrocarbons will be monitored in oil storage area once in a season. If the levels are high suitable measures as detailed in EMP will be initiated. These are controlled by the walk down checks of the operation staff and rectify on daily basis.

Ambient Air Quality Monitoring

The ground level concentrations of PM₁₀, PM_{2.5}, SO₂ and NO_x in the ambient air will be monitored at regular intervals. Any abnormal rise will be investigated to identify the causes and appropriate action will be initiated. Greenbelt will be developed for minimising dust propagation. The ambient air quality data will be transferred and processed in a centralised computer facility equipped with required software. Trend and statistical analysis will be done.

6.4.2 Water and Wastewater Quality Monitoring and Data Analysis

Methods prescribed in "Standard Methods for Examination of Water and Wastewater" prepared and published jointly by American Public Health Association (APHA), American Water Works Association (AWWA) is recommended. Regular walk down checks are made within the plant on daily basis in each area of the plant separately and is controlled through daily planning meetings.

All the wastewater streams in the project area will be regularly analysed for flow rate and physical and chemical characteristics. Such analysis is carried out for wastewater at the source of generation, at the point of entry into the wastewater treatment plant and at the point of final discharge. These data will be properly

documented and compared against the design values for any necessary corrective action. This is checked on a daily basis and monthly reports are submitted to the authorities concerned.

6.4.3 Monitoring of Groundwater

The monitoring of groundwater is the most important tool to test the efficiency of ash pond performance. This is indispensable as it provides detection of the presence of waste constituents in groundwater in case of leachate migration. In this programme, water samples are taken at a predetermined interval and analysed for specific pollutant expected to be in the leachate. For early detection of leachate migration, if any, it is proposed to construct twelve nos piezometers around the ash pond site.

In addition to piezometers, monitoring wells will be installed to a depth of at least 3-m below the maximum historic groundwater depth. Based on assumptions and data about the characteristics of leachate to be generated, approximate permeability of soils in the zone of aeration and direction and velocities of groundwater flow, the maximum probable aerial extent of contaminant migration can be estimated as a basis for establishing the position of monitoring wells.

A minimum of two ground monitoring wells will be typically installed at ash disposal facility: one up-gradient well and one down-gradient well. It is proposed to collect water samples and analyse. Records of analysis will be maintained. All these observations will be taken on a daily & weekly basis and abnormalities are controlled immediately.

6.4.4 Monitoring of Noise Levels

Noise levels in the work zone environment such as boiler house, cooling tower area, DG house will be monitored. The frequency will be once in three months in the work zone. Similarly, ambient noise levels near habitations will also be monitored once in three months. Audiometric tests will be conducted periodically for the employees working close to the high noise sources. Periodic checks and walk down checks are made on shift basis and any abnormality is attended immediately.

6.5 Reporting Schedules of the Monitoring Data

It is proposed that voluntary reporting of environmental performance with reference to the EMP will be undertaken.

The environmental monitoring cell will co-ordinate all monitoring programmes at site and data thus generated will be regularly furnished to the State regulatory agencies.

The frequency of reporting will be on six monthly to the TSPCB officials and to Regional office of MoEF&CC. The Environmental Audit reports will be prepared for the entire year of operations and will be regularly submitted to regulatory authorities.

6.6 Infrastructure for Monitoring of Environmental Protection Measures

A well-equipped laboratory with consumable items will be provided for monitoring of environmental parameters in the site. Alternatively, monitoring can be outsourced to a recognized reputed laboratory.

The following equipment and consumable items will be made available in the site for environmental monitoring or alternatively the monitoring can be outsourced by engaging a reputed authorised environmental laboratory.

6.6.1 Air Quality and Meteorology

PM₁₀, PM_{2.5} samplers with provision for collection of PM, Stack monitoring kit, Personal Dust sampler, Central Weather Monitoring Station, Spectrophotometer (visible range), Single pan balance, Flame photometer, Relevant Chemicals as per IS:5182.

6.6.2 Water and Wastewater Quality

The sampling will be done as per the standard procedures laid down by IS:2488. The equipments and consumables required are:

BOD incubator, COD reflex set-up, Refrigerator, Oven, Stop watch, Thermometer, pH meter, Distilled water plant, Pipette box, Titration set, Dissolved oxygen analyser, Relevant chemicals.

6.6.3 Noise Levels

Noise monitoring will be done utilising an integrating sound level meter to record noise levels in different scales like A-weighting with slow and fast response options.



Table 6.73: List of Parameters along with Equipment Required for Environmental Monitoring – Wet Parameter Analysis

Parameter	Method No.	Equipment Required	Chemicals	Glassware
pH	APHA 4500 H+ B	pH meter	Buffers (Analytical Grade) 4.0, 7.0, 9.2 are required to calibrate the pH Electrode	Beakers: 100 ml of 10 nos. are required for estimation of pH for standards & samples
Conductivity (EC) μ mhos/cm	APHA 2510 B	Conductivity Meter	NIST – Traceable (CRM) of KCl 1413 μ mhos/cm solution/ Supra pure KCl is required to calibrate the E.C. Electrode	Beakers: 100 ml of 10 nos. are required for estimation of standards & samples
Total Dissolved Solids at 180°C (mg/L)	APHA 2540 C	• Oven (0-250°C) • Balance (0.00000 g) • Water Bath (12 no Capacity). • Vacuum pump • Desiccator (Big)	Calcium chloride (Fused) - 1kg is required in the desiccator to desiccate the china dishes. Vacuum grease	China dishes 100 ml / 200 ml -10 no are required. Measuring jar 250 ml - 2 Nos.
Total Suspended Solids at 105°C	APHA 2540 D	Same as above	Micro Fiber Filter papers GF/A. circles 40 +	Measuring jar - 250 ml x 2Nos.



Parameter	Method No.	Equipment Required	Chemicals	Glassware
Chlorides	APHA 4500 Cl-B	Not required	Primary Grade Sodium Chloride • Silver nitrate • Potassium Chromate • Aluminium Hydroxide	Burette 10 ml –(2 nos.) & 50 ml (2 nos.), Conical flask 250 ml (10 nos.), Bulb pipettes 20 ml – (2 Nos). Graduated 10 ml - 2 Nos. Indicator Bottles to keep Potassium Chromate Indicator, Burette stand
Total Hardness	APHA 2340 C	Not required	• Primary Grade CaCO₃ • Ammonium Hydroxide Solution (25%) • Ammonium • EBT Indicator • Triethanol amine • Ethylene diamine Tetra Acetic Acid (EDTA) • Magnesium Sulphate	Burette -10 ml (2 nos.), and 50 ml (2nos.), Conical flasks 250ml (10) Bulb Pipettes 20 ml (2), Measuring pipettes 10 ml (2), Volumetric flasks 250 ml (2), Volumetric flasks 100 (2), Funnels - 6 NoMedium, Burette stands-2No, Indicator Bottle to keep EBT Indicator-2 Nos
Calcium Hardness and Magnesium hardness	APHA 3500 Ca B APHA 3500 Mg B	Not required	• Sodium Hydroxide pellets - Ammonium purpurate indicator NaCl	Burette 10 ml & 50 ml (2) Conical flasks 250 ml (10) Mortar + pestle-1No Bulb pipettes 20 ml -



Chapter-6: Environmental Monitoring Programme

Parameter	Method No.	Equipment Required	Chemicals	Glassware
Oil & Grease	APHA 5520 B	Balance (0.00000 g) • Water Bath (12 no Capacity). Desiccator (Big)	• Calcium chloride fused • n-Hexane • Sodium sulphate • HCl	Chain dishes 100 ml / 200ml –10 no, Funnels medium- 10 no, Glass wool - 1 packet, Separating funnel- 2LI x2 No, 125 ml x 4, Stand-2No
Free Chlorine	APHA 4500 Cl- B	Hot plate	• Acetic acid • KI crystals • sodium thiosulphate (Hypo) • starch	Iodometric flasks - 250 mlX4, Conical flasks - 250ml -6-No, Burette - 50 ml – 2, Measuring cylinders 50mL-1, Burette Stand - 1
Phosphate	APHA 4500 P-D	Spectrophoto meter	Ammonium Molybdate • Stannous chloride • Potassium dihydrogen phosphate • Conc. H₂SO₄	Measuring test tubes 50ml-12, Test tube stand 1 No, Volumetric flask 50 ml -10No, Measuring Pipettes 10 ml -2, Volumetric flask 1000 ml-
Temperature	APHA 2550 - B	Thermometer	-	-



Parameter	Method No.	Equipment Required	Chemicals	Glassware
COD	APHA 5220 D	COD -Reactor & calorimeter	- Analytical Grade potassium dichromate - Analytical Grade Potassium - Hydrogen Phthalate, Conc. H₂SO₄, Silver sulphate	Volumetric flask 100 ml - 10 no, Bulb pipette 20ml- 2 no., 10 ml – 2 no., Measuring pipette 5 x 4
BOD 5 days at 20°C or 3 days at 27°C	APHA 5210- B	BOD Incubator	- KH₂PO₄, Na₂HPO₄ - 7 H₂O, - NH₄Cl, MgSO₄·7H₂O, CaCl₂ - FeCl₃·6H₂O, Conc. H₂SO₄, - NaOH, HCl, Glucose - Glutamic Acid, MnSO₄·7H₂O, KI, Starch Powder, - Primary Grade K₂Cr₂O₇, NaHCO₃ - Single distilled water- 20 Liters for 7 Samples	BOD Bottles-300 ml (25 bottles) Burette 50 ml (2) Bulb Pipette 20 ml (2) Bulb Pipette 10 ml (2) Measuring Pipette (6) Iodometric flask (4) Volumetric flask 1 Lit (4) Volumetric Flasks 250ml (2), Measuring cylinder 250ml (2)
Metals	APHA 3111 B-3030 E	Atomic Adsorption Spectrophotometer (AAS)	Hot plate Distilled water, HNO₃ Standards for the respective metals	Beakers 250 ml -10 nos., Measuring Pipette (5), Volumetric Flasks 50 & 100 ml -10, Measuring cylinder 50ml (2), funnels (10), filter papers

Note: * Standard Methods for the Examination of Water and Wastewater, American Public Health Association (APHA), 21st Ed., 2005



**Table 6.74: List of Parameters along with the Equipment Required for Ambient Air Quality Monitoring
(Parameters listed as per CPCB Norms)**

Parameter/ Unit	Method	Equipment / Chemicals Required	Glassware
# Suspended Particulate Matter (SPM) $\mu\text{g}/\text{m}^3$	Gravimetric	• Glass Fibre Filter • High volume Sampler (HVS) • Calibrated Flow measuring device (for calibration of flow) • Top loading Orifice (for calibration of sampler) • Analytical balance • Hot air oven • Dissector	-
Particulate Matter, Size less than $10\mu\text{m}$ (PM10) $\mu\text{g}/\text{m}^3$	Gravimetric	• Glass Fibre Filter (8 x 10 in size) • Respirable Dust samplers (RDS) and automatic volumetric flow control • Calibrated Flow measuring device (for calibration of flow) • Top loading Orifice (for calibration of sampler) • Analytical balance • Hot air oven • Dissector	
Particulate Matter, Size less than $2.5\mu\text{m}$ (PM2.5) $\mu\text{g}/\text{m}^3$	Gravimetric	• 47mm Polytetrafluoroethylene (PTFE) filter • PM2.5 sampler designed as per Federal • Reference Method (FRM) • Certified Flow Transfer Standard for Flow Calibration • Electronic microbalance $\pm 0.001\text{ mg}$ • Filter equilibration racks	



Parameter/ Unit	Method	Equipment / Chemicals Required	Glassware
Sulphur dioxide (SO ₂) µg/m ³	Improved West and Gaeke	• Calibrated Flow measuring Device • Analytical balance • Spectrophotometer • Chemicals: Distilled water, Mercuric Chloride, EDTA di sodium salt, Sulphamic Acid, Formaldehyde, pararosaniline, Iodine solution, Starch, potassium iodate, Sodium thiosulfate pentahydrate	Impingers, pipettes, Volumetric Flask, Burette, Iodine Flask
Nitrogen dioxide (NO ₂) µg/m ³	Modified Jacob & Hochheiser	• Calibrated Flow measuring Device • Analytical balance • Spectrophotometer • Chemicals: Distilled water, Sodium hydroxide, Sodium Arsenate, Sulphanilamide, N-(1-Naphthyl)-ethylenediamine Dihydrochloride (NEDA), Hydrogen Peroxide, Phosphoric Acid	Impingers, pipettes, Volumetric Flask, Burette, Iodine Flask
Ozone (O ₃) µg/m ³	Chemical method	• Calibrated Flow measuring Device • Analytical balance • Spectrophotometer • Chemicals: Distilled water, Potassium dihydrogen phosphate, disodium hydrogen phosphate, potassium iodide, NaOH, KH₂PO₄, re-sublimed Iodine, Na₂S₂O₃, K₂Cr₂O₇	Impingers, pipettes, Volumetric Flask, Burette, Iodine Flask
Ammonia (NH ₃) µg/m ³	Indophenol Blue Method	• Calibrated Flow measuring Device • Analytical balance • Spectrophotometer • Chemicals: Distilled water, H₂SO₄, Sodium nitroprusside, NaOH, sodium hypochlorite, HCl Phenol, Sodium phosphate, NH₄Cl or NH₄SO₄	Impingers, pipettes, Volumetric Flask, Burette



Chapter-6: Environmental Monitoring Programme

Parameter/ Unit	Method	Equipment / Chemicals Required	Glassware
Carbon monoxide (CO) mg/m ³	Non-Dispersive Infrared Spectroscopy(NDIR)	• CO Analyzer with NDIR detector	
Benzene (C ₆ H ₆) µg/m ³	Adsorption and Desorption followed by GC	• Adsorbent Cartridges - • Calibrated Flow measuring Device • GC-FID or GC-MS	
Benzo (a) Pyrene B(a)P ng/m ³	Solvent Extraction followed by GC or HPLC analysis	• PM10 Respirable Dust Sampler (RDS) • Whatman Glass Fibre (EPM-200) or equivalent • Ultrasonicator or Soxhlet Extraction Apparatus • Rotary Evaporator • Analytical balance • GC-FID • Chemicals/ Standarads : B(a)P, Triphenyl benzene (IS), Toluene, Cyclo hexane, Silica gel	Micropipettes Beakers 250 ml, Amber colour vials(3-5ml), Chromatographic column



Chapter-6: Environmental Monitoring Programme

Parameter/ Unit	Method	Equipment / Chemicals Required	Glassware
Lead (Pb) ($\mu\text{g}/\text{m}^3$), Nickel (Ni) ($\mu\text{g}/\text{m}^3$) and Arsenic (As) (ng/m^3)	Atomic Absorption Spectrophotometer (AAS) method after sampling on Filter paper (EPM 200 or equivalent)	• PM10 Respirable Dust Sampler (RDS) • Hot plate or Microwave digestive system • Analytical balance • Digestion chamber • Flame Atomic Absorption Spectrophotometer (FAAS) or Graphite Atomic Absorption Spectrophotometer (GFAAS) • Chemicals/Standards: Filter paper (EPM 200 or equivalent), HCl, HNO₃, H₂SO₄, Metal Standard • Solutions (CRM s), Sodium borohydrate, Potassium iodide, Distilled water	Polyethylene or polypropylene bottles, Beakers, Micropipettes

Note: * Methods as per Guidelines for the measurement of Ambient Air Pollutants, Volume I, Central Pollution Control Board, Delhi, May 2011 # SPM is not mentioned in AAQ standards (CPCB, 2009)



Table 6.75: List of Parameters along with the Equipment Required for Stack Monitoring

Parameter/ Unit	Method	Equipment / Chemicals Required	Glassware
# Suspended Particulate Matter (SPM) $\mu\text{g}/\text{Nm}^3$	Gravimetric IS: 11255, Part -1, 1995	• Glass Micro fibre Thimble (19mm x 90mm) - • Stack Monitoring Kit , Probe Set, Thermocouple (a) SS 304 Stainless steel K-Type, (b) 2 meter length, Interconnection lead of 2m length and DP-2 plug as connector. • Pitot Tube (a) S-Type pitot tube, Std Length-1.5m (b) SS 304 Stainless steel • Nozzles -3 Nos (a) SS 304 Stainless steel (b) 1/2" dia (c) 3/4" dia and (d) X" dia - Filter Holder (a) SS 304 Stainless steel, (b) suitable for thimble shaped filters of 19 x 90mm (c) End fittings 1/2" BSP threading. • Sampling Probe (a) SS 304 Stainless steel, (b) 20mm OD and (c) Std length 1.5m • Vacuum pump Assembly range 0-150 LPM • Cold Box Assembly (a) sampling train -4 Impingers • Hose pipes depending on length of Stack sampling traverse point • Instrument panel Assembly Contains instruments like., pyrometer, Inclined-Vertical manometer, Flowmeter and Stop watch • Analytical balance, Hot air oven Dissector	



Chapter-6: Environmental Monitoring Programme

Parameter/ Unit	Method	Equipment / Chemicals Required	Glassware
Sulphur dioxide (SO ₂) mg/Nm ³	Barium - thorin Titration IS: 11255, Part -2, 1985	• Calibrated Flow measuring Device- Rotameter • Analytical balance - Chemicals: Distilled water, Isoproponal 80% , Hydrogen peroxide 3%, Potassium Iodide solution, Thorin Indicator, Barium Standard solution	Impingers, pipettes, Volymetric Flask, Burette, Iodine Flask
Nitrogen dioxide (NO ₂) mg/Nm ³	Phenoldisulphonic AcidMethod Method 7, EPA-EMC	• Calibrated Flow measuring Device- Rotameter • Analytical balance • Spectrophotometer • Chemicals: Distilled water, Hydrogen peroxide (3%), Sulfuric acid, Sulfuric acid (0.3%), Ammonium Hydroxide, Phenoldisulfonic acid, Potassium nitrate, Sodium Hydroxides, EDTA reagent.	Impingers, pipettes, Volymetric Flask, Burette, Evaporating dishes, Iodine Flask
Percentage Oxygen (% O ₂)	Portable Flue gas Analyzer / Sensor based method	• O ₂ Electro Chemical sensor Module	
Percentage Carbon dioxide (% CO ₂)	Portable Flue gas Analyzer / Sensor based method	• CO ₂ (IR) Electro Chemical sensor	

Note: * Methods as per specified in Emission Regulations Part-II (Dec.85) by CPCB and BIS: 11255



Table 6.76: Equipment Required for Noise Monitoring

Parameter/ Unit	Method	Equipment / Chemicals Required	Glassware
Noise measurement Leq, Lmin, Lmax, Leq Day, Leq Night (dB (A))	IS:4954-1968	Integrated Sound level meter with facility of logging hourly equivalent noise levels	-



6.1 Budgetary Allocation for Environmental Protection

Environmental protection will be monitored and executed by a centralized environmental management cell. The monetary estimates have been arrived for the proposed activity and are presented.

It is proposed to invest about Rs. 2410 crores on pollution control, treatment and monitoring systems towards capital cost. Recurring cost of Rs.65 crores per annum will be spent on greenbelt development and other pollution control activities. The break-up of the proposed investment is given in **Table 6.76**.

Table 6.77: Cost Provision for Environmental Measures

Sr. No	Description of Item	Proposed Budget (Rs in Crores)	
		Capital Cost	Recurring Cost Per Annum
1	Air		
(i)	ESP and FGD	550.00	11.00
(ii)	Dust Suppression System for coal handling	25.00	0.50
2	RCC chimney with 2 nos steel twin flue and 1 no steel with 1 flue (275 m high) – 3 Nos	400.00	8.00
3	Natural draft cooling tower (NDCT)-5 Nos.	750.00	11.00
4	Bottom ash and fly ash collection, storage, dispensing system	600.00	30.00
5	ETP, STP etc	20.00	1.00
6	Green belt development	50.00	2.00
7	Pollution monitoring instrument / equipment	10.00	1.00
8	Other unforeseen items	5.00	0.50
9	CSR	100.00	10.00
Total		2410.00	65.00

Source: Project Report, TSGENCO



7.0 ADDITIONAL STUDIES

7.1 Preamble

This chapter presents the Public Hearing details, Risk Assessment (Qualitative & Quantitative), Disaster Management Plan (Onsite & Offsite), Occupational Health & Safety Measures in the study area.

7.2 Public Hearing

The public hearing for the proposed (5 x 800 MW) Coal based Yadadri Thermal power Station at Veerlapalem (V), Damarcherla (M), Nalgonda Dist. On 31.05.2016 in the premises of proposed site at Veerlapalem (V), Damarcherla (M), Nalgonda District as per Environment Impact Assessment Notification No.S.O. 1533 (E) dated 14th September 2006 and as per TOR conditions issued by MoEF&CC.

The press notification indicating date and venue of the public hearing was issued by Regional officer, Telangana Pollution Control Board (TSPCB), on 30.04.2016 in prominent newspapers Viz. Namaste Telangana Telugu daily newspaper and the Hindu English daily News paper with project details inviting suggestions, views, comments and objections from the public regarding the above mentioned project. The copies of the press notification issued in newspapers for public hearing are shown in **Figure-7.77**.



Chapter-7: Additional Studies

TELANGANA STATE POLLUTION CONTROL BOARD Regional Office, Nalgonda. H.No.8-15, 1st Floor, Sri Lakshmi Complex, Near RTO office, Sri Vinayaka Nagar, Hyderabad Road, Nalgonda - 508 001. (T.S.) Ph: 88682-248805	
ENVIRONMENTAL PUBLIC HEARING NOTIFICATION In accordance with the Notification No.S.O.1533 (E) dt. 14-09-2006 of the Ministry of Environment & Forests, Government of India and its amendment thereof, it is hereby notified to conduct Environmental Public Hearing for the proposal for setting up of "5X800 MW) Yadadri Thermal Power Station" by TSGENCO at Veerlapalem village, Damacherla Mandal, Nalgonda District, Telangana state. The details of the project activities as given by the proponent are as follows :	
1) Name of the Company with Address & Phone number	Telangana State Power Generation Corporation Limited (A Government Company), Vidut South, Khairabad Hyderabad - 500 082, Phone No.040-23489417 Fax.No.040-23499418
2) Name of the proposed Project, Location with Survey Numbers and extent of land.	Yadadri Thermal Power Station (5x800 MW), Location: Veerlapalem (V), Damacherla (M), Nalgonda Dist. Total land required for the project : 2800.00 Acres, Non Forest Land (Govt. & Private) : 705.00 Acres Forest Land : 2095.00 Acres Non forest land - D-Form Patta Land : 1) Veerlapalem Village, Damacherla Mandal, Survey Nos: 98 Non forest land - Usaf a Patta and Khari Khata: 1) Veerlapalem Village, Damacherla Mandal, Survey Nos: 1 to 7 and 9 to 41 2) Talu Veerappagudem Village, Damacherla Mandal, Survey Nos: 3 & 4. Non forest land - Government Land 1) Veerlapalem Village, Damacherla Mandal, Survey Nos: 71, 75, 80, 90, 92, 93, 94 & 95. Non forest land - Private Patta Land 1) Veerlapalem Village, Damacherla Mandal, Survey Nos: 66, 67, 68, 69, 70, 72, 73, 74, 75, 77, 78, 79, 81, 82, 83, 84, 85, 86, 87, 88, 89 & 91. Forest land 2095 Acres in Veerlapalem forest block area.
3) Name of the authorized person to be contacted with address, phone number and Email.	Sri A. Ajay, Chief Engineer/Civil Thermal, Telangana State Power Generation Corporation Limited, Vidut South, Hyderabad - 500 082, Telangana State, Ph.No. 040-23489417, Email: ceothermal2@yahoo.com
4) Capital cost of the project	Rs. 25059.42 Crores.
5) Line of activity & capacity	Thermal Power generation (4000 MW) (5X800MW) Yadadri Thermal Power Station, Veerlapalem (V), Damacherla (M), Nalgonda Dist.
6) Proposed Environment Protection Measures in the project	Dust Suppression using water spraying, High Efficiency Electro Static Precipitators, 275 M high Chimneys, Effluent Treatment Plant, Sewage Treatment and Ash water recovery system with recycling arrangement for re-using the treated water.
7) Date, Time and Venue of Public Hearing	Date : 31.05.2016, Time : 10:00 AM, Venue : Near Pyke in the premises of "5X800MW) Yadadri Thermal Power Station, Veerlapalem Village, Damacherla Mandal, Nalgonda District.
8) Place: of the availability of Executive Summary and Draft EIA / EMP of the proposed project including soft copy	1) Collector & District Magistrate Office, Nalgonda. 2) District Industries Centre, Nalgonda. 3) CEO, Zila Parishad Office, Nalgonda. 4) Divisional Forest Office, Nalgonda. 5) Regional Office, MoEF & CC, South Eastern Zone, 1st & 2 nd floor, HEPC Building, No.34, Cathedral Garden Road, Nungambakkam, Chennai - 600034. 6) Telangana State Pollution Control Board, Head Office, Paryavaran Bhawan, A-3, Industrial Estate, Sanathnagar, Hyderabad -16. 7) T.S. Pollution Control Board, Zonal Office, Ramachandrapuram, Medak Dist. 8) Dept. of Environment, Forest, Science & Technology, GoTS, Telangana State Secretariat, Hyderabad. 9) Telangana State Pollution Control Board, Regional Office, Nalgonda. 10) Revenue Divisional Office, Myrtaiguda, Nalgonda District. 11) Tahsil Office, Damacherla Mandal, Nalgonda District. 12) Gram Panchayat Office, Veerlapalem Village, Damacherla Mandal, Nalgonda District. 13) Gram Panchayat Office, Talu Veerappagudem Village, Damacherla Mandal, Nalgonda District. 14) Gram Panchayat Office, Thinnapuri Village, Damacherla Mandal, Nalgonda District. 15) Gram Panchayat Office, Kothapalli Village, Damacherla Mandal, Nalgonda District. 16) Gram Panchayat Office, Kallapalli Village, Damacherla Mandal, Nalgonda District.
In accordance with the MoEF Notification no. S.O. 1533 (E), dated 14.09.2006 and its amendments thereof, suggestions, views, comments and objections of the public, located at project site / sites likely to be effected by the proposed project, if any are invited within 30 days from the date of publication of this notification. All the above persons can also make their representations in writing to the undersigned officer. All these persons can also participate in the public hearing on the date and venue specified above.	
Place : Nalgonda Date : 29/04/2016	
SIGNATURE OF ENVIRONMENTAL ENGINEER (FAC), T.S. POLLUTION CONTROL BOARD, REGIONAL OFFICE, NALGONDA.	

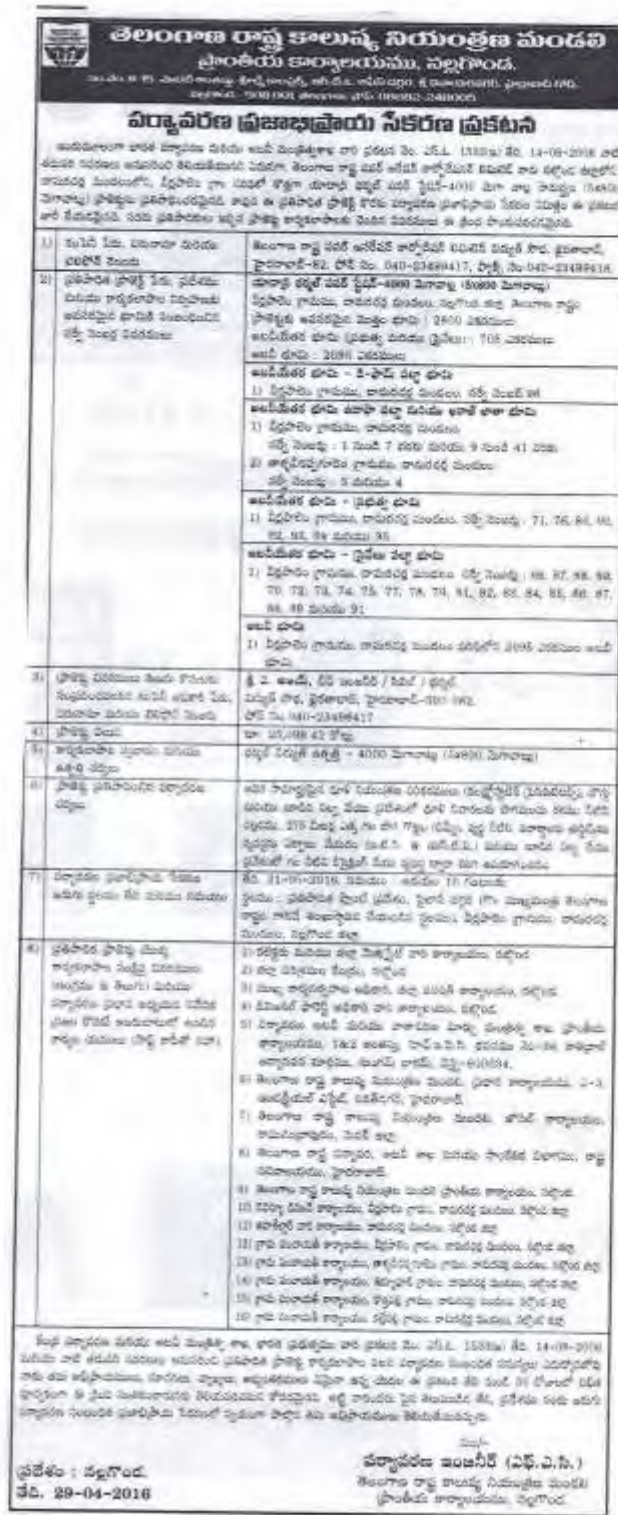


Figure-7.77.

Copies of the Press Notification Issued in Newspapers for Public Hearing



About 3000 public have attended the meeting along with Hon'ble MP, Nalgonda; Hon'ble MLA of Miryalaguda constituency of Nalgonda District including other local body representatives, print and electronic media.

The Environmental Engineer, TSPCB, Regional Office, Nalgonda, while welcoming the District Collector, Nalgonda, the Joint Collector, Public representatives and general public, has explained about the salient features of the EIA Notification 2006 of the Ministry of Environment and Forests, Government of India's EIA notification No.S.O.1533 (E) dated 14th September 2006 issued by the Ministry of Environment and Forest, Govt. of India under the Environment (protection) Act, 1986. He stated that the public consultation process has been made mandatory for the projects listed in Schedule –A & B1 of EIA Notification, 2006 for obtaining Environmental Clearance from the Ministry of Environment, Forest & Climate Change, Govt. of India. He further explained that as per the provisions of EIA Notification, public opinion regarding the proposed project was invited in writing from the public by giving an advance notification in **Namaste Telangana** (Telugu daily) and **The Hindu** (English daily) newspapers on 30.04.2016. The public were given 30 days time to submit their opinions, objections, suggestions etc. in writing. The Executive summaries both in Telugu & English and the EIA reports were displayed for access to the public as mentioned in the press notification.

The Environmental Engineer, further informed that, as a part of the programme the project authorities would explain the environmental aspects of the proposed project and then the people would be given an opportunity to elicit their opinion. The project authorities would give replies to the issues raised during the hearing before concluding the hearing process. He further explained that, all the proceedings of the public hearing would be recorded and forwarded to the Ministry of Environment, Forests & Climate Change (MoEF&CC), Govt. of India for further course of action. He then requested the Collector & District Magistrate, Nalgonda to preside over the public hearing.

The Collector & District Magistrate, Nalgonda while welcoming Hon'ble MP & MLA, and other officials, media and the public gathered at the venue, requested the representatives of TSGENCO to explain the salient features of the proposed project.

While welcoming and addressing the dignitaries and public gathering, **Sri C. RadhaKrishna, Chairman & Managing Director (I/C) /TSGENCO** has expressed that,

- ❖ Power sector is the core sector of growth in the economy and more so in the newly formed State of Telangana. There is a power deficit of 2700 MW after formation of Telangana State w.e.from 02.06.2014. To tide over this power crisis to some extent, the government has been purchasing power from other states at higher cost.



- ❖ Hon'ble Chief Minister has envisioned a power –surplus Telangana State by the end of 2018. In pursuance to his orders, the State generation utility TSGENCO is working to realise the ambitious goal of building a 'Golden Telangana' and to meet power requirement for water grid schemes, lift irrigation, 24 hours power supply to the entire state, 9 hours power supply to agricultural sector, uninterrupted supply to industries and other sectors .
- ❖ In this regard, TSGENCO has proposed to establish power plants viz, 800 MW Kothagudem Thermal Power station (Stage-VII) at Paloncha, 1080 MW (4 x 270 MW) Bhadadri Thermal Power Station at Manuguru in Khammam district and 4000 MW Yadadri Thermal Power station at Damaracherla in Nalgonda district with total investment of Rs. 39000 crores approximately. For this ,they obtained financial closure from REC and PFC which are Central Government agencies.
- ❖ The proposed Yadadri Thermal Power Station (5x800 MW) is being developed by TSGENCO with the financial assistance from Rural Electrification Corporation and Power Finance Corporation at an investment of Rs.25,099.42 crores.
- ❖ The Expert Appraisal Committee of MoEF&CC, GoI, New Delhi has issued the terms of reference to the project on **16-02-2016** for conducting EIA studies. Accordingly, the draft Environmental Impact Assessment study was conducted by the accredited consultant as per the Standard terms of reference issued on 02.11.2015.
- ❖ The project is designed by adopting latest and most efficient technology in thermal power projects. An amount of Rs. 2410 crore is provided in the project cost for installation of equipment and required systems to control the pollution levels as prescribed by MoEF&CC, GoI, New Delhi .
- ❖ The proposed (5 x 800 MW) 4000 MW Supercritical Plant will be the First in terms of capacity at one place in the country, undertaken by Government Sector Utility.
- ❖ The Project is based on the Super Critical Technology which has been made mandatory by the Ministry of Power, Government of India for all the Projects coming in the 13th plan.
- ❖ The Units will not have a Boiler Drum, but only Tubes which circulates water and the water heated by the fire in the furnace, duly converting into RH steam, SH steam and is finally let into Turbine for running the Machines duly producing electricity from the Generator.
- ❖ The temperature of main stream will be 565 Degrees Celsius and re-heater steam will be 593 Degrees Celsius. The steam capacity of the Unit will be 2420 Tonnes per hour and the pressure will be 247 Kgs per Square Centimeter.
- ❖ The requirement of water will be 9755 Cubic Meters per hour. The Boiler is designed for pulverized coal either 100% imported Coal or 50% imported + 50%



indigenous coal. The chimney will be 275 meters high, 2 nos with twin flue arrangements for four Units and one for fifth unit.

- ❖ The coal requirement will be 138 Lakh Tonnes Per Annum with 50% imported coal + 50% indigenous and 110 Lakh Tonnes if it is 100% imported.
- ❖ The station heat rate will be 2109.4 Kcal per Kwhr.
- ❖ The natural draft cooling tower (NDCT) of height 170 meters with a COC of 5.
- ❖ As per the latest environmental norms the SPM levels, NO_x & Sox to be maintained are 30 mg/Nm³, 100 mg/Nm³ and 100 mg/Nm³ respectively. To achieve SPM levels at 30 mg/Nm³ additional ESPs will be provided. Modification of Boiler Mills and Flue Gas Ducts will be added to achieve the NO_x levels. For achieving SO_x levels of 100mg/Nm³ FGD Plant will be installed. All these will be incorporated in this Project.
- ❖ Also 39 Lakh Tonnes of fly ash will be generated per annum and this will be utilized 100% within a period of 3 years and this has been committed to MOEF. There are 22 cement factories around plant and they have assured for lifting of fly ash from above plant.
- ❖ Setting up of latest electro static precipitators with 99% efficiency to control dust emissions and an additional ESP field is also proposed to bring the dust emission as per the latest norms i.e. to bring down the dust emission below 30 mg/Nm³.
- ❖ To control NO_x, Ammonia will be used, through SCR(Selective Catalytic Reduction) mechanism which will bring down the NO_x concentration below the standard levels as stipulated in the norms.
- ❖ Flue gas desulphurisation (FGD) plant is proposed to bring down the sulphur concentration levels as stipulated in the ToR.
- ❖ The estimated quantum of coal requirement is 13.81 mtpa, which includes 50 per cent of indigenous coal and 50 per cent imported coal with the average GCV of coal as 4550 k.Cal/kg.
- ❖ The make-up and consumptive water requirement is assessed as 9755 cum/hr which will be sourced from the river Krishna.
- ❖ Five natural draft cooling towers are envisaged to recycle the water with COC 5.
- ❖ It is also contemplated to establish Effluent Treatment Plant, Ash water recovery system and Sewage Treatment Plant with recycling system to utilise the treated water for development of green belt and floor washings, dust suppression in coal plant areas and ashing requirements etc.



- ❖ The TSGENCO has allocated Rs. 100 crores towards the implementation of development works such as water supply, repairs to the school buildings, construction of roads and toilets etc in the surrounding villages under corporate social responsibility of TSGENCO.
- ❖ An amount of Rs. 285.81 crores towards land compensation, R&R package and other charges was deposited with the District Collector, Nalgonda in the month of January 2016 for acquiring Ac. 854.32 Gts of patta lands and Ac. 920.25 Gts of ROFR land.
- ❖ In addition to the above, about Rs. 198 crores was deposited with the Forest Department towards NPV of forest land which includes raising and maintenance under compensatory afforestation over an extent of 4676 acres.
- ❖ Establishment of this project has certain beneficial impacts in terms of bridging the power demand-supply gap and providing employment opportunities that will be created during the course of construction and operation phase as well.

He then sought support to the proposed thermal power station as it will give required boost to the power generation capacity and also to make the State to attain self-sufficiency in respect of power.

The District Collector has requested the public gathered at the venue of public hearing to offer their views, comments, suggestions and objections, if any, on the proposed thermal power project. He also requested Hon'ble Member of Parliament, Nalgonda constituency to offer his views on the proposed thermal power plant and also welcomed the other public representatives and invited the views from the public on the proposed power plant duly requesting the project proponent to clarify the issues raised by speakers who have present during public hearing.

The proceedings of the public hearing as furnished by the Environmental Engineer, Regional Office, TSPCB, Nalgonda vide his letter no: 74117/PCB/RO-NLG/EPH/2016-525 Dated 02.06.2016 is incorporated herewith for perusal.

The action plan on the issues raised by the public representatives along with the public opinion is given below:

The points raised by the public/public representatives, response given by the project authorities and action plan for fulfillment of the assurances given to the public are furnished below:

S. No	Points raised by Public representative/public	Response/Commitment by project proponent	Action Plan to comply with the commitments



Chapter-7: Additional Studies

S. No	Points raised by Public representative/public	Response/Commitment by project proponent	Action Plan to comply with the commitments
1.	Sri Sri Gutta Sukhendar Reddy, Hon'ble Member of Parliament, Nalgonda constituency while welcoming the proposed thermal power project has explained following events behind realising the dream of power plant in his constituency area: ➤ This is the biggest project after the formation of the State and any development will have some adverse impact. ➤ Electricity is a quintessential requirement like water. This project will help to enhance the supply of power from 6-hrs to 9 hrs for agriculture. ➤ After commissioning of the project, there will be no power cuts in the State. At present the State is purchasing power from neighbouring States at an average cost of Rs. 6/- per unit which will come down drastically to Rs. 4-5/- per unit. ➤ Government of India banned the setting up of new units based on sub-critical technology and this project utilises the latest super-critical technology. ➤ Moreover, the compensation is paid as per the Land Acquisition Act, 2013. Necessary infrastructure will be promoted in surrounding villages with the advent of the proposed thermal power project. There is an extent of 650-acres of land without pattas but under cultivation in Thallaveerappagudem panchayat, for which compensation has to be paid on par with patta lands. ➤ He has requested the District Administration and CMD, TSGENCO to take necessary action in that direction. ➤ He further requested the CMD to engage the local labourers for construction purposes and provide employment to the local people in the project by giving priority for the land oustees. ➤ He added that Hon'ble CM was kind enough to release	An amount of Rs. 285.81 crores towards land compensation, R&R package and other charges was deposited with the District Collector, Nalgonda in the month of January 2016 for acquiring Ac. 854.32 Gts of patta lands and Ac. 920.25 Gts of ROFR land. The Chairman & Managing Director(I/C), TSGENCO has also requested the District Collector, Nalgonda, to pay the balance compensation and R&R package to all the balance land losers if any to be paid.	➤ Need based studies have been carried out in surrounding villages to study socio economic profiles, infrastructure availability and infrastructure requirement Accordingly EIA report is prepared for implementation of CSR activities ,necessary provision has been made towards drinking water, sanitation, education, health care, infrastructure development, with a provision of Rs 100.40crores @ 0.40% of the project cost towards CSR plan. ➤ Nursery will be established and saplings will be supplied at free of cost to all the surrounding villages for development of green belt other than the power plant area. ➤ Green belt development will be taken up in the vacant areas of the power plant including proposed colony & around ash pond area to meet the environmental norms as fixed by MoEF&CC, GoI to protect the environment. ➤ Providing Electro static precipitators with 99.98% efficiency, construction of 275 meter high chimneys, effluent treatment plant, ash water recovery system, Seewage treatment plant with recycling arrangement, to mitigate the environment pollution levels. No plant effluent will be discharged in to the near by water bodies. ➤ Water Sprinkling system will be provided in ash ponds in order to prevent fugitive emissions from the ash ponds.



Chapter-7: Additional Studies

S. No	Points raised by Public representative/public	Response/Commitment by project proponent	Action Plan to comply with the commitments
	compensation liberally to all classes of lands lost under the project. He expressed profound gratitude to all scheduled tribe people and other land losers for parting their lands to facilitate the setting up of this project. ➤ Finally, he thanked the District administration for their excellent effort and cooperation in ensuring the timely acquisition of land for the project.		➤ Dust extraction & suppression system will be provided in the coal handling areas to mitigate the fugitive emissions. ➤ Local villagers/agriculture labour (Project displaced persons) will be taken as unskilled/Semi skilled /skilled/ workers in Civil/E&M construction works as per their eligibility and they will be continued as outsource workers after commissioning of the unit as per plant requirement in labour oriented annual maintenance works such cleaning of roads, drains, up keeping of all buildings, maintenance of lawns and plantations, annual maintenance works in coal handling plant etc.
2.	Sri N. Bhaskar Rao, Hon'ble Member of Legislative Assembly Miryalaguda, ➤ He specifically thanked the Hon'ble CM for choosing this location for setting up this mega power project. ➤ There were several apprehensions over the implementation of this project initially. In fact, few villagers have lost their lands. ➤ On behalf of the people of his constituency, he assured full cooperation to the implementation of this project. ➤ There are no pattas for 740-acres of land, however, he assured them that the compensation will be worked out to render justice to them. ➤ He expressed his gratitude to the Hon'ble Minister for Power in expediting the process of compensation payment. He requested the management of TSGENCO to reciprocate on the same lines by timely completion of the works on the	He welcomed the project.	



Chapter-7: Additional Studies

S. No	Points raised by Public representative/public	Response/Commitment by project proponent	Action Plan to comply with the commitments
	project. ➤ He has further stated that there are no political differences in respect of this project and assured the officials of cooperation from the leaders cutting across the party lines and from the people as well. He expects that Damarcherla area will be transformed economically and socially as the land rates are increasing with the setting up of this project from 50-lakhs to 1.0 crores. ➤ He has assured that work will be provided to all eligible local people without their political affiliations. ➤ He expressed his gratitude to the people for extending the unequivocal support for setting of this important mega project which enabled him to keep up his word given to the Hon'ble CM.		
3.	Sri Shankar Naik, ZPTC Member-Damarcherla. ➤ He welcomed the project. ➤ He has stated that Kapoora thanda and Veerlapalem people are affected by this project and employment is not provided to the B. Tech graduates as was done in the case of ITI trained people. ➤ Compensation has not been paid so far to the crops damaged by the recent hail storm and urged the authorities to expedite the process of compensation.	He has welcomed the project	Based on the G.O.Ms No.98,Dt 15.04.1986, issued by the then Govt. of Andhra Pradesh, not more than 50 % of the vacancies of the categories equivalent to Junior Assistants/Typsts and the cadre below are to be filled with displaced families or their dependants of the respective families duly following the reservations for various categories viz SC,ST,BC,Ex- servicemen ,Physically handicapped and meritorious, sportsman and other conditions stipulated. Action will taken by TSGENCO to fill up in the cadre of Junior plant attendants of different categories with the land losers who are having SSC+ITI qualification duly following all other rules stipulated in the GO.Also the posts of drivers, Office sub ordinates and other categories which are equal



Chapter-7: Additional Studies

S. No	Points raised by Public representative/public	Response/Commitment by project proponent	Action Plan to comply with the commitments
			to class IV and below cadre will be filled up with the land losers depending upon their qualification and their eligibility. No other cadres above classIV will be considered for employment under land loser quota as there is no provision in the Government GO.
4.	Smt. Mangamma, President- Mandal Praja Parishad, Damarcherla ➤ She welcomed the setting up of the project. ➤ She has requested for payment of compensation to the land holders as there are no pattas vested with them, who are mainly from backward classes. She demanded the payment of compensation within a month time on par with the patta lands and provision of employment to the people of the mandal	Welcomed the project The District administration has already listed out the names of all land losers and compensation was paid to 80 % of land losers. In regard to the non pattedars , the Revenue authorities has to take the decision for payment of compensation in terms of Government rules& regulations.TS GENCO has already deposited sufficient fund with the Dist.Collector,Nalgonda.	
5.	Sri Kotya Naik, Sarpanch-Veerlapalem, He has stated that the land acquisition process has been completed in his village, which includes forest land also. He has brought out the problem of losing the grazing area of the cattle and the dung-storing grounds and sought alternate land to compensate the loss. People would be happier if employment is provided on priority to the project displaced persons. He has requested for expediting the	He welcomed the project There is no notified grazing land in the	Local villagers/agriculture labour (Project displaced persons) will be taken as unskilled/Semi skilled /skilled/ workers in Civil/E&M construction works as per their eligibility and they will be continued as outsource workers after commissioning of the unit as per plant requirement in labour oriented annual maintenance works such cleaning of roads,



Chapter-7: Additional Studies

S. No	Points raised by Public representative/public	Response/Commitment by project proponent	Action Plan to comply with the commitments
	process of compensation to the remaining land. He appealed to TSGENCO not to engage the labourers from outside area and only local labourers should be engaged during the construction and operation phase.	lands acquitted for setting up of thermal project.	drains, up keeping of all buildings, maintenance of lawns and plantations, annual maintenance works in coal handling plant etc.
6.	Smt.Aruna Balu,MPTC member Veerlapalem welcomed the project.	She has welcomed the project	
7.	Sri Balu Naik, Husband of MPTC member-Veerlapalem He has stated that farmers of the village have lost their agricultural lands due to the proposed thermal project and have been paid Rs. 7.0 lakhs per acre. Endowment lands are not paid so far. He demanded the authorities for payment of Rs. 6 lakhs to the non-right holders. He sought employment to the local people and demanded that no outsider should be engaged. The village lost its grazing ground to cattle and suitable place should be identified in the adjacent forest areas. He sought the establishment of corporate hospital with health card worth of Rs. 5.0 lakhs to be provided to each villager.	There are no any endowment land in the lands acquired for the project. Employment will be provided in the plant operation as per plant requirement and as per the guide lines given in the GOMs No 98 dated 15 th April 1986.	There is a 100 bedded Govt. area hospital at Miryalaguda which is at a distance of 25 km from project site. However, Periodical health camps will be conducted in surrounding villages of the plant and necessary medicines will be distributed at free of cost to the people who visit the health camps. Project hospital will be constructed in the project premises for treating all the plant workers, officials ,Engineers and other staff members.
8.	Sri G. Kotaiah, MPTC member, Thalla veerppagudem He supported the setting up of the power project as it would boost the rural economy.	He has welcomed the project	



Chapter-7: Additional Studies

S. No	Points raised by Public representative/public	Response/Commitment by project proponent	Action Plan to comply with the commitments
9.	Smt.J. Rajyalakshmi, Sarpanch, Thallaveerppagudem She urged the authorities to make adequate payment of compensation to the lands lost under the proposed project and employment to the people of her village as per eligibility.	An amount of Rs 285.81 crores was deposited with the Dist. Collector, Nalgonda towards payment of land compensation, ex-gratia and R&R package to all the genuine land losers	
10.	Sri D. Narayana Reddy, PACS Chairman- Veerlapalem, He has stated that about 174 families have lost their lands and has requested the government to allot double-bed room houses to all of them. He sought facilities to the land losers on par with BCs and SCs. He demanded for the setting up of an ITI college to train adequate number of local youth in skills required by the project, as the existing private ITI college is having a limited intake capacity of 30-40 members only. He demanded employment to all eligible people of the area.		The District Collector, Nalgonda will take care of these issues. In regard to providing employment to the land losers it is already explained.
11.	Sri B. Hanuma Naik, R/o Modugulakuntathanda welcomed the setting up of the project.		
12.	Sri Eeshwar, R/o Kapoorthanda He raised the issue of losing his complete land under this project and sought justice by way of providing employment to all such people.	Employment will be provided to the genuine land losers in terms of Go Ms No 98 dated 15.04.1986 depending upon the their eligibility and qualification.	
13.	Sri G. Surya Naik, R/o Modugulakuntathanda He sought enhancement of compensation to the lands lost by them as the existing compensation is not adequate enough.	The compensation paid to the land losers as per land acquisition act 2013 which is a latest one and very reasonable.	



Chapter-7: Additional Studies

S. No	Points raised by Public representative/public	Response/Commitment by project proponent	Action Plan to comply with the commitments
14.	Sri Vasha Naik, R/O Modugulakulathanda ➤ He has stated that, the compensation is not commensurate with the market rate and sought payment as per the value determined locally. ➤ He wanted that resettlement colony could be located near Shanthi Nagar. ➤ He also requested for payment of compensation to the lands under enjoyment of local people (assignee land). ➤	The compensation paid to the land losers as per land acquisition act 2013 which is a latest one and very reasonable. The District Administration has already listed out names of all land losers and compensation was already paid to 80% of land losers.	-
15.	Sri Chandrasekhar Yadav, CPI(M) Leader ➤ He has stated that water is available, land is available and people have sacrificed their lands for setting up of this project. ➤ Keeping this in view, compensation should be paid to the farmers of surrounding thandas. ➤ He demanded employment to all eligible people irrespective of their party affiliations. Earlier, the managements of cement factories located in the mandal discriminated the local people by not providing employment to the local people. Instead, they brought the people from outside, leaving dust pollution to the locals.	He welcomed the project Employment will be provided in the plant operation as per plant requirement and as per the guide lines given in the GOMs No 98 dated 15th April 1986 as per eligibility and qualification.	
	➤ He cited the examples of M/s Deccan Chromites, M/s India Cements Limited to prove his case. He warned of agitation in case the local land losers and other affected people are not provided employment in the proposed project.		.



Chapter-7: Additional Studies

S. No	Points raised by Public representative/public	Response/Commitment by project proponent	Action Plan to comply with the commitments
16.	Sri A. Balu Naik, R/o Veerlapalem He demanded employment to one member from each family and free supply of electricity and water. He requested for the establishment of a hospital to cater to the needs of the people.	He welcomed the project. Water supply schemes will be provided in surrounding villages for supply of safe drinking water under CSR policy of TSGENCO. There is a 100 bedded Govt area hospital at Miryalaguda which is at a distance of 25 km from project site. However, Periodical health camps will be conducted in surrounding villages of the plant and necessary medicines will be distributed at free of cost to the people who visit the health camps.	
17.	Sri Mohd. Yousuf, TDP Leader, R/o Wadapally (V), Damarcherla (M) ➤ He stated clearly that all political parties irrespective of their party affiliations welcomed the setting up of the proposed project. ➤ He wanted to know about the actual number of people to be provided direct employment in this project. About 180 families were displaced on account of acquisition of their properties and they should be provided employment on priority basis. ➤ He hoped that, adequate steps would be taken to prevent the contamination of Krishna river water from dust pollution, which used to serve as drinking water source for thousand people living in these areas. There is no information on this aspect in the draft EIA report. There were instances of non-payment of	He welcomed the project.	- In regard to providing jobs to the land losers already explained in previous paras. i. The effluent treatment plant proposed to set up in the plant is designed with recycling system so as to re use the treated water for cooling tower make up, dust suppression system in coal conveyors and coal stack yard, green belt



S. No	Points raised by Public representative/public	Response/Commitment by project proponent	Action Plan to comply with the commitments
	compensation even after acquisition of lands and the people had bitter experiences on this count earlier. He sought compensation to the loss of agriculture crops in case of any such instances of pollution. ➤ He demanded for the allotment of double-bed room houses as part of compensation.		development and floor wash in the plant. ii. Ash water recovery system is designed with recycling system so as to recover the decanted water from ash pond and treat the same in the treatment plant and reuse the treated water for ashing purpose. iii. Sewage treatment plant will also be designed with recycling system so as to use the treated water in the green belt development. As such no plant effluent and decanted water from ash pond will be discharged into the near by water bodies.
18.	Sri A. Parsha Naik, ex-Sarpanch- Veerlapalem ➤ He demanded adequate compensation to the project affected people belonging to Veerlapalem and Thalla veerappagudem. ➤ He thanked profoundly for payment of compensation to about 80% of land losers and requested for the expeditious payment of compensation for the remaining people of TV Gudem.	He Welcomed the project.	An amount of Rs. 285.81 crores towards land compensation, R&R package and other charges was deposited with the District Collector, Nalgonda in the month of January 2016 for acquiring Ac. 854.32 Gts of patta lands and Ac. 920.25 Gts of ROFR land. The District Administration has already listed out names of all land losers and compensation will be paid accordingly.
19.	Sri D. Balaji Naik, Mandal President, TRS party-Damarcherla ➤ He assured cooperation of local people to the proposed project and sought employment on priority basis to the people of Damaracherla mandal only. He hoped that Damaracherla would become a mega city in near future and the electricity generated from this project would provide uninterrupted supply of power to the entire state of Telangana.	He welcomed the project.	



Chapter-7: Additional Studies

S. No	Points raised by Public representative/public	Response/Commitment by project proponent	Action Plan to comply with the commitments
20.	Sri M. Kishan Naik, TRS Leader, R/o Narsapuram thanda spoke bilingually. ➤ He stated that Scheduled Tribe dependent on agriculture for their livelihood and there should be adequate place to store the natural organic fertiliser like cow dung etc. Pollution has troubled them frequently. He pointed out that STs being un-educated were not provided with pattas to the lands cultivated by them and demanded payment of compensation to all such lands. ➤ He also dwelt about the people who left these areas in search for suitable employment and all such people should be provided compensation.	He welcomed the project The District administration will take care of these issues.	
21.	Sri K. Saidulu, TRS activist, R/o Wadapally ➤ He thanked the Hon'ble CM for selecting the location to set up this mega project. ➤ He requested for the payment of compensation to the lands lost under the project. ➤ He also requested for coverage of entire mandal under CSR. ➤ He further requested for setting up of institutions to cater to the needs of people under KG-PG free education scheme.	He welcomed the project	A provision of Rs 100.40 crore is made in the project cost to take up the CSR activities in the surrounding villages of Project. Sufficient amount is deposited with the District Collector, Nalgonda towards payment of land compensation. It is a State Government policy and the education department has already initiated the steps in this regard.
22.	Sri Veera Kotireddy, ex-PACS chairman, Damaracherla while welcoming the project requested the payment of compensation to the residents of TV Gudem and sought an assurance in respect of provision of employment. An ITI should be established in this	He welcomed the project	An amount of Rs.2410 crores is provided in the project cost for installing suitable equipment / systems to mitigate pollution levels as per



Chapter-7: Additional Studies

S. No	Points raised by Public representative/public	Response/Commitment by project proponent	Action Plan to comply with the commitments
	mandal for attaining the technical skills required for the project by the local people and preference on provision of employment. Most of the people in the thandas (Veerlapalem, Veerappagudem & Modugula thanda) surrounding this project have lost their lands and needed rehabilitation and requested for provision of 500-Sq. yards of homestead land to accommodate their cattle. Since the area up to 10-km radius will be impacted by pollution, there will be corresponding increase in temperature and requested to take suitable measures. In all such cases, employment should be provided as measure of compensation.		the norms fixed by MoEF&CC, GoI, New Delhi & TSPCB. The District Collector, Nalgonda will take care of in establishing ITI college in the district for providing vocational training courses to the local youth. Jobs will be provided to the genuine land losers as per the Go Ms no 98 Dated 15.04.1986.
23.	Sri Kokala Venkateshwarlu, Congress Party SC cell Coordinator & Chairman- Lift Irrigation Scheme ➤ He stated that the project site covers the route of existing pipeline and requested the realignment of pipeline and the construction of pump house. He expressed happiness that the new state was formed and new power station would come up. He cited the case of M/s India Cements Limited that fertile lands of black cotton soil were acquired and resulted in the loss of agriculture income. ➤ He sought the name of TV Gudem to be incorporated in the title of the project along with name of	He welcomed the project	The concerned authorities will be advised to lay the pipe lines of the water grid scheme which is under progress now so as to avoid the fouling with plant structures in future.



Chapter-7: Additional Studies

S. No	Points raised by Public representative/public	Response/Commitment by project proponent	Action Plan to comply with the commitments
	Veerlapalem village. Several forest cases were filed against the people of TVGudem for taking up illegal cultivation earlier, for all such lands he demanded payment of compensation at the rate of Rs. 6 lakhs per acre. The actual occupants of such lands should be identified and compensation should be paid to them only. In survey number 26, an extent of 78 acres of land is being cultivated by 30 families, only assignment pattas were issued in their favour and some of them disposed their lands. However, the land remained in the name of original assignee. He sought in all such cases the present occupant should be ascertained before effecting payment of compensation.		
24.	Sri Suddha Saidaiiah, R/o TV Gudem stated that, ➤ only 100-acres of land are covered under pattas and the remaining 700-acres of land are classified as forest land under cultivation. ➤ He sought provision of employment to all the land oustees. He demanded the development of infrastructure like roads, which needs to be converted as CC roads and construction of Ramalayam temple. ➤ He sought adequate compensation to 700-acres of land located in TV Gudem. He also sought the name of TV Gudem to be incorporated in the title of the project along with name of Veerlapalem village.	-	The Studies have been carried out in surrounding villages to study socio economic profiles, infrastructure availability and infrastructure requirement. Accordingly EIA report is prepared for implementation of CSR activities. Necessary provision has been made towards drinking water, sanitation, education, health care, infrastructure development, with a provision of Rs 100.40crores @ 0.40% of the project cost towards CSR plan. The infrastructure works under this provision will be taken up based on the proposals furnished by the District administration.
25.	Sri R. Saidulu, R/o TV Gudem thanked the people of TV Gudem for supporting the setting up of the project. He demanded payment of compensation at the rate of Rs. 6 lakhs per acre and provision of employment for one member. In case of lands under enjoyment, Rs. 5 lakhs per acre and provision of employment for one	He welcomed the project The concerns were already	



Chapter-7: Additional Studies

S. No	Points raised by Public representative/public	Response/Commitment by project proponent	Action Plan to comply with the commitments
	member.	clarified/explained by Revenue authorities and will be taken care by District revenue administration.	
26.	Sri A. Karunakar Reddy, Mandal President- YSRCP, Damarcherla welcomed the setting up of the project. He stated that about 80% of the land oustees received compensation and about 20% yet to be compensated. He sought construction of a corporate type hospital for providing free health care and institutions for imparting free education.	He welcomed the project The concerns were already clarified/explained in earlier response. CSR activities will be taken up as per recommendations given by M/s CMSR, Hyderabad. The details of CSR activities are given in EIA report	
27.	Sri Venkateshwarlu, R/o Ganeshpahad alleged that, not even a single person was provided employment in the cement industries including the post graduates of that local area. He sought job opportunities for the local people	He welcomed the project	
28.	Sri K. Sathyanarayana, R/o TV Gudem stated that the village lost entire forest land of 650 acres to the project. He demanded employment for all local people and also to the engineering and post-graduates from the village without following the process of eligibility. He expressed apprehensions on the viability of agriculture in view of the impending increase in temperatures on account of this mega project. Action shall be taken to control dust pollution	He welcomed the project. Providing of employment to the land losers is already explained the previous paras. Necessary measures towards control of pollution levels will be taken as sufficient provision is made in the project cost which is already explained in the	



Chapter-7: Additional Studies

S. No	Points raised by Public representative/public	Response/Commitment by project proponent	Action Plan to comply with the commitments
		previous paras. There won't be any effect on the agriculture due to this proposed plant as experienced at KTPS, Paloncha, Khammam dist where two crops are coming every year without any reduction in the yield.	
29.	Sri Konakanti Narsaiah, R/o TV Gudem has stated that, there is a dispute of ownership in respect of 150-acres of patta land and compensation has been withheld which may be expedited. He sought employment protection card as a guarantee. Compensation should be paid to the custodian of the enclosed lands.	He welcomed the project. Replies already given in the previous paras.	
30.	Sri R. Suresh, R/o TV Gudem stated that the lands were sold and claim for compensation is made by previous land holders, which should be curbed.	He welcomed the project and The District Administration will settle the land compensation issues as they are competent authorities.	
31.	Sri Pokala Kiran Madiga, TMRPS, R/o TV Gudem cited the past experiences of inadequate compensation paid to the lands acquired for setting up M/s India Cements Limited. Compensation for cultivating the forest land was paid at the rate of Rs. 2 lakhs per acre. He demanded the enhancement of compensation for all such lands where bore wells were dug up and power was also supplied. He requested for issuance of ID cards for all land	Replies are already given in the previous paras for similar type of queries.	



Chapter-7: Additional Studies

S. No	Points raised by Public representative/public	Response/Commitment by project proponent	Action Plan to comply with the commitments
	oustees and dependent labourers should be provided with employment in the project. He sought construction of the temple in his village.		
32.	Sri S. Saidi Reddy, TDP activist, Damarcherla welcomed the setting up of the proposed thermal power project.		
33.	Sri Skailash Naik, R/o Kondrapolu village welcomed the setting up of the project as it would enhance the employment opportunities. He complained that the industries in Damaracherla mandal were using the resources of their area without providing any gainful employment to the local people and engaging people from outside.	Already clarified in regard to providing employment to land losers.	
34.	Sri R. Saidulu, R/o TV Gudem supported the project proposal in their area.		
35.	Sri R. Kotaiah, R/o TV Gudem sought the name of TV Gudem to be incorporated in the title of the project along with name of Veerlapalem village. He requested to take up the construction of temple in his village and up-gradation of local school to full-fledged level so that pupil could continue their studies beyond 8 th standard up to 10 th standard without any sort of difficulty of going outside the village.	Development /expansion of existing school buildings will be taken up under CSR policy as per the proposals received from the District Collector ,Nalgonda.	



Chapter-7: Additional Studies

S. No	Points raised by Public representative/public	Response/Commitment by project proponent	Action Plan to comply with the commitments
36.	Sri Parshya Balu Naik, Banjara Seva Samithi leader, R/o Kalepally requested for restoration of lift irrigation scheme. He welcomed the setting up of the project.	The existing lift irrigation scheme on the Tungapadu vagu will not be disturbed in any way.	
37.	Sri L. Hanimi Reddy, R/o Veerlapalem supported the project proposal in their area.		
38.	Sri Ravinder, TRS district Secretary, R/o Dlawarpurthanda supported the project proposal.		
39.	Smt. T. Nagalakshmi Bhargav, Chairperson- Miryalaguda Municipality unequivocally supported the establishment of proposed mega power project as this step would enhance the economic activity in this region.		
40.	Sri N. Balu Naik, Akhila Bharata Banjara Seva Samithi, R/o Veerlapalem stated that the village lost its grazing ground to the project and sought alternate land in the adjacent forest area.	There is no notified grazing land in the lands acquired for the project.	
41.	Sri G. Hathiram, R/o Thimmapuram welcomed the proposed project.		
42.	Sri G. Hanimi Reddy, R/o Veerlapalem sought clarification as to whether the lands in survey number 190 were included in the project area. He demanded acquisition of lands in survey number 190 and payment of compensation.	This is not pertaining to the above project.	
43.	Sri K. Sreenu, Sarpanch- Mogilicherla supported the setting up of the proposed project.		



Chapter-7: Additional Studies

S. No	Points raised by Public representative/public	Response/Commitment by project proponent	Action Plan to comply with the commitments
44.	Sri Gunda Lakshmi Kanth Gupta, R/o Wadapally wanted a pollution-free power plant in their area. He hoped that the proposed project would benefit the area. Since this area is tail-end of Nagarjuna Sagar canal, water supply is irregular. Hence, he requested to implement lift irrigation scheme to increase the greenery as a measure of abatement of pollution. He requested that the latest and most efficient technology for control of pollution should be adopted in the proposed thermal power plant. He sought employment to the local people and adequate compensation to all land oustees.	Green belt development will be taken up as per the norms prescribed by the MoEF&CC, GoI, New Delhi and an extent of 1225 acres of land allocated for this purpose. In regard to pollution control measures already explained in previous paras.	
45.	Sri D. Venkateshwarlu, R/o Damarcherla while welcoming the setting up of the project requested for construction of a hospital.	There is a 100 bed Govt area hospital with well equipped & doctors in Miryagudem town which is 25 km away from the project.	
46.	Sri A. Anjaneyulu, ex-MPTC, Wadapally thanked the Hon'ble CM for selecting this area for construction of mega power project. He appealed to the project authorities to establish high power ESPs using advanced technologies to control dust pollution.	Accepted.	



Chapter-7: Additional Studies

S. No	Points raised by Public representative/public	Response/Commitment by project proponent	Action Plan to comply with the commitments
47.	Sri N. Harinder, National Alliance for People's Movement, R/o Miryalaguda objected the setting up of thermal power project by TSGENCO. He quoted the recent international convention, wherein the Hon'ble Prime Minister of India also agreed to the suggestions to desist from construction of new thermal power projects in view of impending increase of 2 degree Celsius in global temperatures, which will make the earth inhospitable for living beings. He cited the popular saying "earth can support the needs of human beings but not to the greed." He alleged that EIA report was not studied by anybody here except one person though the report was exhibited for the access of the public. As per the report, the power project would generate 30 lakh tonnes of ash annually. That means the project generates ash at the rate of 2 tonnes/minute. As per the report, 7% of the total ash produced would be supplied to the cement industries in this area and 93% of ash would be left in the ash pond. The TSGENCO had no concrete plans of disposing the ash without causing any harm to environment. He questioned the rationale behind setting up of this type of mega power plant, which is detrimental to environment and people. At present the TSPCB is staffed with three members to cater the needs of 2000 industries located in the district. He stated that the cost of the power from this project would be around Rs. 5/- per unit, whereas the solar power project developed with site specific locations would cater to the needs of the people without causing pollution. He added that solar power could be harnessed and supplied to the consumers by way of putting up at decentralised locations at cheaper prices without any adverse impacts. The mega projects like the present one require rehabilitation & resettlement of people. The experience of the people, who are displaced due to the construction of Pulichintala Project, is fresh in the minds of people even after		a) It is not correct that, the EIA report says, 7% of the total ash produced would be supplied to the cement industries in this area and balance 93% of ash would be discharged in to the ash pond. The table 4.68 of chapter 4 of EIA report will give the fly ash utilization schedule and the 100 % fly ash utilization will be met by the end of 3rd year from the date of commissioning of the project as there are number of cement industries around the proposed project and ash will be issued to them for production of PP cement. TSGENCO is also planning to set up two fly ash brick manufacturing plants in the plant premises for production of fly ash bricks and utilizing the same for construction of plant buildings, residential quarters and other needs. b) All the environment protection measures will be taken and the systems will be designed to maintain the norms as prescribed by the MoEF&CC, GoI, and the State Pollution Control Board, Hyderabad. c) No plant effluent will be discharged in to the near by water bodies as all the plant effluent treatment systems will be designed with recycling arrangement so as to re use the treated water for cooling tower make-up, ashing purpose, in dust suppression system, green belt development and floor wash etc. d) 275 meter high chimneys are proposed for better dispersion of flue gases in the surrounding



Chapter-7: Additional Studies

S. No	Points raised by Public representative/public	Response/Commitment by project proponent	Action Plan to comply with the commitments
	lapse of seven years. There is water course adjacent to the M/s India Cements Limited, which cater to the needs of thousands of acres in the vicinity, which may be affected by the dust pollution. The EIA report failed to evaluate the adverse impact on the water course.		environment. e)Online air quality monitoring systems and effluent monitoring system will be provided to monitor the effluent parameters so as to take corrective measures when ever there is any deviation in the normative values. f)In order to comply with the environmental protection measures budgetary provision of Rs. 2410 crores is made in the project cost for installing the above systems in the plant. g)The Telangana state is a newly formed state which came into force w.e.from 02.06.2014 .There is a power deficit of 2700 MW at the time of formation of the state. h) The solar power plants are not a base load stations which run only at 18% to 19% PLF. It is only a supplementary to existing thermal & Hydel power stations to fill the deficit to some extent. However the Telangana state Government has initiated steps for setting up of 5000 MW solar power plants in the state. Already 800 MW is connected to the grid and 2000 MW will be commissioned by end of March 2017.Further, balance 2200 MW solar power plants will come within two years. i) Also the solar power plants cannot fulfill the needs of the newly formed state and the cost of generation is also high when compared to the Coal based thermal power plants since the land required for each MW of solar power plant is 5 acres where as for thermal



Chapter-7: Additional Studies

S. No	Points raised by Public representative/public	Response/Commitment by project proponent	Action Plan to comply with the commitments
			power plants , the land requirement is varying from 0.50 acre/MW to 0.70 acre/MW. Availability of land is also a major problem in Telangana state. The people of the state will not afford the power at higher tariff where power is supplied to the agricultural sector at free of cost and domestic sector at subsidized prices. j) For implementing R&R policy and payment of compensation to the land losers an amount of Rs 285.81 crores was already deposited with the District Collector. Also as provided jobs to the land losers at KTPS complex, Khammam District and KTPP at Warangal district jobs will be provided to the land losers as per the Govt. rules in vogue. There is no question of going back in this issue. k) A vagu known as Thungapadu vagu is passing through the plant site. The sub committee of Expert Appraisal Committee (EAC) of MoEF&CC,Gol,New Delhi has visited the site on 05.12.2015 along with the Thungapadu vagu and made certain recommendations for strengthening of the vagu and also recommended for grant of ToR. The TSGENCO has already furnished the action plan vide letter no: CEC/Thermal/SE/C/TCD-I/F.YTPS/D.No;284/15-16 dated 23.01.2016 on the recommendations given by the sub committee of EAC of MoEF&CC, Gol,New Delhi. Further no plant effluent or decanted water from ash pond will be discharged into any water bodies as the effluent



Chapter-7: Additional Studies

S. No	Points raised by Public representative/public	Response/Commitment by project proponent	Action Plan to comply with the commitments
			treatment /ash water recovery systems are designed to re use the treated water.
48.	Sri K. Thirupathaiah Goud, R/o Wadapally supported the setting up of the project and sought implementation of the lift irrigation scheme.	The Telangana State Government is already initiated various lift irrigation schemes under “Mission Bhagiratha” programme which is applauded by one of the Central Minister in his recent visit to the state.	
49.	Sri P. Rampal Reddy, Telangana Trade Union welcomed the project and requested that no person from Andhra should be allowed to take up any sort of employment in the project and only local people should be given opportunity to do the same work.	Only local people will be considered for providing livelihood in the project.	
50.	Sri G. Mahesh Goud, Vidhyardhi sangham, BC Welfare Association sought employment and wanted to know the details of job opportunities available in the proposed project.	Explained in the previous paras.	
51.	Dr. S. Nagasena Reddy, Environmentalist, R/o Veerlapalem while welcoming the project he dwelt the elaborate process followed by Expert Appraisal Committee of MoEF&CC. The EAC headed by one Dr. C.R. Babu (from Kakinada) and assisted by one Deputy Director from MoEF inspected the site and deferred the location of the thermal power plant. With great effort, the government convinced the authorities and obtained terms of reference for the present location. He cited the latest guidelines regarding brick kilns wherein the use of fertile top soil useful for agriculture is prohibited. Construction is going at a brisk pace in Hyderabad city and fly ash in large quantities can be used for manufacturing of bricks apart from meeting the requirement of cement	He welcomed the project.	



Chapter-7: Additional Studies

S. No	Points raised by Public representative/public	Response/Commitment by project proponent	Action Plan to comply with the commitments
	units. He sought free power supply to the lift irrigation schemes under CSR to provide irrigation needs of the area. He assured that he would volunteer to support TSGENCO legally in case of any impending cases filed against the proposed project.	Two Brick plants will be established by TSGENCO for manufacturing of fly ash bricks for utilizing the same in construction of the plant buildings, residential quarters of TSGENCO and bricks will also be supplied to the private parties as per their requirement. No. of entrepreneurs are also coming forward to establish the brick plants once the project works commences.	
52.	Sri G. Ramaiah, R/o Veerlapalem questioned the decision of setting up of the thermal power plant at Veerlapalem instead of coal mining areas like Manuguru and Kothagudem. He raised the issue of compensation for occupied lands. He sought raising plantation on large-scale in advance.		Green belt development will be taken up in the vacant areas of the power plant including proposed colony & around ash pond area to meet the environmental norms as fixed by MoEF&CC, GoI to protect the environment.
53.	Sri Surkanti Venkat Reddy, NGO, Choutuppal welcomed the setting up of the proposed power plant. He cited that the progressive people of Telangana State supported the project like this in contrast to the opposition of setting up of similar type of projects at Kakarapally and Sompet by the people from Andhra region. He sought to take up advance operations for developing plantations.		Nursery will be established and saplings will be supplied



S. No	Points raised by Public representative/public	Response/Commitment by project proponent	Action Plan to comply with the commitments
			at free of costs to all the surrounding villages for development of green belt other than the power plant area
54.	Sri Jeethiram, R/o Thimmapuram requested for the survey of lands in survey number 190 in Veerlapalem area	He welcomed the project proposal. Revenue authorities will take care for his request as per requirement.	Re

The District Collector, Nalgonda requested the project proponent i.e. CMD(I/C), TSGENCO to offer his clarifications on various issues raised during the course of public hearing.

The District Collector, Nalgonda requested the project proponent i.e. CMD, TSGENCO to offer his clarifications on various issues raised during the course of public hearing.

Sri C. Radha Krishna, Chairman and Managing Director (I/C)- TSGENCO gave a detailed explanation to the technical issues raised as follows:

- The Plant is designed for Zero discharge concept. No effluent will be discharged into the natural stream. Effluent treatment plant will be constructed with recycling system and treated water will be utilized for cooling water make up, dust suppression system in coal plant, wetting of coal in coal stock yard and for plantations. Also Ash Water Recovery System will be provided to collect decanted water from the Ash Pond and the same collected water will be reused in ashing purpose.
- The Tungapadu Vagu which is flowing through the Plant site will not be disturbed. The Sub-Committee of Expert Appraisal Committee (special Team) from MOEF, Govt, New Delhi has visited the Project site on **05.12.2015** and after a thorough visit recommended for deepening the stream and also recommended to provide embankments on either side of the stream so that it cannot be disturbed. To this effect TSGENCO has already committed to the MOEF.
- Arrangements for 100% Fly Ash Utilisation are made available so that there will not be any Air Pollution.
- With respect to the query about temperature of 140 Degrees at the Plant it is clarified that the Chimney's height is designed for 275 meters so that the



exhaust temperatures of flue gas is let out at that height and there will not be any thermal pollution.

The EE, TSPCB while summing up of the proceedings stated that there are 15 written representations received by him and about 54 persons from the public spoken during the course of public hearing. He has stated that entire proceedings are videographed and will be sent along with the written representations to the MoEF&CC for further course of action.

The District Collector stated that the public hearing was conducted in accordance with the provisions of the notification. There are 15 written representations received on this project and about 54 speakers have offered their comments at this venue. Many people supported the setting up of this project. People from surrounding villages overwhelmingly supported this project proposal. Regarding payment of compensation, 80% of work has been completed and the remaining 20% will be completed at the earliest after verification of the antecedents of the occupants. The district administration has submitted proposal for enhancement of compensation in case of certain categories, whose lands are covered under acquisition process. The entire proceedings are videographed and the minutes will be sent to the MoEF&CC for further course of action.

He then concluded the hearing on positive note as all the public, who have gathered at the venue of public hearing supported the setting up of the above project at Veerlapalem (v), Dameracherla (M) Nalgonda district.



Replies to the points mentioned in the representations received w.r.to Environmental Public Hearing held on 31.05.2016 by TSPCB – Clarifications/Action Plan to fulfill the demands.

S. No	Name of the Agency	Points mentioned in the representation	Clarification/Action Plan
	Sri.N.BhaskaraRao, Hon'ble MLA,Miryalaguda Constituency,Nalgonda Dist. Representation received Dated 31.05.2016	He supported the proposed Power project.	The lands for the proposed project are alienated/acquired by the District Collector, Khammam and handed over to TSGENCO.
	Sri. D.Narayana Reddy, S/o.Chintha Reddy, Veerlapalem(v),Damaracherla (M),NalgondaDistrict. representation received Dated 31.05.2016	He supported the proposed Power project as per CPCB norms. And requested the Management to provide & take all pollution control measures &he requested the management to develop the green belt in surrounding villages. He requested the management to give employment to land losers and local villagers& to spent CSR funds to roads,schools &health camps.	An amount of Rs.59.5 crores was deposited with the District Collector, Khammam towards land compensation, exgratia and R&R package. The District Collector has informed that 90% of the amount already disbursed to the original beneficiaries and balance compensation will be paid after finalizing the genuine land losers. Any land related issues are to be dealt with the District Collector Khammam.
	Sri.P.Venkateswarlu, Chairman, Sri Kantamaheshwara Ettipothala Pathakam,Tallaveerappagudem(v),D amaracherla(M),NalgondaDistrict. representation received Dated 31.05.2016	He supported the proposed Power project. And requested the management to give employment to land losers and local villagers & sanction the new lift irrigation scheme for Thallaveerappagudem(v) instead of Sri Kantamaheshwara Ettipothala pathakam which is lost in acquisition of YTPS project.	
	Sri N.Kotya Naik,Sarpanch, Veerlapalem(v),Damaracherla(M),Nal gonda District. representation received Dated 31.05.2016	He supported the proposed Power project. He requested that the management to do all basic needs in his village.	
	Sri.P.Kiran Madiga,Founder President,TMRPS, 2-2-87/24/1/d/1,Amberpet, Mallikarjuna Nagar, Hyderabad. representation received Dated 10.03.2016.	He supported the proposed Power project. And requested the management to give employment to land losers and local villagers & sanction the new lift irrigation scheme for Thallaveerappagudem (v) instead of Sri Kantamaheshwara Ettipothala pathakam which is lost in	



		acquisition of YTPS project.	
	Smt.J.Rajya Lakshmi,Sarpanch, Tallaveerappagudem(v), Damaracherla(M),Nalgonda District. representation received Dated 31.05.2016	She supported the proposed Power project and take up development activities in their village as top priority. And requested management to give employment first priority in their village as their village is very close to the proposed project.	Suggestions made by the said representative will be taken into consideration.
	Sri R.Saidulu, CPI Mandal Secretary, Damaracherla(V&M), Nalgonda District. representation received Dated 31.05.2016	He supported the proposed Power project and requested to provide jobs for the local villagers. The management to give free power, education, medical treatment, drinking water & double bed room houses and he also requested to control pollution &temperature by advanced technology. He requested the Government to sanction Government Technical College and he requested the management to give 100 % local employment.	
	Samachara Hakku Sadhana Samithi,Nalgonda District Committee,Nalgonda. representation received Dated 31.05.2016	They supported the proposed power project. They requested the management to develop the forest in other area. The Management to take up developmental activities in villages.	
	Sri.V.Abraham General Secretary, Manava vanarulu & paryavarana Parirakhana prachara samstha. representation received Dated 31.05.2016	He supported the proposed power project as the proponent proposed all necessary pollution control measures in EIA report .	
	Sri Surkanti Venkata Reddy, Social worker Nalgonda District. representation received Dated 31.05.2016	He supported the proposed power project and requested for good compensation and jobs to local.	
	Sri. G. Mohan State Secretary, Human Rights Forum representation received Dated 31.05.2016	Submitted detailed questionnaire on ToR's, Coal, Water, Forest, Socio Economic impact assessment, Ash pond, Health, Cumulative Impact assessment	



		and alternatives. He expressed that, the EIA report is not complete.	
	Sri.N.Harinder, Human Rights Forum. representation received Dated 31.05.2016		
	Sri.Ch.Sailu,NGO, Chotuppal (V&M), Nalgonda Dist. representation received Dated 28.05.2016		
	Sri. J.Ravinder, Human Rights Forum. representation received Dated 31.05.2016		
	Modugula Thanda & Kapoor Thanda Hamlets of Veerlapalem Villagers,Damaracherla(M), Nalgonda District.		
	Sri.P.Nagaiah,President,Priya Chaitanya Vedika,Hyderabad		

- a) The proceedings and the list of attendees for the public hearing and the replies for representations received from various people are given as **Annexure 14**.
- b) Out of the 16 representations received through Regional Officer, TSPCB, Nalgonda, 14 members have supported the project duly requesting to provide employment to land losers, taking of CSR activities in surrounding villages, payment of compensation etc., All these are suitably clarified and answered in the above action plan.
- c) 2 members, i.e., Sri G.Mohan, State Secretary, Human Rights Forum and Sri N.Harinder, Human Rights Forum have raised certain issues in regard to the EIA report. The same were addressed and were incorporated as **Annexure 15**.
- d) The issues raised by Dr. Babu Rao, Retd Scientist, Hyderabad and received through Dr. M.Ramesh, Joint Director, MoEF & CC vide his e-mail dated 15/06/2016 are also answered and incorporated as **Annexure 15**.
- e) The issues raised by Sri Prasad Khale, Conservation Officer, Conservation Action Trust and received through Dr. M.Ramesh, Joint Director, MoEF & CC vide his e-mail dated 29/05/2016 are also answered and incorporated as **Annexure 15**.



The photographs of the public hearing are given below:







7.3 CSR Studies

Detailed CSR report has been prepared by M/s Centre for Management & Social Research, Hyderabad and enclosed as **Annexure 16**.

Action plan for implementation of CSR activities is provided in Chapter-7, for which a provision of Rs. 100.40 crores was made in the project cost under capital budget.

7.4 R&R Studies

The District Collector, Nalgonda has raised a demand note vide his letter dt. 02-12-2015 for deposition of an amount of Rs. 285.81 crores towards LA compensation, R&R benefits for Project Displaced Families & Project Affected Families, infrastructure and unforeseen items, etc., which is worked out as per LA and R&R Act, 2013. TSGENCO has deposited an amount of Rs. 285.81 Crores vide Lr. No. CE/C/Th/SE/C/TCD-I/F. No.259/2015-16, dt. 04.01.2016. Copy of the same is enclosed as **Annexure 17**.

7.5 Hydrogeological Studies

Detailed hydro-geological study of the area has been carried out by M/s Vimta Labs Ltd, summary of which is provided as **Annexure 12**. The summary of the same is discussed in Chapter-3.



Table 7.78: Item-wise Estimation for Implementing the CSR Activities

Table 4.2 Item wise estimation for implementing the CSR activities			
Category no.	Activities	Unit	Cost in Rs.
1	Construction of drains	100 m	85000
2	Construction of CC Roads with a width of 4.0M	1000 m	5500000
3	Providing over Head Tank with 5 HP motor	60000 ltr capacity	2500000
4	Laying of BT road	1 km	1500000
5	Laying Drinking Water supply pipelines (100 mm dia. PVC pipe)	1 km	300000
6	Providing Solar Street lights	1 No.	30000
7	Providing Mineral water plant (RO Plant) for safe drinking water The location for setting up of RO plant will be decided by the local Panchayat/Municipality and operation costs of the plant will be borne by Panchayat/Municipality. Only annual equipment maintenance will be provided by TSGENCO	1 No.	1000000
8	Development of green belt (including cost of plant, labour charges, tree guard etc.) - Capital expenditure Rs. 1500/- per 1 sapling for initial plantation and one year maintenance @ Rs. 500/- per 1 sapling	1 sapling	2000
9	Conducting of Training programme for youth and employment opportunities (for one year)/Income Generating Activities trainings for women	Training cost per person	28000
10	Providing Individual Toilets	1 No.	25000
11	Providing furniture, computers, Lab equipment, sports kits, books for libraries and development of play ground	Lump Sum/Per school	500000
12	Boundary wall for schools	1 Km	2500
13	Providing maintenance cost of toilets in schools and replacement of sanitary fittings and salary of cleaner per annum	Lump sum/ school	180000
14	Development of school buildings and construction of additional class rooms for schools in 5 villages	Lumpsum/ 5 villages	4000000
15	Construction of building for Anganwadi centre (15'X15')	1 No.	500000
16	Provision of bore well in schools	1 No.	70000
17	Rehabilitation of physically challenged persons, widows and senior citizens	Lumpsum	2183066
18	Conducting awareness campaigns against sexually transmitted diseases	Lumpsum	20000
19	Conducting health camps once in 6 months	Lumpsum	100000
20	Assistance to vulnerable groups	Lumpsum/Unit	50000
21	Community Halls	Lumpsum /1 No	800000
22	Hand pumps	Lumpsum /1 No	20000



7.6 Risk Assessment

The thermal power plant is a large electricity generation industry. It consist a number of process to generate electricity by use of fossil fuel. It also consist several major equipment and operations involve in its process. The purpose of hazard identification and risk assessment in thermal power plant is to identify physical, chemical, biological and environmental hazards in the plant, analyse the event sequences leading to those hazards and calculate the frequency and consequences of hazardous events. Then risk level is assigned to each hazard for identifying required corrective action to minimize the risk or eliminate the Hazard.

7.6.1 Plant Description

Thermal power plant is electricity generation plant which converts the fossil fuel stored energy to electrical energy by means of generating electricity. In other words, it is merely a chain of Energy conversion as follow:

- Chemical energy in the fuel is converted to Heat energy of steam.
- Heat energy of steam is converted to Mechanical or rotating energy of a rotating wheel called Turbine.
- The mechanical energy of Turbine is converted as Electrical Energy in a Generator.

Thermal power plant has the following area operations:

A. Coal Handling Plant

Coal transported to the plant by the rail line and carrier trucks. This coal is transfer from the underground bunker to crusher by series of conveyer belt. In coal crusher coal size reduced up to $\frac{3}{4}$ " after that coal transfer to the boiler's coal bunker or coal yard. In the case of emergency the coal is fetch from coal yard. Coal feeder control the quantity of coal from coal bunker and send it to the ball mill or roll mill for pulverization process. Where coal crushed to the fine powder and mixed with preheated air come through the air from preheater. This process use for drying the coal and sends coal powder up to the burner of furnace. The rest of impure coal and rocks pass out to the bottom of mill and transfer to the clinker grinder then to the storage.

B. D.M. Plant

Raw water is de-mineralizing to free water from salts and ions then treated with sulphuric acid and caustic soda to retain the ph level up to 9. This process is done in the demineralization plant. De-mineralized water transfers through pipeline to D. M. water tank.

C. Boiler

The Feed water pump pass the water through low pressure heater, high pressure heater and economizer to raise its temperature and send to boiler drum. The furnace of the boiler had four coal burner and one diesel burner. Diesel burner used to rises the temperature of furnace up to up to auto ignition temperature of pulverized coal. Coal burn and generate flue gases which boil the water of boiler drum. Then flue gases passes through super heater , secondary super heater, re-heater, economizer, air pre-heater and tri-sector air heater after that its temperature is reduced. The flue gas mainly content fly ash particles and air pollutants like SO_x , NO_x, CO_x, toxic gases, metal fumes so before passing it to the chimney its treated in the Electro-



static precipitator. In ESP, the fly ash particles and pollutants are extracted from the flue gases by using ammonia.

D. Turbine and Generator

The generated steam is passing through the super heater to the high pressure turbine. After driving the turbine a part of this steam sends to the H.P. heater 2 and left pass through the reheater then secondary super heater and regain its pressure to drive Intermediate turbine. Then the steam transfer to the H.P.H 2 and low pressure turbine. Then steam from low pressure turbine transfer to L.P.H 4-5-6 and condenser. In condenser steam is cooled by cooling water and then deaerator circulates it for steam generation. The three turbines used to drive one shaft which drives the rotor of the generator by mean to generate electricity. The various auxiliaries of turbine and generator is cooled by hydrogen gas and cooling oil.

E. Switch Yard

The generate electricity transfer to the unit step-up transformer and passed it to switch yard. Switch yard boost up and divide generated electricity and pass it to the transmission line for distribution.

7.6.2 Qualitative Risk Assessment

A qualitative risk analysis prioritizes the identified project risks using a pre-defined rating scale. Risks will be scored based on their probability or likelihood of occurring and the impact on project objectives should they occur. The HAZID(Hazard Identification) technique is used to provide the Qualitative risk assessment for this project.

7.6.2.1 Introduction

In present scenario for any industry to be successful it should meet not only the production requirements but also maintain the safety standards for all concerned. The coal fired thermal power plant susceptible to a wide range of hazards in its various operational areas. Hazard identification and risk assessment is systematic approach to protect the health and minimize danger to life, property and environment.

It includes the methodological steps to identify hazard related to materials, operations and conditions. Assess the risk level of the hazards and apply or suggest the possible remedies and corrective actions to reduce the risk.

7.6.2.2 Methodology

Hazard identification and risk assessment is a combinations deterministic, probabilistic and quantitative method. The deterministic methods take into consideration the products, the equipment and the quantification of the various targets such as people, environment and equipment. The probabilistic methods are based on the probability or frequency of hazardous situation apparitions or on the occurrence of potential accident. The quantitative methods analyses various data numerically.

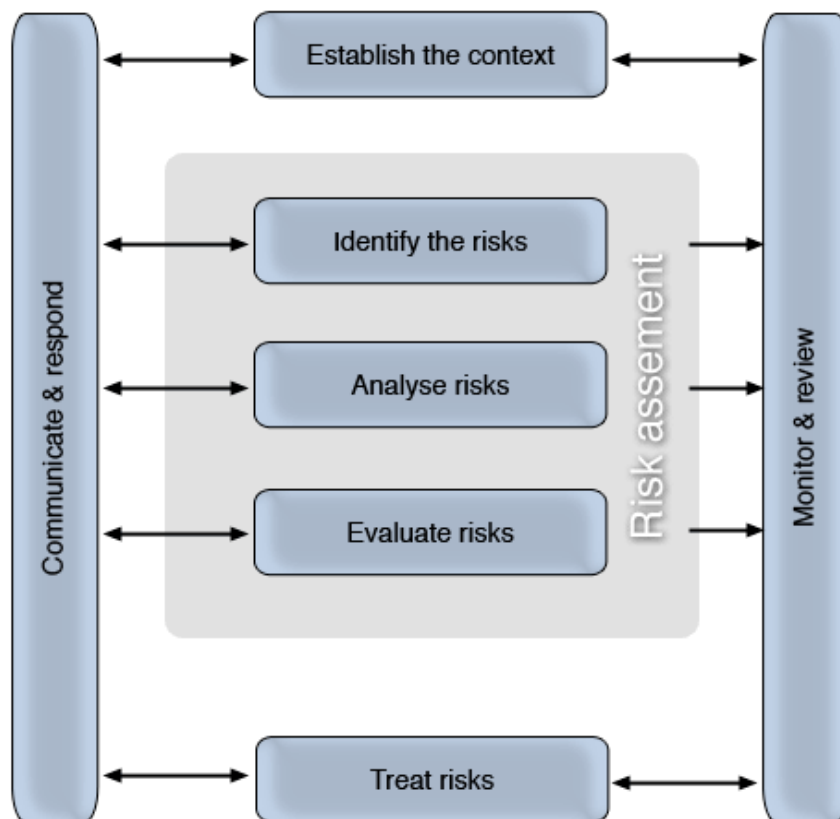
The five steps of hazard identification and risk assessment are:

- Step1: System Description: Define the system and there subsystem and operations.



- Step2: Hazard Identification - Defining and describing a hazard, including its physical characteristics, magnitude and severity, causative factors, and locations or areas affected.
- Step3: Risk Analysis- Analyze the Probability, frequency or likelihood the potential losses associated with a hazard.
- Step4: Risk Rating - Risk Classification Screening Table is formed and value of hazard or calculated risk class gives the require action to be taken.
- Step5: Resolve the Risk – corrective action recommended preventing, reducing or transferring the risks, by short and longterm planning.

Figure 7. 79: Risk Assessment Methodology



7.6.2.3 Safety Policy and Regulations

Keeping in view of the safety requirement during construction, operation and maintenance phase, TSGENCO has formulated safety policy with the following regulations.

- To allocate sufficient resources to maintain safe and healthy conditions at work place.



- To take steps to ensure that all known safety factor are taken in to account in the design, construction, operation and maintenance of plants, machinery and equipment.
- To ensure that adequate safety instruction are given to all employees.
- To provide wherever necessary, protective equipment, safety appliances and clothing and to ensure their proper use.
- To inform employees about materials, equipment or processes used in their work area known to be potentially hazardous to health and safety.
- To keep all operations and methods of work under regular review for making necessary changes from the point of view of safety in the light of experience and up to date knowledge.
- To provide appropriate instruction, training and supervision in health and safety, first aid and to ensure that adequate publicity is given to these matters.
- To ensure proper implementation of fire prevention and an appropriate fire fighting services together with training facilities for personnel involved in this service.
- To ensure that professional advice is made available wherever potentially hazardous situations exit or might arise
- To organize collection, analysis & presentation of data on accident, sickness & incident involving personal injury to health with a view to taking corrective, remedial & preventive action.
- To promote through the establishment machinery, joint consultation in health & safety matters to ensure effective participation by all employees.
- To publish/ notify regulation, instruction and notice in the common language of employees.
- To prepare separate safety rules for each type of occupation/process involved in a project.
- To ensure regular safety inspection by a component person at suitable intervals of all buildings equipment, work places and operations.

7.6.3 HAZID

Risk initiating event likelihood and consequences are assumed by taken reference of visited plant real activities. Risk Classification screening table is given below

Table 7.80 :Risk Classification Screening

S.No.	Hazard Description	Initiating Event Likelihood	Unmitigated Consequences		Risk Class	Corrective Action
			Life Safety	Property Damage		
1	Coal Handling Plant Hazard					
i	Fire in coal storage	2	1	2	B	Regular inspection, water spray, isolation from ignition sources
ii	Coal dust explosion in coal conveyer bunker	1	3	4	B	Proper ventilation, spark proof electrical Equipment



S.No.	Hazard Description	Initiating Event Likelihood	Unmitigated Consequences		Risk Class	Corrective Action
			Life Safety	Property Damage		
iii	Injury during coal handling like slip and trip	4	1	-	A	Proper PPE's
iv	Respiratory problem due to coal dust	3	3		B	Dust mask should be provided
v	Catches on conveyer belt	2	2	2	B	Safety guard on the moving part
vi	Rail line and other transport line accidents	4	2	1	A	Speed limit on plant area
vii	Injury during maintenance on ball mill	3	3	1	B	Training, proper supervision, PPE's
viii	Fall from the height during work on conveyer belt, conveyer control room etc	3	4	-	C	Safety belt, safety net should provided, training
ix	Struck by falling object	4	2	1	A	Safety helmet, safety net
2	D.M. Plant Hazard					
i	Fire hazard	2	3	3	B	Fire extinguisher, eliminate the possible ignition source
ii	Chemical burn by Spillage of sulphuric acid and caustic soda lye during unloading, overflow, Damage on storage tank or pipe line	4	3	2	A	Wash rinse exposed area, training, maintenance, proper supervision
iii	High noise level	1	3	-	A	Ear plug, ear muff should provided
3.	Boiler Hazard					
i	Explosion in boiler due to over pressure and temperature	1	4	4	C	Continuous monitoring, maintenance
ii	Explosion in	1	4	4	C	Regular



S.No.	Hazard Description	Initiating Event Likelihood	Unmitigated Consequences		Risk Class	Corrective Action
			Life Safety	Property Damage		
	boiler due to improper combustion of fuel.					inspection, maintenance
iii	Burn injury due to hot water and hot steam pipeline leakage	3	3	3	B	Inspection, maintenance
iv	Exposure to the hot surface of pipeline or machineries.	3	1	-	A	A Regular inspection, maintenance
v	Water tube burst due to Failure in boiler water level Control	2	-	4	C	Continuous monitoring, maintenance
vi	Fire in diesel supply line	3	3	3	B	Regular inspection, maintenance
vii	Burn injury by hot fly ash	4	1	-	A	Maintenance, proper exhaust
viii	Catches on the moving part of the machinery like F.D. fans or motors	3	2	1	A	Proper fencing on the moving parts of turbine
ix	Burst of the equipment body due to over pressure and over temperature	3	1	4	A	Regular inspection, maintenance
x	Slip , trip and fall from the height during routine work, maintenance or inspection	4	4	2	B	Training, proper supervision, PPE's
4.	Generator And Turbine Hazard					
i	Explosion in turbine due to cooling system failure	1	4	5	C	Regular inspection, maintenance
ii	Damage on generator due to lack of	2	1	4	A	Regular inspection, maintenance



S.No.	Hazard Description	Initiating Event Likelihood	Unmitigated Consequences		Risk Class	Corrective Action
			Life Safety	Property Damage		
	lubrication in coupling shaft					
iii	Fire on cooling oil	3	3	3	B	Proper storage, isolation from the ignition sources
iv	Fire and explosion on hydrogen tank	2	4	4	C	Proper storage, isolation from the ignition sources
v	High noise level	1	3	-	B	Ear plug, ear muff should provided
5.	Switch Yard Hazard					
i	Fire on transformer	3	-	4	C	Regular inspection, maintenance
ii	Electric shock and electric burn routine work, maintenance or inspection of electrical panels in switch yard	5	4	1	B	Training, PPE's should provided
iii	Slip, trip and from the height during routine work, maintenance on switch yard	4	4	1	B	Safety belt, safety harness should provided, training
6.	Other Hazard					
i	Control room fire hazard	2	1	3	A	Fire extinguisher, eliminate the over heating
ii	Eye irritation and respiratory problem pipeline	4	1	-	A	Wash rinse exposed area, maintenance
iii	Fire on storage tank	2	4	4	C	Fire extinguisher, eliminate the possible ignition source
iv	Fire hazard on fuel storage tank	2	5	4	D	Proper storage, isolation from the ignition sources

Table 7.81 : Risk Classification

Class	General Description	Action



Class	General Description	Action
A	Low risk events	Low risk level ;no further risk reduction action required
B	Moderate risk events	Required minor risk reduction improvements; generally addressed by codes, standards, company or industry practices
C	Moderate-High risk events	Generally required further analysis to determine an optimal risk reduction strategy or reliability analysis of propose risk controls
D	High risk events	High risk required immediate risk reduction analysis

The risk rating of the present and possible hazard is evaluated which divide them into acceptable, tolerable and unacceptable risk level. Which risks are in unacceptable level there possible corrective action also recommended to improve safety measure and analysis. The results of this analysis will be of valuable to find out the consequence on emergency situation that may occur. With this knowledge, the level of preparedness can be assessed and measures taken to enhance capabilities through training and preparation of a more effective response to such occurrences.

7.6.3.1 Preventing Fires & Explosions

- Fires & explosions in boiler can also result from the ignition of volatile materials and fuels. The most hazardous procedures are during the firing- up and shutting-down procedures. Coal-fired boiler should have safeguards to ensure that unspent fuel does not accumulate and ignite. The fuel supply to boiler should be fitted with an automatic shut-off mechanism.
- Operators should be trained in safe systems of work. The building should be designed to be non-combustible, with automatic fire suppression engineered or designed into the process where appropriate.
- Risk assessments should be carried out to consider the potential dispersal of toxic chemicals from non-furnace processes & combustion products, and the potential impact of an explosion on the surrounding areas.
- Regular safety audits should be undertaken to ensure that hazards are clearly identified and risk-control measures maintained at an optimum level.
- Boiler should not be operated beyond their safe lives.

• Toxic Vapors, Dusts & Fibres

Conversion of Coal into power will lead to the release of toxic fumes either during operation or accidentally. When a boiler is stripped for maintenance purposes, particular care should be taken to avoid inhaling dusts or fibres from the insulating material. Dust and fume collectors should be incorporated into the boiler design.

• Handling of Heavy Bags

Handling of heavy bags of the final products may lead to occupational injuries like strains, sprains and cramps. This can be avoided by going for mechanical handling of the product or minimising the weight for manual handling.



7.7 Disaster Management Plan

7.7.1 Disasters

A disaster is a catastrophic situation in which, suddenly, people are plunged into helplessness and suffering and, as a result, need protection, clothing, shelter, medical and social care and other necessities of life.

Disasters can be divided into two main groups. In the first, are disasters resulting from natural phenomena like earthquakes, volcanic eruptions, storm surges, cyclones, tropical storms, floods, avalanches, landslides, forest fires. The seismic zone map of India is given below as **Figure 7.79 (A)**.



Figure 7.79 (A): Seismic Zone Map of India



The second group includes disastrous events occasioned by man, or by man's impact upon the environment. Examples are armed conflict, industrial accidents, radiation accidents, factory fires, explosions and escape of toxic gases or chemical substances, river pollution, mining or other structural collapses, air, sea, rail and road transport accidents and can reach catastrophic dimensions in terms of human loss. There can be no set criteria for assessing the gravity of a disaster in the abstract, since this depends to a large extent on the physical, economic and social environment in which it occurs. What would be considered a major disaster in a developing country, ill-equipped to cope with the problems involved may not mean more than a temporary emergency elsewhere. However, all disasters bring in their wake similar consequences that call for immediate action, whether at the local, national or international level, for the rescue and relief of the victims. This includes the search for the dead and injured, medical and social care, removal of the debris, the provision of temporary shelter for the homeless, food, clothing and medical supplies, and the rapid re-establishment of essential services.

7.7.2 Objectives of Disaster Management Plan [DMP]

The Disaster Management Plan (DMP) is aimed to ensure safety of life, protection of environment, protection of installation, restoration of production and salvage operations in the same order of priorities. For effective implementation of the DMP, it should be widely circulated and personnel training through rehearsals/drills should be organised. The DMP should reflect the probable consequential severities of the undesired event due to deteriorating conditions or through 'Knock on' effects. Further, the management should be able to demonstrate that its assessment of the consequences uses good supporting evidence and is based on currently available and reliable information, incident data from internal and external sources and, if necessary, the reports of external, independent, agencies.

To tackle the consequences of a major emergency inside the factory or immediate vicinity of the factory, a DMP has to be formulated and this planned emergency document is called "Disaster Management Plan".

The objective of the Industrial Disaster Management Plan is to make use of the combined resources of the plant and the outside services to achieve the following:

- Effect the rescue and medical treatment of casualties
- Safeguard other people
- Minimise damage to property and the environment
- Initially contain and ultimately bring the incident under control
- Identify any dead
- Provide for the needs of relatives
- Provide authoritative information to the news media
- Secure the safe rehabilitation of affected area
- Preserve relevant records and equipment for the subsequent inquiry into the cause and circumstances of the emergency.

In effect, it is to optimise operational efficiency to rescue, rehabilitation and render medical help and to restore normalcy.



7.7.3 Emergency Organisation

It is recommended to set up or strengthen the Emergency Organisation. A senior executive who has control over the affairs of the plant would be heading the Emergency Organisation. He would be designated as Site Controller. As per the General Organisation chart, Resident Director would be designated as the Incident Controller. In the case of stores, utilities, open areas, which are not under the control of the Production Heads, Senior Executive responsible for maintenance of utilities would be designated as Incident Controller. All the Incident Controllers would be reporting to the Site Controller. Each Incident Controller, for him, organises a team responsible for controlling the incidence with the personnel under his control. Shift Incharge would be the reporting officer, who would bring the incidence to the notice of the Incident Controller and Site Controller. Emergency Co-ordinators would be appointed who would undertake the responsibilities like fire fighting, rescue, rehabilitation, transport and provide essential and support services. For this purpose, Security Incharge, Personnel Department, Essential services personnel would be engaged. All these personnel would be designated as key personnel.

In each shift, electrical supervisor, electrical fitters, pump house incharge, and other maintenance staff would be drafted for emergency operations. In the event of power or communication system failure, some of the staff members in the office/plant offices would be drafted and their services would be utilized as messengers for quick passing of communications. All these personnel would be declared as essential personnel.

7.7.4 Emergency Communication

Whoever notices an emergency situation such as fire, growth of fire, leakage etc. shall inform his immediate superior and Emergency Control Centre. The person on duty in the Emergency Control Centre shall appraise the Site Controller. Site Controller shall verify the situation from the Incident Controller of that area or the Shift Incharge and shall decide about an impending On Site Emergency. This shall be communicated to all the Incident Controllers and Emergency Co-ordinators. Simultaneously, the emergency warning system shall be activated on the instructions of the Site Controller.

7.7.5 Emergency Responsibilities

The responsibilities of the key personnel are appended below.

• **Site Controller**

On receiving information about emergency, he would rush to Emergency Control Centre and take charge of ECC and the situation and assesses the magnitude of the situation on the advice of Incident Controller and would decide:

- Whether the affected area needs to be evacuated
- Whether personnel who are at assembly points need to be evacuated
- About declaration of emergency and ordering the for operation of emergency siren
- To organise announcement by public address system about location of emergency
- To assess which areas are likely to be affected, or need to be evacuated or are to be alerted



- To maintain a continuous review of possible development and assess the situation in consultation with Incident Controller and other Key Personnel as to whether shutting down the plant or any section of the plant is required and if evacuation of persons is required
- To direct personnel for rescue, rehabilitation, transport, fire, brigade, medical and other designated mutual support systems locally available, for meeting emergencies
- To control evacuation of affected areas, if the situation is likely to go out of control or effects are likely to go beyond the premises of the factory to inform District Emergency Authority, Police, Hospital and seek their intervention and help
- To inform Inspector of Factories, Deputy Chief Inspector of Factories, TNPCB and other statutory authorities
- To give a public statement if necessary
- To keep a record of chronological events and prepare an investigation report and preserve evidence
- On completion of On Site Emergency and restoration of normalcy, to declare 'all clear' and order for 'all clear' signal.

• **Incident Controller**

- Assembles the incident control team.
- Directs operations within the affected areas with the priorities for safety to personnel, minimise damage to the plant, property and environment and minimise the loss of materials.
- Directs the shutting down and evacuation of plant and areas likely to be adversely affected by the emergency.
- Ensures that all key personnel's help is sought.
- Provides advice and information to the Fire and Security Officer and the Local Fire Services as and when they arrive.
- Ensures that all non-essential workers/staff of the affected areas are evacuated to the appropriate assembly points, and the areas are searched for casualties.
- Has regard to the need for preservation of evidence so as to facilitate any inquiry into the causes and circumstances, which caused or escalated the emergency.
- Co-ordinates with emergency services at the site.
- Provides tools and safety equipment to the team members.
- Keeps in touch with the team and advises them regarding the method of control to be used.
- Keeps the Site Controller of Emergency informed of the progress being made.

• **Emergency Co-ordinator - Rescue, Fire Fighting**

- On knowing about emergency, rushes to ECC.
- Helps the Incident Controller in containment of the emergency.
- Ensures fire pumps in operating conditions and instructs pump house operator to be ready for any emergency with standby arrangement.
- Guides the fire fighting crew i.e. firemen, trained plant personnel and security staff.
- Organises shifting the fire fighting facilities to the emergency site, if required.
- Takes guidance of the Incident Controller for firefighting as well as assesses the requirements of outside help.



- Arranges to control the traffic at the gate and the incident area.
- Directs the security staff to the incident site to take part in the emergency operations under his guidance and supervision.
- Evacuates the people in the plant or in the nearby areas as advised by Site Controller.
- Searches for casualties and arranges proper aid for them.
- Assembles a search and evacuation team.
- Arranges for safety equipment for the members of this team.
- Decides which paths the evacuated workers should follow.
- Maintains law and order in the area and, if necessary, seeks the help of police.

• **Emergency Co-ordinator - Medical, Mutual Aid, Rehabilitation, Transport and Communication**

- In the event of failure of electric supply and thereby internal telephone, sets up communication point and establishes contact with the Emergency Control Centre (ECC).
- Organises medical treatment to the injured and, if necessary, arrange to shift the injured to nearby hospitals.
- Mobilises extra medical help from outside, if necessary.
- Keeps a list of qualified first aiders of the factory and seeks their assistance.
- Maintains first aid and medical emergency requirements.
- Makes sure that all safety equipment is made available to the emergency team.
- Assists Site Controller with necessary data and to coordinate the emergency activities.
- Assists Site Controller in updating the emergency plan, organizing mock drills, verification of inventory of emergency facilities and furnishing report to Site Controller.
- Maintains liaison with Civil Administration.
- Ensures availability of canteen facilities and maintenance of rehabilitation centre.
- He will liaise with Site Controller/Incident Controller.
- Ensures transportation facility.
- Ensures availability of necessary cash for rescue/rehabilitation and emergency expenditure.
- Controls rehabilitation of affected areas on discontinuation of emergency.
- Makes available diesel/petrol for transport vehicles engaged in emergency operation.
-

• **Emergency Co-ordinator - Essential Services**

- He would assist Site Controller and Incident Controller.
- Maintains essential services like Diesel Generator, Water, Fire Water, Compressed Air/Instrument Air and power supply for lighting.
- He would plan alternate facilities in the event of power failure, to maintain essential services such as lighting, refrigeration plant etc.
- He would organise separate electrical connections for all utilities and emergency services so that in the event of emergency or fires, essential services and utilities are not affected.



- Gives necessary instructions regarding emergency electrical supply, isolation of certain sections etc. to shift in charge and electricians.
- Ensures availability of adequate quantities of protective equipment and other emergency materials, spares etc.

• General Responsibilities of Employees during an Emergency

During an emergency, it becomes more enhanced and pronounced when an emergency warning is raised; the workers, if they are in-charge of process equipment, should adopt safe and emergency shut down and attend to any prescribed duty as essential employee. If no such responsibility is assigned he should adopt a safe course to assembly point and await instructions. He should not resort to spread panic. On the other hand, he must assist emergency personnel towards objectives of DMP.

7.7.6 Emergency Facilities

• Emergency Control Centre (ECC)

TSGENCO will established an Emergency Control Centre. It has external telephone, telefax and telex facility. All the Site Controller/ Incident Controller Officers, Senior Personnel would be located here. The following information and equipment will be provided at the Emergency Control Centre (ECC):

- Intercom, telephone
- P and T telephone
- Safe contained breathing apparatus
- Fire suit/gas tight goggles/gloves/helmets
- Hand tools, wind direction/velocities indicators
- Public address megaphone, hand bell, telephone directories(Internal, P and T) factory layout, site plan
- Emergency lamps/torch lights/batteries
- Plan indicating locations of hazard inventories, plant control room, sources of safety equipment, work road plan, assembly points, rescue location, vulnerable zones, and escape routes
- Hazard chart
- Emergency shut-down procedures
- Nominal roll of employees
- List of key personnel, list of essential employees, list of Emergency Co-ordinators
- Duties of key personnel
- Addresses with telephone numbers of key personnel, emergency coordinator, and essential employees.
- Important addresses and telephone numbers including Government agencies, neighbouring industries and sources of help, outside experts, chemical fact sheets, population details around the factory.

• Assembly Point

Number of assemblies depending upon the plant location would be identified wherein employees who are not directly connected with the disaster management would be assembled for safety and rescue. Emergency breathing apparatus, minimum facilities like water etc. would be organised. In view of the size of plant, different locations are earmarked as assembly points. Depending upon the location of hazard, the assembly points are to be used.



• **Emergency Power Supply**

Plant facilities would be connected to Generator and would be placed in auto mode. Thus, water pumps, plant's lighting and emergency control centre, administrative building and other auxiliary services are connected to emergency power supply. In all the blocks, flameproof type emergency lamps would be provided.

• **Fire Fighting Facilities**

First Aid and Firefighting equipment suitable for emergency are maintained well in each section in the plant. This would be developed according to the statutory requirements as well as per Tariff Advisory Committee (TAC) Regulations. However, fire hydrant line covering major areas has been laid. Fire alarms have been located in the bulk storage areas.

• **Existing Fire Fighting Facilities**

The TSGENCO plant is already has adequate fire fighting facilities and the same will be used in post MEP also, after augmenting, if necessary.

• **Location Type of Fire Extinguishers**

- Turbo-generator area CO2 Type, Foam Type Dry chemical powder
- Cable galleries CO2 Type, Foam Type Dry chemical powder
- High voltage panel CO2 Type, Foam Type Dry chemical powder
- Control rooms CO2 Type, Foam Type Dry chemical powder
- MCC rooms CO2 Type, Foam Type Dry chemical powder
- Pump houses CO2 Type, Foam type dry chemical powder
- Fuel tank Area CO2 type, Foam Type Dry chemical powder Sand Basket
- Offices & Godowns Foam or Dry chemical powder Type
- Crushers house CO2 Type, Foam Type dry chemical powder

• **Location of Wind Sock**

Windssocks exist in the plant and the same will continue to be used after the implementation of the MEP also to indicate direction of wind for emergency escape.

• **Emergency Medical Facilities**

Stretchers, gas masks and general first aid materials for dealing with chemical burns, fire burns etc. will be maintained in the medical centre as well as in the emergency control room. Private medical practitioners' help would be sought. Government hospital would be approached for emergency help. Apart from plant first aid facilities, external facilities would be augmented. Names of medical personnel and medical facilities in the area would be prepared and updated. Necessary specific medicines for emergency treatment of burns patients, and for those affected by toxicity would be maintained. Breathing apparatus and other emergency medical equipment would be provided and maintained. The help of nearby industrial managements in this regard would be taken on mutual support basis.

• **Ambulance**

An ambulance with driver availability in all the shifts, emergency shift vehicle will be ensured and maintained to transport injured or affected persons. Many persons would be trained in first aid so that, in every shift, first aid personnel would be available.

7.7.7 Emergency Actions



• **Emergency Warning**

Communication of emergency will be made familiar to the personnel inside the plant and people outside. An emergency warning system has already been established in the plant.

• **Emergency Shutdown**

There are a number of facilities which can be provided to help deal with hazardous conditions, when a tank is on fire. The suggested arrangements are:

- Stop feed
- Dilute contents
- Remove heat
- Deluge with water
- Transfer contents.

Whether a given method is appropriate depends on the particular case. Cessation of agitation may be the best action in some instances but not in others. Stopping of the feed may require the provision of bypass arrangements.

Methods of removing additional heat include removal through the normal cooling arrangements or use of an emergency cooling system. Cooling facilities, which use vaporising liquid, may be particularly effective, since a large increase in vaporisation can be obtained by dropping pressure.

• **Evacuation of Personnel**

There could be more number of persons in the storage area and other areas in the vicinity. The area would have adequate number of exits and staircases. In the event of an emergency, unconnected personnel have to escape to assembly point. Operators have to take emergency shutdown procedure and escape. Time Office maintains a copy of deployment of employees in each shift. If necessary, persons can be evacuated by rescue teams.

• **All Clear Signal**

Also, at the end of an emergency, after discussing with Incident Controllers and Emergency Co-ordinators, the Site Controller orders an all clear signal. When it becomes essential, the Site Controller communicates to the District Emergency Authority, Police, and Fire Service personnel regarding help required or development of the situation into an Off-Site Emergency.

7.7.8 General

• **Employee Information**

During an emergency, employees would be warned by raising siren in specific pattern. Employees would be given training of escape routes, taking shelter, protecting from toxic effects. Employees would be provided with information related to fire hazards, antidotes and first aid measures. Those who would be designated as key personnel and essential employees should be given training in emergency response.

• **Public Information and Warning**

The industrial disaster effects related to this plant may mostly be confined to the plant area. The detailed risk analysis has indicated that the pool fire effects would not be felt outside. However, as an abundant precaution, the information related to chemicals in use would be furnished to District Emergency Authority (normally the Collector) for



necessary dissemination to general public and for any use during an off-site emergency.

• **Co-ordination with Local Authorities**

Keeping in view the nature of the emergency, two levels of co-ordination are proposed. In the case of an On Site Emergency, resources within the organisation would be mobilised and in the event of an extreme emergency, local authorities' help should be sought.

In the event of an emergency developing into an offsite emergency, local authority and District Emergency Authority (normally the Collector) would be appraised and under his supervision, the Off Site Disaster Management Plan would be exercised. For this purpose, the facilities that are available locally, i.e. medical, transport, personnel, rescue accommodation, voluntary organisations etc. would be mustered. Necessary rehearsals and training in the form of mock drills should be organised.

• **Mutual Aid**

Mutual aid in the form of technical personnel, runners, helpers, special protective equipment, transport vehicles, communication facility etc. should be sought from the neighbouring industrial managements.

• **Mock Drills**

Emergency preparedness is an important part of planning in Industrial Disaster Management. Personnel are being trained suitably and prepared mentally and physically in emergency response through carefully planned, simulated procedures. Similarly, the key personnel and essential personnel are being trained in the operations.

• **Important Information**

Important information such as names and addresses of key personnel, essential employees, medical personnel, transporters' addresses, addresses and phone numbers of those connected with Off Site Emergency such as Police, Local Authorities, Fire Services, District Emergency Authority are prepared and maintained.

7.7.9 Off-Site Emergency Preparedness Plan

The task of preparing the Off-Site Emergency Plan lies with the District Collector; however, the off-site plan will be prepared with the help of the local district authorities. The proposed plan will be based on the following guidelines.

7.7.9.1 Introduction

Off-site emergency plan follows the on-site emergency plan. When the consequences of an emergency situation go beyond the plant boundaries, it becomes an off-site emergency. Off-site emergency is essentially the responsibility of the public administration. However, the factory management will provide the public administration with the technical information relating to the nature, quantum and probable consequences on the neighbouring population.

The off-site plan in detail will be based on those events, which are most likely to occur, but other less likely events, which have severe consequence, will also be considered. Incidents, which have very severe consequences yet have a small probability of occurrence, should also be considered during the preparation of the plan. However,



the key feature of a good off-site emergency plan is flexibility in its application to emergencies other than those specifically included in the formation of the plan. The roles of the various parties who will be involved in the implementation of an off-site plan are described below. Depending on local arrangements, the responsibility for the off-site plan should either rest with the works management or, with the local authority. Either way, the plan should identify an emergency co-ordinating officer, who would take the overall command of the off-site activities. As with the on-site plan, an emergency control centre should be set up within which the emergency co-ordinating officer can operate.

An early decision will be required in many cases on the advice to be given to people living "within range" of the accident; in particular, whether they should be evacuated or told to go indoor. In the latter case, the decision can regularly be reviewed in the event of an escalation of the incident. Consideration of evacuation may include the following factors:

- In the case of a major fire but without explosion risk (e.g. an oil storage tank), only houses close to the fire are likely to need evacuation, although a severe smoke hazard may require this to be reviewed periodically
-
- If a fire is escalating and in turn threatening a store of hazardous material, it might be necessary to evacuate people nearby, but only if there is time; if insufficient time exists, people should be advised to stay indoors and shield themselves from the fire

For release or potential release of toxic materials, limited evacuation maybe appropriate downwind if there is time. The decision would depend partly on the type of housing "at risk". Conventional housing of solid construction with windows closed offers substantial protection from the effects of a toxic cloud, while shanty house, which can exist close to factories, offers little or no protection

The major difference between releases of toxic and flammable materials is that toxic clouds are generally hazardous down to much lower concentrations and therefore hazardous over greater distances. Also, a toxic cloud drifting at, say, 300 m per minute, covers a large area of land very quickly. Any consideration of evacuation should take this into account.

Although the plan will have sufficient flexibility built in to cover the consequences of the range of accidents identified for the on-site plan, it will cover in some detail the handling of the emergency to a particular distance from each major hazard works.

7.7.9.2 Aspects Proposed to be considered in the Off-Site Emergency Plan

The main aspects, which should be included in the emergency plan, are:

Organisation

Details of command structure, warning systems, implementation procedures, emergency control centers. Names and appointments of incident controller, site main controller, their deputies and other key personnel.

Communications

Identification of personnel involved, communication centre, call signs, network, lists of telephone numbers.



Specialised knowledge

Details of specialist bodies, firms and people upon whom it may be necessary to call e.g. those with specialised chemical knowledge, laboratories.

Voluntary organizations

Details of organisers, telephone numbers, resources etc.

Chemical information

Details of the hazardous substances stored or processed on each site and a summary of the risk associated with them.

Meteorological information

Arrangements for obtaining details of weather conditions prevailing at the time and weather forecasts.

Humanitarian arrangements

Transport, evacuation centers, emergency feeding treatment of injured, first aid, ambulances, temporary mortuaries.

Public information

Arrangements for dealing with the media press office; (b) informing relatives, etc.

Assessment

Arrangements for: (a) collecting information on the causes of the emergency; (b) reviewing the efficiency and effectiveness of all aspects of the emergency plan.

7.7.9.3 Role of the Emergency Co-ordinating Officer

The various emergency services should be co-ordinated by an emergency co-ordinating officer (ECO), who will be designated by the District Collector. The ECO should liaise closely with the Site Controller. Again, depending on local arrangements, for very severe incidents with major or prolonged off-site consequences, the external control should be passed onto a senior local authority administrator or even an administrator appointed by the central or state government.

7.7.9.4 Role of the Local Authority

The duty to prepare the off-site plan lies with the local authorities. The emergency planning officer (EPO) appointed should carry out his duty in preparing for a whole range of different emergencies within the local authority area. The EPO should liaise with the works, to obtain the information to provide the basis for the plan. This liaison should ensure that the plan is continually kept upto date.

It will be the responsibility of the EPO to ensure that all those organisations, which will be involved off site in, handling the emergency, know of their role and are able to accept it by having for example, sufficient staff and appropriate equipment to cover their particular responsibilities. Rehearsals for off-site plans should be organised by the EPO.

7.7.9.5 Role of Police



Formal duties of the police during an emergency include protecting life and property and controlling traffic movements. Their functions should include controlling bystanders, evacuating the public, identifying the dead and dealing with casualties, and informing relatives of dead or injured.

7.7.9.6 Role of Fire Authorities

The control of a fire should normally be the responsibility of the senior fire brigade officer who would take over the handling of the fire from the site incident controller on arrival at the site. The senior fire brigade officer should also have a similar responsibility for other events, such as explosions and toxic release. Fire authorities in the region should be apprised about the location of all stores of flammable materials, water and foam supply points, and fire-fighting equipment. They should be involved in on-site emergency rehearsals both as participants and, on occasion, as observers of exercises involving on-site personnel.

7.7.9.7 Role of Health Authorities

Health authorities, including doctors, surgeons, hospitals, ambulances, and similar other persons/institutions should have a vital part to play following a major accident, and they should form an integral part of the emergency plan.

For major fires, injuries should be the result of the effects of thermal radiation to a varying degree, and the knowledge and experience to handle this in all but extreme cases may be generally available in most hospitals. For major toxic releases, the effects vary according to the chemical in question, and the health authorities should be apprised about the likely toxic releases from the plant, which will enable them to deal with the aftermath of a toxic release with treatment appropriate to such casualties.

Major off-site incidents are likely to require medical equipment and facilities in addition to those available locally, and a medical "mutual aid" scheme should exist to enable the assistance of neighbouring authorities to be obtained in the event of an emergency.

7.7.9.8 Role of Government Safety Authority

This will be the factory inspectorate available in the region. Inspectors are likely to want to satisfy themselves that the organisation responsible for producing the off-site plan has made adequate arrangements for handling emergencies of all types including major emergencies. They may wish to see well documented procedures and evidence of exercise undertaken to test the plan.

In the event of an accident, local arrangements regarding the role of the factory inspector will apply. These may vary from keeping a watch to a close involvement in advising on operations. While the industry will activate the DMP and take necessary alleviating measures and arrange to extend all medical and security support, the factory inspectorate may be the only external agency with equipment and resources to carry out appropriate tests to assess the impact.



7.8 Occupational Health and Safety

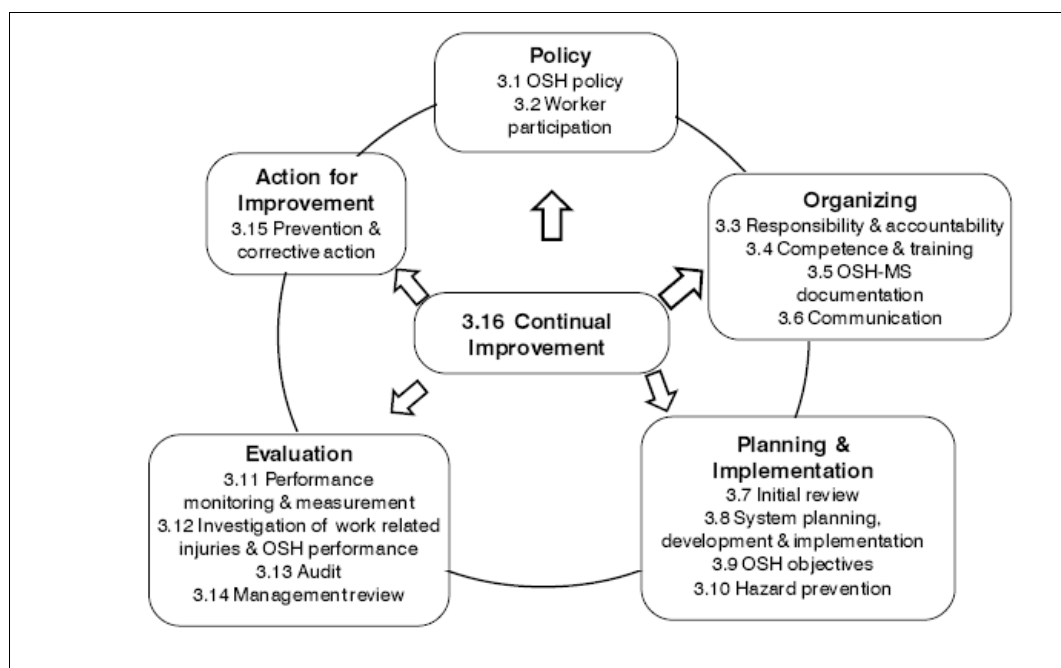
For large industries, where multifarious activities are involved during construction, erection, testing, commissioning, operation and maintenance; the men, materials and machines are the basic inputs. Along with the boons, industrialization generally rings several problems like occupational health and safety.

The industrial planner, therefore, has to properly plan and take steps to minimize the impacts of industrialization and to ensure appropriate occupational health and safety including fire plans. All these activities again may be classified under construction indirection, and operation and maintenance.

The facilities to be provided for protection of health and ensuring safety to the workers will include the construction workers, truck drivers as well as operation and maintenance personnel during operation phase. The contractors will be advised to abide by the statutory instructions of Factories Act 1948 and amendments thereof in order to ensure safety of their workmen. The following paragraphs outline the various measures to be taken by the Company and infrastructural facilities to be provided to its work force both in construction and operation phase for ensuring safety and proper work environment.

Some workplace hazards have the potential to cause so much injury or disease that specific regulations or codes of practice are warranted. These regulations and codes, adopted under state and territory OH & S Acts, explain the duties of particular groups of people in controlling the risks associated with specific hazards. Codes of Practice provide advice on how to meet regulatory requirements. As such, codes are not legally enforceable, but they can be used in courts as evidence that legal requirements have or have not been met.

Table 7.82: OS&H Lifecycle





Safety in the workplace is critical to the success of running a business, no matter what size it is. As a small business owner one has certain rights and responsibilities regarding health and safety in the workplace. Even without any employees, one must ensure that the business doesn't create health and safety problems for the customers and the general public.

All safety gears will be provided to workers and care will be taken by EMC that these are used properly by them. All safety norms will be followed.

7.8.1 Occupational Health

Occupational health needs attention both during construction and erection and operation and maintenance phases. However, the problem varies both in magnitude and variety in the above phases.

Construction and Erection

The occupational health problems envisaged at this stage can mainly be due to constructional accident and noise. To overcome these hazards, in addition to arrangements to reduce it within TLV's, necessary protective equipment shall be supplied to workers.

Operation and Maintenance

The problem of occupational health, in the operation and maintenance phase is primarily due to noise which could affect hearing. The necessary personal protective equipment will be given to all the workers. The working personnel shall be given the following appropriate personnel protective equipment.

- Industrial Safety Helmet;
- Crash Helmets;
- Face shield with replacement acrylic vision;
- Zero power plain goggles with cut type filters on both ends;
- Zero power goggles with cut type filters on both sides and blue color glasses;
- Welders equipment for eye and face protection;
- Cylindrical type earplug;
- Ear muffs;
- Canister Gas mask;
- Self-contained breathing apparatus;
- To provide appropriate facilities for first aid and prompt treatment of injuries and illness at work;
- To provide appropriate instruction, training, retraining and supervision to employees in health and safety, first aid and to ensure that adequate publicity is given to these matters;
- To ensure proper implementation of fire prevention methods and an appropriate fire fighting service together with training facilities for personnel involved in this service;
- To organize collection, analysis and presentation of data on accident, sickness and incident involving people injury or injury to health with a view to taking corrective, remedial and preventive action;
- To promote through the established machinery, joint consultation in health and safety matters to ensure effective participation by all employees;
- To publish/notify regulations, instructions and notices in the common language of employees;



- To prepare separate safety rules for each type of occupation/processes involved in a plant; and
- To ensure regular safety inspection by a competent person at suitable intervals of all buildings, equipment, work places and operations

Personal Protective Equipment (PPE)

• General Provisions

As a supplementary protection against exposure to hazardous conditions in the project where the safety of workers cannot be ensured by other means, such as eliminating the hazard, controlling the risk at source or minimizing the risk, suitable and sufficient PPE, having regard to the type of work and risks, and in consultation with workers and their representatives, should be used by the worker and provided and maintained by the employer, without cost to the workers.

- Items of PPE provided should comply with the relevant national standards and criteria approved or recognized by the competent authority.
- Those responsible for the management and operation of the personal protection programme should be trained in the selection of the proper equipment, in assuring that it is correctly fitted to the people who use it, in the nature of the hazards the equipment is intended to protect against, and provide adequate comfort, and in the consequences of poor performance or equipment failure.
- PPE should be selected considering the characteristics of the wearer and additional physiological load or other harmful effects caused by the PPE. It should be used, maintained, stored and replaced in accordance with the standards or guidance for each hazard identified at the facility and according to the information given by the manufacturer.
- PPE should be examined periodically to ensure that it is in good condition.
- Different PPE & their components should be compatible with each other when worn together.
- PPE should be ergonomically designed and, to the extent practicable, should not restrict the user's mobility or field of vision, hearing or other sensory functions.
- Employers should ensure that the workers who are required to wear PPE are fully informed of the requirements and of the reasons for them, and are given adequate training in the selection, wearing, maintenance and storage of this equipment.
- When workers have been informed accordingly, they should use the equipment provided throughout the time they may be exposed to the risk that requires the use of PPE for protection.
- The PPE should not be used for longer than the time indicated by the manufacturer.
- Workers should make proper use of the PPE provided, and maintain it in good condition, consistent with their training and be provided with the proper means for doing so.

Head Protection

- Any helmet that has been submitted to a heavy blow, even if there are no evident signs of damage, should be discarded.
- If splits or cracks appear, or if a helmet shows signs of ageing or deterioration of the harness, the helmet should be discarded.



- Where there is a hazard of contact with exposed conductive parts, only helmets made of non-conducting material should be used.
- Helmets for persons working overhead should be provided with chin straps.
- In addition to safety, consideration should also be given to the physiological aspects of comfort for the wearer.
- The helmet should be as light as possible, the harness should be flexible and should not irritate or injure the wearer and a sweatband should be incorporated.
- All protective headgear should be cleaned and checked regularly.

Face & Eye Protection

- Face shields or eye protectors should be used to protect against flying particles, fumes, dust and chemical hazards.
- Face shields should be used in boiler operations and other hot work involving exposure to high-temperature radiation sources. Protection is also necessary against sparks or flying hot objects. Face protectors of the helmet type and the face-shield type are preferred.
- With the use of face and eye protectors, due attention should be paid to greater comfort and efficiency.
- The protectors should be fitted and adjusted by a person who has received training in this task.
- Comfort is particularly important in helmet and hood type protectors as they may become almost intolerably hot during use. Air lines can be fitted to prevent this.
- Face and eye protectors should give adequate protection at all times even with the use of corrective vision devices.
- Eye protectors, including corrective lenses, should be made of appropriate high-impact material.

Respiratory Protective Equipment

- When effective engineering controls are not feasible, or while they are being implemented or evaluated, respirators, appropriate to the hazard and risk in question, should be used to protect the health of the worker.
- When the hazard and risk cannot be assessed with sufficient accuracy to define the appropriate level of respiratory protection, employers should make positive pressure air-supplied respiratory protective devices available.
- When selecting respirators, an appropriate number of sizes and models should be available from which a satisfactory respirator can be selected. Different sizes and models should be available to accommodate a broad range of facial types. Workers should be fit-tested for respirators.
- Respirators should be cleaned and sanitized periodically. Respirators intended for emergency use should be cleaned and sanitized after each use.
- The user should be sufficiently trained and familiar with the respirator in order to be able to inspect the respirator immediately prior to each use to ensure that it is in proper working condition. Inspection may include the following:
 - tightness of connections;
 - the condition of the respiratory inlet and outlet covering;
 - head harness;
 - valves;
 - connecting tubes;
 - harness assemblies;



- hoses;
- filters;
- cartridges;
- end of service life indicator;
- electrical components;
- shelf life date;
- The proper function of regulators, alarms and other warning systems.
- Respirators should be properly stored. Damage may occur if they are not protected from physical and chemical agents such as vibration, sunlight, heat, extreme cold, excessive moisture or damaging chemicals.
- Each respirator should be used with an understanding of its limitations, based on a number of factors such as the level and duration of exposure, the characteristics of the chemical and the service life of a respirator.
- Workers should be medically evaluated for their ability to wear a respirator safely before they are required to do so.

Hearing Protection

- When effective engineering controls are not feasible or while they are being implemented or evaluated, hearing protection should be used to protect the health of workers.
- Hearing loss of speech frequencies may occur with elevated long-term exposure to noise. The use of hearing protectors gives the best results to users who are well informed of the risks and trained in their use. If earplugs are used, special attention should be paid to the proper fitting technique.
- Hearing protectors should be comfortable, and the users should be trained to use them properly. Special attention should be paid to possible increased risk of accidents due to the use of hearing protectors. Earmuffs reduce the capacity to locate sound sources and prevent warning signals from being heard. This is especially true for workers with considerable hearing loss.
- No model is suitable for all persons. Those wearing hearing protectors should be able to choose from alternative products that meet the attenuation criteria. Earplugs should not be the only solution as not all people can wear them.
- Hearing protectors should be made available at the entrance to the noisy area and they should be put on before entering the noisy area. Noisy areas should be indicated by appropriate signs.
- The attenuation of hearing protector's works well only if they are well maintained. Good maintenance consists of cleaning, changing replaceable parts such as cushions, and overall monitoring of the state of the hearing protector.
- Hearing protectors should be evaluated through an audiometric test programme for exposed workers.

Protection from fall

- When other measures do not eliminate the risk of falling, workers should be provided with and trained in the use of appropriate fall protection equipment, such as harnesses and lifelines. Workplaces and traffic lanes in which there are fall hazards or which border on a danger zone should be equipped with devices which prevent workers from falling into or entering the danger zone.
- Devices should be provided to prevent workers from falling through floors and openings.
- Safety harnesses should be worn where required and the lifeline should be attached to an adequate anchor point.



- Harnesses should be chosen that are safely used with other PPE that may be worn simultaneously.
- Appropriate and timely rescue should be provided when using fall-arrest equipment to prevent suspension trauma.

Occupational Health – Proposal for Surveillance

The choice and the implementation of specific measures for preventing workplace injury and ill health in the work-force of the plant depend on the recognition of the principal hazards, and the anticipated injuries and diseases, ill health and incidents. Below are the most common causes of injury and illness:

- Slips, trips and falls on the same level; falls from height; unguarded machinery; falling objects;
- Engulfment; working in confined spaces; moving machinery, on-site transport, forklifts and cranes;
- Exposure to controlled and uncontrolled energy sources; exposure to mineral wools and fibres; inhalable agents (gases, vapors, dusts and fumes);
- Skin contact with chemicals (irritants acids, alkalis), solvents and sensitizers); contact with hot objects;
- Fire and explosion; extreme temperatures; radiation (non-ionizing, ionizing);
- Noise and vibration; electrical burns and electric shock;
- Manual handling and repetitive work; failures due to automation; ergonomics;
- Lack of OSH training; poor work organization;
- Inadequate accident prevention and inspection; inadequate emergency first-aid and rescue facilities; lack of medical facilities and social protection
- The plant generates dust during its operation and transportation thus causing lung disease, pneumoconiosis, silicosis etc. in the long run.
- Dust may enter into the systemic circulation and thereby reach the essentially all the organs of body and affects the different tissues.
- Working near heavy noise generating equipments may cause hearing and blood pressure related diseases
- Continuous working and improper working position leading to pain & exhaustion.

Plan of evaluation of health of workers

- By pre designed format during pre placement and periodical examinations.
- Proper schedule will be devised and followed with help of occupational health experts and doctors.
- Health effects of metals used and health hazard plans based on monthly correlation of these metal related diseases and people affected.

Schedule of medical check-up during operational phase

- Comprehensive Pre-employment medical checkup for all employees
- General check up of all employees once every year.
- Medical examination will be done for all the employees after retirement and all those employees with more than 5 years of service leaving the company. After retirement, medical examination facility will be provided for a period of 5 years.
- Local hospitals and Govt. health monitoring system will be engaged.
- Dispensary and ESI facility will be provided to all workers as applicable



Chapter-7: Additional Studies

- All safety gears will be provided to workers and care will be taken by EMC that these are used properly by them. All safety norms will be followed



Chapter-7: Additional Studies

CONFIDENTIAL	ENTRY MEDICAL EXAMINATION	TSGENCO
I hereby authorize any of the doctors, hospitals or clinics mentioned in this form to provide the Medical Service with copies of all my medical records so that the Organization can take action upon my application for employment. I certify that the statements made by me in answer to the questions below are, to the best of my knowledge, true, complete and correct. I realize that any incorrect statement or material omission in the medical information form or in any other document required by the Organization renders a staff member liable to termination or dismissal.		
Date: (dd/mm/yy) _____ Signature: _____		
Pages 1 and 2 are to be completed by the candidate		
FAMILY NAME (IN BLOCK CAPITALS)	GIVEN NAMES	MAIDEN NAME (FOR WOMEN ONLY)
		SEX M ☐ F ☐
ADDRESS (STREET, TOWN, DISTRICT OR PROVINCE, COUNTRY) AND TELEPHONE		DATE OF BIRTH (day/month/year)
		NATIONALITY
POSITION APPLIED FOR (DESCRIBE NATURE OF WORK)	TELEPHONE	BIRTHPLACE
	PRESENT MARITAL STATUS Single ☐ Married ☐ DATE: (dd/mm/yy) _____ Divorced ☐ DATE: (dd/mm/yy) _____ Separated ☐ DATE: (dd/mm/yy) _____ Widowed ☐ DATE: (dd/mm/yy) _____	
DUTY STATION		
Have you ever undergone a medical examination for any other agency? _____		
Have you ever been employed by this company or any other agency? _____		
If so, please state when, where and for which organization: _____		
FAMILY HISTORY		
Relative	Age (if still alive)	State of Health (if still alive, present state; if deceased, cause of death)
Father		Age at death
Mother		Have members of your family had the following illnesses or disorders?
Brothers		Yes
Sisters		No
Spouse		Who?
Children		High Blood Pressure
		Heart Disease
		Diabetes
		Tuberculosis
		Asthma
		Cancer
		Epilepsy
		Mental Disorders
		Paralysis
TO BE COMPLETED BY THE OFFICIAL REQUESTING THE MEDICAL EXAMINATION		TO BE COMPLETED BY THE DIRECTOR OF THE MEDICAL SERVICE
Name of the Official	Comments	
Department or Unit		
Date	Date: (dd/mm/yy)	Signature: _____
VERY IMPORTANT: Please indicate the recruiting Agency or Organization:		



Chapter-7: Additional Studies

Each question requires a specific answer (yes, no, date etc.); to leave a blank or draw a line is not sufficient. If the questionnaire is not fully completed and enquires are therefore needed, time may be lost.

1. Have you suffered from any of the following diseases or disorders? Check yes or no. If yes, state the year

	YES Date	NO		YES Date	NO		YES Date	NO		YES Date	NO
Frequent sore throats			Heart and blood vessel disease			Urinary disorder			Fainting spells		
Hay fever			Pains in the heart region			Kidney trouble			Epilepsy		
Asthma			Varicose veins			Kidney stones			Diabetes		
Tuberculosis			Frequent indigestion			Back pain			Gonorrhoea		
Pneumonia			Ulcer of stomach or duodenum			Joint problems			Any other sexually transmitted disease		
Pleurisy			Jaundice			Skin disease			Tropical diseases		
Repeated bronchitis			Gall stones			Sleeplessness			Amoebic dysentery		
Rheumatic fever			Hernia			Any nervous or mental disorder			Malaria		
High blood pressure			Haemorrhoids			Frequent headaches					

2. Are you being treated for any condition now? Describe: _____

3. Have you ever coughed up blood? _____

4. Have you ever noticed blood in your stools? _____ In your urine? _____ Give details: _____

5. Have you ever been hospitalized (hospital, clinic, etc.)? _____
Why, where and when? _____

6. Have you ever been absent from work for longer than one month through illness? _____ If so, when? _____
And for what illness? _____

7. Have you had any accidents as a result of which you are partially disabled? _____ If so, what and when? _____
Do you have any other disability? _____

8. Have you ever consulted a neurologist, a psychiatrist or a psychoanalyst? _____

9. Are you taking any medicine regularly? _____ If so, which? _____

10. Have you gained or lost weight during the last three years? _____ If so, which? _____

11. Have you ever been refused life insurance? _____ If so, state reason: _____

12. Have you ever been refused employment in health grounds? _____ If so, state reason: _____

13. Have you ever received or applied for a pension or compensation for any permanent disability? _____ Degree? _____
Please give details: _____

14. Have you ever stayed in any other country? _____ If so, for how long? _____

15. Have you in the past suffered from any condition which prevented travel by air? _____

16. Do you consider yourself to be in good health? _____ Do you have full work capacity? _____

17. Do you smoke regularly? ☐ Yes ☐ No If so, what do you smoke? ☐ Cigarettes ☐ Pipe ☐ Cigars
For how many years have you smoked? _____ How much per day? _____

18. Daily consumption of alcoholic beverages: _____

19. Has any doctor or dentist advised you to undergo medical or surgical treatment in the foreseeable future? _____
Give details: _____

20. Give any other significant information concerning your health: _____

21. What is your occupation? _____ Indicate at least three posts you have occupied: _____

22. List any occupational or other hazards to which you have been exposed: _____

23. Have you ever been rejected for military service for medical reasons? _____

24. **FOR WOMEN** Are your periods regular? ☐ Yes ☐ No | Do you take contraceptive pills? ☐ Yes ☐ No | If so, for how many years have
Are they painful? ☐ Yes ☐ No | you been doing so? _____ Have you ever been treated for a gynecological
Do you have to stay in bed when they come ☐ Yes ☐ No | complaint? ☐ Yes ☐ No
If so for how long? _____ Date of your last period: _____ | If so, which? _____



Chapter-7: Additional Studies

TO BE COMPLETED BY THE EXAMINING PHYSICIAN									
GENERAL APPEARANCE					Height: cm.		Weight: kg.		
Skin:					Scalp:				
SIGHT, MEASURED VISUAL ACUITY									
Gross vision:		Right		Left		Pupils:		Equal? Regular?	
Vision with spectacles:		Right		Left		Fundi (if necessary):			
Near vision:		Right		Left		Colour vision:			
With correction:		Right		Left					
HEARING (test by whispering)	Right	Normal :			Sufficient:			Insufficient:	
	Left	Normal :			Sufficient:			Insufficient:	
	Ear drum	Right:			Left:				
NOSE-MOUTH-NECK		Nose :			Pharynx :			Teeth :	
		Tongue :			Tonsils :			Thyroid :	
CARDIOVASCULAR SYSTEM							Peripheral arteries		
Pulse rate :			Auscultation :			-carotid :			
Rhythm :			Blood pressure :			-posterior tibial :			
Apex beat :			Varicose veins :			-dorsalis pedis :			
Electrocardiogram – Please attach tracing									
RESPIRATORY SYSTEM					Breasts	RIGHT		LEFT	
Thorax:					 				
DIGESTIVE SYSTEM					Spleen:				
Abdomen :					Hernia:				
Liver :					Rectal examination :				
NERVOUS SYSTEM					Plantar reflexes				
Papillary reflexes:		- To light:			Motor functions :				
		- On accommodation:			Sensory functions :				
Patellar reflexes :					Muscular tonus :				
Achilles reflexes:					Romberg's sign :				
MENTAL STATE									
Appearance:					Behaviour:				
GENITO-URINARY SYSTEM									
Kidneys:					Genitals:				
SKELETAL SYSTEM									
Skull :					Upper extremities:				
Spine:					Lower extremities:				
LYMPHATIC SYSTEM									
CHEST X-RAY (Full size film – Please send the radiologist's report.)									



Chapter-7: Additional Studies

CONFIDENTIAL	PERIODIC MEDICAL EXAMINATION		TSGENCO	
For recruitment do not use this form.	Periodic Examination ☐	Extension ☐	Reassignment ☐	End of Service ☐
Pages 1 and 2 are to be completed by the staff member				
FAMILY NAME (IN BLOCK CAPITALS)	GIVEN NAMES	MAIDEN NAME (FOR WOMEN ONLY)	SEX	
			M ☐	F ☐
ADDRESS (STREET, TOWN, DISTRICT OR PROVINCE, COUNTRY) AND TELEPHONE			DATE OF BIRTH (day/month/year)	
			NATIONALITY	
EMPLOYMENT HELD	SINCE	FAMILY CHANGES SINCE THE LAST EXAMINATION: (MARRIAGE, BIRTHS, DEATHS, DIVORCE: GIVE THE DATES)		
YEARS OF SERVICE				
DEPARTMENT OR UNIT				
OFFICE OR DIVISION/SECTION		LAST COMPLETE MEDICAL EXAMINATION		
DUTY STATION (CITY AND COUNTRY)		Date (d/m/y)	Place:	
A. INTERIM HISTORY – Since your last examination:				
1. Indicate the illnesses or accidents which you have had, stating their length. Give the place of hospitalization if applicable.				
2. Do you consider that your health is altogether satisfactory? If not, for what reason?				
3. Have you been examined by: Your own doctor? ☐ Yes ☐ No A specialist? ☐ Yes ☐ No If so, when and for what reason?				
4. Have you consulted: A neurologist? ☐ Yes ☐ No A psychiatrist? ☐ Yes ☐ No A psychoanalyst? ☐ Yes ☐ No If so, when and for what reason?				
5. Are you under medical treatment at present? If so, state treatment followed:				
6. Have members of your family had any serious health problems? ☐ Yes ☐ No If yes, give details:				
7. Please give any additional information that might help the examining doctor:				
8. Name and address of your own doctor:				
TO BE COMPLETED BY STAFF MEMBER		TO BE COMPLETED BY THE DIRECTOR OF THE MEDICAL SERVICE		
Place:		Medical Classification:	1a	1b
Date (d/m/y):			2a	2b
Signature:		Comments:		
		Date: (d/m/y)	Signature:	
VERY IMPORTANT: Please indicate the Agency or Organization concerned:				



Chapter-7: Additional Studies

B. PRESENT HEALTH - Each question requires a specific answer (yes, no, date, etc.); to leave a blank or draw a line is not sufficient. If the questionnaire

is not fully completed and enquiries are therefore needed, time may be lost.

1. Have you suffered from any of the following diseases or disorders? Check yes or no. If yes, state the year.

	YES Date	NO		YES Date	NO		YES Date	NO		YES Date	NO
Frequent sore throats			Heart and blood vessel disease			Urinary disorder			Fainting spells		
Hay fever			Pains in the heart region			Kidney trouble			Epilepsy		
Asthma			Varicose veins			Kidney stones			Diabetes		
Tuberculosis			Frequent indigestion			Back pain			Gonorrhoea		
Pneumonia			Ulcer of stomach or duodenum			Joint problems			Any other sexually transmitted disease		
Pleurisy			Jaundice			Skin disease			Tropical diseases		
Repeated bronchitis			Gall stones			Sleeplessness			Amoebic dysentery		
Rheumatic fever			Hernia			Any nervous or mental disorder			Malaria		

C. DAILY HABITS

1. Do you smoke regularly?

☐ Yes

☐ No

If so, what do you smoke?

☐ Cigarettes

☐ Pipe

☐ Cigars

For how many years have you smoked?

How much per day?

2. Daily consumption of alcoholic beverages:

3. Recreation:

What kind now?

How often?

D. FOR WOMEN STAFF ONLY

1. Do you take contraceptive pills?

☐ Yes

☐ No

2. When did you last visit a gynaecologist?

For what reason?

3. Any pregnancies since last examination?

4. Date of menopause (if applicable): (d/m/y)



TO BE COMPLETED BY THE EXAMINING PHYSICIAN					
GENERAL APPEARANCE			Height: cm.	Weight: kg.	
Skin:			Scalp:		
SIGHT, MEASURED VISUAL ACUITY					
Gross vision:	Right:	Left:	Pupils:	Equal?	Regular?
Vision with spectacles:	Right:	Left:	Fundi (if necessary):		
Near vision:	Right:	Left:	Colour vision:		
With correction:	Right:	Left:			
HEARING (test by whispering)	Right:	Normal:	Sufficient:		Insufficient:
	Left:	Normal:	Sufficient:		Insufficient:
	Ear drum:	Right:	Left:		
NOSE-MOUTH-NECK		Nose:	Pharynx:		Teeth:
		Tongue:	Tonsils:		Thyroid:
CARDIOVASCULAR SYSTEM					Peripheral arteries
Pulse rate:		Auscultation:		-carotid:	
Rhythm:		Blood pressure:		-posterior tibial:	
Apex beat:		Varicose veins:		-dorsalis pedis:	
Electrocardiogram (if indicated or after age of 45) – Please attach tracing					
RESPIRATORY SYSTEM			Breasts:	RIGHT	LEFT
Thorax:			 		
DIGESTIVE SYSTEM			Spleen:		
Abdomen:			Hernia:		
Liver:			Rectal examination:		
NERVOUS SYSTEM			Plantar reflexes:		
Papillary reflexes:	- To light:		Motor functions:		
	- On accommodation:		Sensory functions:		
Patellar reflexes:			Muscular tonus:		
Achilles reflexes:			Romberg's sign:		
MENTAL STATE					
Appearance:			Behaviour:		
GENITO-URINARY SYSTEM					
Kidneys:			Genitals:		
SKELETAL SYSTEM					
Skull:			Upper extremities:		
Spine:			Lower extremities:		
LYMPHATIC SYSTEM					
CHEST X-RAY (Full size film – Please send the radiologist's report.)					



LABORATORY			
The results of <u>all</u> the following investigations must be included except where marked "if indicated".			
Urine :	Albumin	Sugar	Microscopic
Blood:	Haemoglobin :	%	grams/l
	Haematocrit :	%	Leucocytes :
	Erythrocytes :		Differential count (if indicated):
Blood chemistry:			
	Sugar :		Urea or creatinine:
	Cholesterol :		Uric acid :
Serological test for syphilis: Please attach laboratory report			
Stool examination:			
COMMENTS (Please comment on all the positive answers given by the staff member and summarize the abnormal findings).			
CONCLUSIONS (Please state your opinion on the physical and mental health of the candidate and fitness for the proposed post).			
The examining doctor is requested before sending this report to verify that the questionnaire, pages 1 and 2 of this form, has been fully completed by the candidate and that all the results of the investigations required are given on the report. Incomplete reports are a major source of delay in recruitment.			
Name of the examining physician (In block capitals):		Signature:	
Address:		Date: (dd/mm/yy)	



In the proposed Power plant the following medical checkups to people working in areas mentioned below should be taken.

Sl.No.	Area of exposure	Occupational diseases	Tests to be conducted Quarterly
1.	Coal Handling	Coal miners pneumonia, conenoses and cardio vascular diseases	Hemo gram, ESR, RBS, X-Ray, HIV-I&II, HBSAG, for employees > 40 years fasting lipid profile, serum creatinine, ECG and physician consultation
2.	Turbine compressor room etc high noise	Noise induced hearing loss	ENT consultation Audio metry, Hemo gram, ESR, RBS, X-Ray, HIV-I&II, HBSAG, for employees > 40 years fasting lipid profile, serum creatinine, ECG and physician consultation
3.	Ash Handling & silica dust	Glycolic	Hemo gram, ESR, RBS, X-Ray, HIV-I&II, HBSAG, for employees > 40 years fasting lipid profile, serum creatinine, ECG and physician consultation
4.	Oil handling area	Dermatitis	Dermatologist examination, Hemo Hemo gram, ESR, RBS, X-Ray, HIV-I&II, HBSAG, for employees > 40 years fasting lipid profile, serum creatinine, ECG and physician consultation
5.	Chlorine storage	Halogen poisoning	Hemo gram, ESR, RBS, X-Ray, HIV-I&II, HBSAG, for employees > 40 years fasting lipid profile, serum creatinine, ECG and physician consultation
6.	Railway sidings (loco drivers & crane operators)	Refer to Ophthalmologist	Hemo gram, ESR, RBS, X-Ray, HIV-I&II, HBSAG, for employees > 40 years fasting lipid profile, serum creatinine, ECG and physician consultation
7.	Canteen staff	---	CBP/ESR/Widal/HBSAG/HIV-I&II, for employees > 40 years fasting lipid profile Fasting Lipid Profile, ECG, General Physician referrals

7.8.2 Endemic diseases

Endemic diseases in the 10km radius of the project site are as follows.

- Asthma
- Malaria
- Cold / Cough
- Typhoid
- Head ache
- Joint/leg/Knee pains



- Kidney related.
- Fever
- Body pains

7.8.3 Action Plan to Mitigate Endemic Diseases and Occupational Health Diseases

- An occupational health center should be constructed immediately in the proposed project site with doctors and nurses availability round the clock in case of medical emergencies and accidents for giving first aid treatment.
- As the people living in the 10 KM radius are suffering from endemic diseases medical awareness camps and specialists medical camps should be frequently conducted with special emphasis on prevention of endemic diseases and screening camps to prevent endemic diseases and if found ill, should be referred to government hospitals for necessary treatment.
- By construction of power station in this area the economic growth will directly or indirectly increases the per capita income of people who can then afford to live a better quality of life and disease free life by taking healthy and nutritious food.
- A well equipped project hospital in the proposed project site should be constructed for the employees and their dependants who work in the project area and duty medical officers (round the clock for emergency services) with advanced life support and well equipped causality with causality medical officer to attend emergencies. The medical equipment and infrastructure should of latest technology.

7.8.4 Safety Plan

Safety of both men and materials during construction and operation phases is of concern. The preparedness of an industry for the occurrence of possible disasters is known as emergency plan. TSGENCO already has a proper safety plan and the same will be made available during construction, operation and maintenance phases of the proposed modernisation of the plant with the following regulations:

- To allocate sufficient resources to maintain safe and healthy conditions of work.
- To take steps to ensure that all known safety factors are taken into account in the design, construction, operation and maintenance of plants, machinery and equipment.
- To ensure that adequate safety instructions are given to all employees.
- To provide wherever necessary protective equipment, safety appliances and clothing, and to ensure their proper use.
- To inform employees about materials, equipment or processes used in their work, which are known to be potentially hazardous to health or safety.
- To keep all operations and methods of work under regular review for making necessary changes from the point of view of safety in the light of experience and up-to-date knowledge.
- To provide appropriate facilities for first aid and prompt treatment of injuries and illness at work.
- To provide appropriate instruction, training, retraining and supervision to employees in health and safety, first aid and to ensure that adequate publicity is given to these matters.



- To ensure proper implementation of fire prevention methods and an appropriate fire fighting service together with training facilities for personnel involved in this service.
- To organise collection, analysis and presentation of data on accident, sickness and incident involving personal injury or injury to health with a view to take corrective, remedial and preventive action.
- To promote, through the established machinery, joint consultation in health and safety matters to ensure effective participation by all employees.
- To publish/notify regulations, instructions and notices in the common language of employees.
- To prepare separate safety rules for each type of occupation/processes involved in a project.
- To ensure regular safety inspection by a competent person at suitable intervals of all buildings, equipment, work places and operations.

7.8.4.1 Safety Organisation

Construction and Erection Phase

A qualified and experienced safety officer should be appointed. The responsibilities of the safety officers include identification of the hazardous conditions and unsafe acts of workers and advice on corrective actions, conduct safety audit, organise training programmes and provide professional expert advice on various issues related to occupational safety and health. He is also responsible to ensure compliance of Safety Rules/Statutory Provisions. In addition to employment of a safety officer by TSGENCO, every contractor, who employs more than 250 workers, should also employ one safety officer to ensure safety of the worker, in accordance with the conditions of contract.

Operation and Maintenance Phase

When the construction is completed, the posting of safety officers should be in accordance with the requirement of Factories Act and their duties and responsibilities should be as defined thereof.

7.8.4.2 Safety Circle

In order to fully develop the capabilities of the employees in identification of hazardous processes and improving safety and health, safety circles would be constituted in each area of work. The circle would consist of 5-6 employees from that area. The circle normally should meet for about an hour every week.

7.8.4.3 Safety Training

A full-fledged training centre already exists the plant. Safety training is being provided by the Safety Officers with the assistance of faculty members called from Corporate Centre, Professional Safety Institutions and Universities. In addition to regular employees, limited contractor labour should also be provided safety training. To create safety awareness, safety films should be shown to workers and leaflets and literature should be distributed. Some precautions and remedial measures to be adopted to prevent fires are given below:

- Compartmentation of cable galleries, use of proper sealing techniques of cable passages and crevices in all directions would help in localising and



identifying the area of occurrence of fire as well as ensure effective automatic and manual fire fighting operations

- Spread of fire in horizontal direction would be checked by providing fire stops for cable shafts
- Reliable and dependable type of fire detection system with proper zoning and interlocks for alarms are effective protection methods for conveyor galleries
- Housekeeping of a high standard helps in eliminating the causes of fire and regular fire watching system strengthens fire prevention and fire fighting
- Proper fire watching by all concerned should be ensured.

7.8.4.4 Health and Safety Monitoring Plan

All the potential occupational hazardous work places such as acid and alkali storage areas should be monitored regularly. The health of employees working in these areas should be monitored once a year for early detection of any ailment due to exposure to hazardous chemicals.



8.0 PROJECT BENEFITS

8.1 Preamble

Telangana State Power Generation Corporation Limited (TSGENCO) is one of the pivotal organizations of Telangana, engaged in the business of Power Generation. Apart from operation & maintenance of the power Station it has undertaken the execution of the ongoing & new power projects scheduled under capacity addition programme and is also taking up renovation & modernization works of the old power stations.

TSGENCO has been incorporated as per Companies Act-2013 on 19.05.2014 and commenced operations from 02.06.2014. This was a sequel to Government's reforms in power sector to un-bundle the activities relating to generation, transmission and distribution of power. All the Generating Stations owned by erstwhile (Andhra Pradesh State Electricity Board) APSEB in Telangana area were transferred under the control of TSGENCO.

Proposed project of 5 X 800 MW Super critical Coal fired Yadadri power Station at village Veerlapalem in Damarcherla Tehsil of Nalgonda district in Telangana is to primarily cater to the requirements of empowering Telangana state.

The project will result in considerable growth of stimulating the industrial and commercial activities in the state. Small and medium scale industries may be further developed as a consequence.

Proposed power project would be beneficial in reducing the existing and ever escalating demand of electricity in the state of Telangana and also in the southern part of India.

In operation phase, the proposed project would require significant workforce of non-technical and technical persons. Migration of persons with better education and professional experience will result in increase of literacy in the surrounding villages.

8.2 Construction Phase

8.2.1 Employment

The proposed 5 X 800 MW coal based super critical thermal power project, at Nalgonda District, Telangana state will provide a significant amount of direct and indirect employment opportunities to the local people with different skills and trades. The proposed project needs employees during construction and operation of plant. The manpower required for the proposed project is estimated to be 1200 people during construction phase and 800 employees during operation and maintenance phase.



Indirect employment opportunities to local people in contract works in construction and operation, supply of materials, transportation, supply of goods and services to power plant and other community services. Demand of housing for rental accommodation will be increased. Markets with vegetables and other commodities will be developed due to the increased inflow of residents. A large number of small and medium scale industries, physical & social infrastructure facilities will emerge due to the increase in the availability of power.

8.2.2 Community Services

TSGENCO will employ local people to the extent possible in order to reduce the need for additional infrastructure. In addition, TSGENCO will develop necessary infrastructure like accommodation, water supply, sewerage, medical facility, etc. for catering to the needs of the project personnel and their families. It is proposed to develop township for employees near the plant site. The local people will be indirectly benefited by these developments.

8.2.3 Transportation

TSGENCO will strengthen the existing road connecting the project area.

8.3 **Operational Phase**

8.3.1 Population

During the operational phase, about 1000 people will be employed. Considering an average family size of 4 persons, there is a likelihood of increase of about 2000 persons in the study area. Considering that most of the skilled personnel proposed to be employed for the proposed project would be from outside the study area and unskilled/ semiskilled personnel will be from within the study area, the proposed project would add to the population in the study area which results in better scope for indirect employment etc.

8.3.2 Education

Unskilled people and limited skilled people (depending on availability) will be hired from local population. People expected to come to the study area from outside are expected to be educated and especially skilled. In addition, some secondary developments like opening of new schools, shops may take place in view of the increased family population due to the proposed employment. These factors will be beneficial to locals residing in the study area.



8.3.3 Employment

The man power requirements for the operational phase of the power project will be about 1200 persons. Many of these persons however will be skilled people and possibly will come from outside the study area. Need of unskilled people will be satisfied from local population.

In addition to the direct employment mentioned above, there will be indirect employment of local people by utilizing their expertise in different areas like horticulture, site clearing (for power plant construction), etc. Also, due to secondary development in the study area, employment opportunities will be generated. About 1000 people are expected to get indirect employment.

8.3.4 Physical Infra Structure

The following physical infrastructure facilities will further improve due to the proposed project.

- Road transport facilities
- Educational facilities
- Housing facilities
- Banking facilities
- Post office & communications
- Recreation facilities
- Water supply and sanitation
- Power supply

8.3.5 Community Social Responsibility

The TSGENCO has demonstrated its commitment to Corporate Social responsibility by effectively implementing a wide range of CSR initiatives in a transparent and participatory manner.

On the basis of the CSR policy, the company has formulated a set of objectives and identified core areas of intervention for an impact-oriented implementation of CSR policy; the objectives and the core areas are as follows:

1. To improve the economic, health and social status of men and women where the operation of the company takes place.
2. To sustain and support health, social, economic and entrepreneurship activities with the active participation of local communities and to create opportunities to take ownership of CSR programs.

Core Sectors of Corporate Social Responsibility

- Education and capacity building;



- Health and family welfare;
- Sustainable development;
- Infrastructure development; and
- Rehabilitation of physically challenged people among land losers.

8.3.6 Proposed CSR Activities by TSGENCO

A detailed CSR study has been conducted by Centre for Management and Social Research (CMSR), Hyderabad. A detailed budget has been allotted towards CSR activities as a capital expenditure. The detailed CSR report for the proposed power plant along with the action plan and budget is given in **Annexure 16**.



9.0 ADMINISTRATIVE ASPECTS OF ENVIRONMENT MANAGEMENT PLAN

9.1 Institutional Arrangements for Environment Protection and Control

The power plant will be supervised and controlled by a General Manager supported by adequate team of technically and statutorily qualified personnel apart from the operating staff of skilled, semi skilled, unskilled and other categories.

Environment Management will be the responsibility of the Environment Management cell headed by the Manager (Environment) and comprising of Environmental Engineer, safety officer, chemists, etc. The Manager (Environment) will report to the Plant General Manager.

The Manager-Environment will be responsible for environment management activities in the power plant. To facilitate effective environment management, TSGENCO will create a department consisting of officers from various disciplines to co-ordinate the activities concerned with the management and implementation of the environmental control measures.

Basically, this department will supervise the monitoring of environmental pollution levels viz. ambient air quality, water and effluent quality, noise level either departmentally or by appointing external agencies wherever necessary.

In case the monitored results of environmental pollution are found to exceed the allowable limits, the Environmental Management Cell will suggest remedial action and get these suggestions implemented through the concerned authorities.

The Environmental Management Cell will also co-ordinate all the related activities such as collection of statistics of health of workers and population of the region, afforestation and green belt development.

9.3 Vision & Mission of TSGENCO

Mission

- To spearhead accelerated power development by planning and implementing new power projects
- To generate adequate and reliable power most economically, efficiently and eco-friendly
- To implement Renovation and Modernisation of all existing units and enhance their performance



Vision

- Self sufficiency in power in next three to four years
- 6160 MW capacity addition
- Providing reliable and uninterrupted power supply to Agriculture, Industrial, Commercial and Domestic sectors

9.4 Corporate Environment Policy

An environmental policy is a statement of an organization's commitment and road map to improving its environmental performance. Developing a policy will help in obtaining a better understanding of how an organization's activities impact on the environment and how to reduce those impacts. Improving the organization's environmental performance has numerous benefits including creating a healthier and safer workplace, and enhancing the corporate image in the community.

Environment policy can enhance productivity by increasing the efficiency with which we use resources and energy. An Environmental management system enables an organization to identify its environmental aspects and determines which of them can have a significant impact on the environment. The ISO:14000 standards require the policy to be suitable for the nature, scale and environmental impacts of the organization's activities, products and services. Corporate Environmental Policy is enclosed as **Annexure 18**.

9.4.1 Environment Policy Statement of TSGENCO

The role of the concerned Director includes participation in management review, reviewing action plans of the perspective stations designed for achieving environmental policy goals, approving allocation of resources or implementing the action plans in the respective stations. The Environmental Management Group at Headquarters level will be led by Project Manager.

The main responsibility of the Project Manager is as follows:

- Organize the management reviews
- Review of implementation of Environmental Policy at headquarters level
- Review and support for implementation of programs designed for respective project (station level) & headquarters level.
- Review of monitoring and measurement of environmental performance of all projects
- Implementation of Environmental Committee decisions



The Environmental Management Group will have an Environmental Management Committee. The environmental Management Committee meetings will be convened by Project Manager as the convener once in every quarter and as & when necessity arises with concerned Directors. The Chairman/TSGENCO will be the Chairman of the committee.

The role of the Environmental management Committee:

- The committee will review all environmental legal requirements applicable to the stations and their compliance.
- The station level action plans prepared for achieving the environmental policy will be reviewed in the light of the technical and legal requirements and the achievability in the identified time frame and allocation of funds for implementation.
- Update any changes in the standards or Legal requirements and structuring guidelines at the stations for bringing them into operational level.
- Review of Compliance reports and audit reports and suggest the plan for implementation to reach compliance status.

EMS Coordinator (Executive Engineer), works in the corporate office. The EMS Coordinator (EE) works under the control of Deputy Project Manager. Under the direction of EMS Coordinator, the components covering Environmental Clearance and Consent for Establishment for new projects will be executed by AEE and AE whereas ash Management will be executed by another group constituting AEE and AE.

Further, all the station level monitoring reports and legal compliances (pollution Control Coordinates work) will be collected and monitored by Senior Chemist and Chemist.

9.4.2 Environment Group at Project Level

The organizational setup for Environmental management is presented in **Figure 9.28**. The responsibilities of Station Head are as follows:

- Review the legal registry;
- Attending the CFO meetings and obtaining consents;
- Attending legal hearings;
- Review the status of Environmental compliances/non-compliances frequently and at least once in monthly and initiate appropriate action plan;
- Appraisal with Corporate office about the sanction of action plans submitted and ensure support for technical and financial clearances for executing the same;
- Submission of reports to the concerned authorities time to time; and
- Any other issues relating to the environmental aspects.

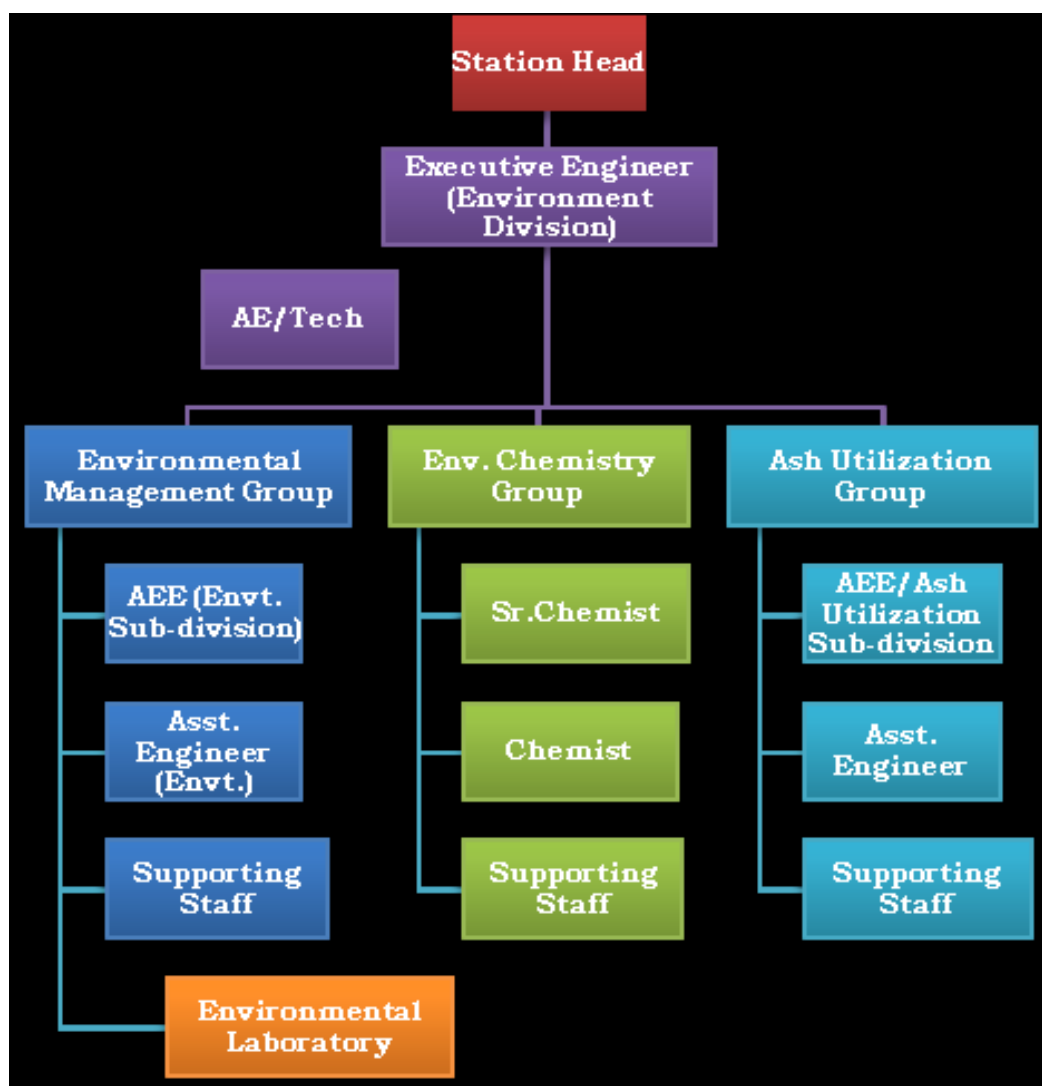


Figure 9.29: Organizational Setup for Environmental Management at Project Level



9.4.3 Management Reporting

Having defined the various functions dealing with environmental related aspects, an extensive system of management reporting and exception reporting of all environmental parameters, deviations and will be established. TSGENCO aims at carrying out checks at identified points within the plant and outside with respect to emissions in air, effluent discharge and ash pond effluents etc. at appropriate frequencies and then report the results to the Station Head at Project Level and Corporate EMG. Exception reports will be put up to the management. Based on the nature of deviations and the trend, identification of gaps, audit reports etc. decisions will be taken to control the deviating parameters. These decisions are classified as:

- **Short term** through which problems can be resolved within a week or so and include such issues which generally reflect operational corrections, improvements and generally do not involve capital modifications.
- **Medium term** which involves a deviation of a few months says up to 12 months and includes minor capital modifications etc.
- **Long term** decisions, which basically involve retrofitting and major capital modifications of the existing plant and equipment.

Based on the decisions, the implementation of remedial action is monitored periodically. This process of auditing and exception reporting to the management helps evolve appropriate response and actions.

	Environmental Impact Assessment for the proposed 5 x 800 MW Supercritical coal based Yadadri Thermal Power Station at Veerlapalem village, Damarcherla mandal, Nalgonda district, Telangana by M/s Telangana State Power Generation Corporation Limited Chapter-10: Disclosure of Consultants

10.0 DISCLOSURE OF CONSULTANTS

10.1 Preamble

This chapter provides the overview of the Consultants engaged in EIA studies.

10.2 About Bhagavathi Ana Labs Pvt. Ltd.

Bhagavathi Ana Labs Private Limited (BALPL), a Bureau Veritas (BV) Group company, is a professional services company providing environmental consultancy, environmental engineering, analytical and quality testing, water resource studies, technical training and enviro-legal services.

Since inception in 1984, the company has completed number of projects spread all over India. The company has qualified and experienced staff of more than 100 people operating across seven offices in India. The professionals and technicians include environmental engineers, environmental scientists, environmental planners, chemists, mining engineers, geologists, hydro-geologists, economic and social science specialists etc. BALPL is an ISO 9001-2000 Company and is accredited by:

- ISO 9001:2008
- Ministry of Environment and Forests (MoEF), Govt. of India, New Delhi
- National Accreditation Board for Education & Training (NABET) registered Environmental Consultants by Quality Council of India (QCI)
- National Accreditation Board for Testing and Calibration Laboratories (NABL) as per ISO/IEC 17025:2005 in Chemical, Mechanical & Biological fields
- Bureau of Indian Standards (BIS), New Delhi
- Food Safety and Standards Authority of India
- Indian Green Building Council (Membership No. CS-1325)
- Director General for Quality Assurance (DGQA)
- RITES

The Quality system of Bhagavathi is designed to comply with EPA, ASTM, AOAC, ISO/IEC -17025:2005, GLP, CGMP, GCP, IP, BP, USP & other applicable. National and International Standards and to deliver results with complete traceability and transparency

The firm has been engaged in the work of Environmental Impact Assessment studies, preparation of Environmental Management Plans (EMP) and Mining Plans for the last 15 years for the purpose of obtaining clearance from Ministry of Environment & Forests.



Environmental Impact Assessment for the proposed 5 x 800 MW Supercritical coal based Yadadri Thermal Power Station at Veerlapalem village, Damarcherla mandal, Nalgonda district, Telangana by M/s Telangana State Power Generation Corporation Limited

Chapter-10: Disclosure of Consultants



Figure 10.30: NABET Certificate





Environmental Impact Assessment for the proposed 5 x 800 MW Supercritical coal based Yadadri Thermal Power Station at Veerlapalem village, Damarcherla mandal, Nalgonda district, Telangana by M/s Telangana State Power Generation Corporation Limited

Chapter-10: Disclosure of Consultants



Figure 10.31: NABL Certificate - Chemical Testing



Figure 10.32: NABL Certificate - Mechanical Testing





Figure 10.33: NABL Certificate - Biological Testing



टिप्पण : मूल अधिसूचना भारत के राजपत्र, अध्यादेश, में संख्यांक. का.आ. 1174(अ), तारीख 18 जुलाई, 2007 द्वारा प्रकाशित की गई थी और तत्पश्चात् अधिसूचना सं० का.आ. 1539(अ), तारीख 13 सितंबर, 2007, का.आ. 1811(अ), तारीख 24 अक्टूबर, 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 दिसंबर, 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 Bhagavathi 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, Bulbhor, Nagpur - 441122 (Maharashtra)	(1) Dr. (Ms.) Sugandha D. Garway (2) Ms. Kavita Saygaonkar (3) Mr. Yogesh Dhole	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) Rangareddy 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-I, Panchikula-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 Mukherjee (2) Ms. Sutapa Bhownick	3.01.2014

Figure 10.34 : MoEF&CC Certificate

Annexure 1
EAC, Thermal – Site Visit Photographs (05th December, 2015)



Annexure 2: TOR Letter and Compliance Statement

Copy of Additional ToR Letter No. J-13012/18/2015 - IA. I (T) dated 16th February, 2016



No. J-13012/18/2015 - IA. I (T)
Government of India
Ministry of Environment, Forest and Climate Change

Indira Paryavaran Bhawan, Jor Bagh Road,
Aliganj, New Delhi-110003

Dated: 16.02.2016

To

M/s. Telangana State Power Generation Corpn. Ltd. (TSGENCO)
(A Government of Telangana State Undertaking)
Room No. 258, A Block, Vidyut Soudha
Hyderabad- 500 082

Tel. No. 040-23499417; Fax: 040-23499418

Sub: 5x800 MW Super Critical Coal Based Thermal Power Project at Damaracherla, District Nalgonda, Telangana by M/s. Telangana State Power Generation Corporation Ltd. (TSGENCO) - reg. ToR

Sir,

The undersigned is directed to refer your online application dated 19.09.2015 and subsequent documents/information submitted on the above subject.

2. The proposal was considered by the Expert Appraisal Committee (Thermal Power) during its 45th, 48th & 50th Meetings held during 29th -30th October, 2015, 18th December, 2015 and 28th-29th January, 2016 respectively for determination of the Terms of Reference (TOR) for undertaking detailed EIA and preparation of EMP in accordance with the provisions of the EIA Notification dated September 14, 2006. A sub-committee of the EAC has also visited the site on 05.12.2015.

3. After detailed deliberations, the Committee recommended the following ToR in addition to the standard TORs (as applicable) accorded vide Ministry's Online Portal on 02.11.2015 for undertaking detailed EIA study and preparation of EMP. The Committee agreed to the request of PP for using the baseline data being collected from 01.12.2015 in the EIA/EMP as the Standard ToR was already accorded.

- (i) The Tungapadu Vagu should not be diverted, but it should be preserved, protected and its flows enhanced.
- (ii) The PP should leave a minimum of 100 m buffer on either side of its banks and this buffer should be developed into native forest.
- (iii) No effluent should be discharged into the rivulet or River Krishna.
- (iv) In areas where the banks are breached, the breaches should be plugged and strengthened.
- (v) In areas where the riverbed is silted/partially blocked due to landslides, the blocks and silt should be removed in a way that the original gradient is maintained.
- (vi) No water from the stream shall be extracted.
- (vii) To sustain the downstream ecology of the Tungapadu Vagu, the Irrigation Department should release minimum ecological flows from the reservoirs constructed in the upstream.
- (viii) The plateaus and their slopes within the project area, which are not used for the project purpose, are highly degraded. These should be restored to their original natural forest ecosystem and should be used for the conservation of rare and endemic plants and animals found in the plateaus of project area. These forests

Ramesh



- not only serve as green belt to mitigate fugitive emissions, CO₂ and other pollutants, but also serve as a conservation area.
- (ix) The reserve forest that demarcates the project boundary on the South is also highly degraded. This intact patch should be restored to its original forest ecosystem and should be connected to the forest ecosystem of the project area and other reserve forest in the area. This would not only serve as buffer for the project but also acts as a corridor for wildlife and enhance stream flow. For this purpose, the PP should provide grants to the State Forest Department and work should start within a reasonable time of 1-2 years after preparing a detailed site specific action plan.
 - (x) The PP should create a permanent corpus fund for tribal welfare and also provide adequate compensation for the land losers irrespective of their status besides best possible R&R package and extending social welfare schemes and healthcare system for local communities.
 - (xi) Cumulative impact assessment of air, water, soil and socio-economics should be carried out in view of a number of cement plants already established/operating in the vicinity of the proposed plant.
 - (xii) As agreed by the PP, the area for ash pond shall be minimized by shifting it towards North. Further, a minimum distance of 500 m buffer shall be maintained between the proposed ash pond and Tungapadu Vagu. The buffer shall be developed into thick green belt/natural forest.
 - (xiii) As agreed, the impervious lining for the ash pond shall be over and above the clay lining.
4. Besides the above, the following general points shall be followed:
- a. All documents to be properly referenced with index, page numbers and continuous page numbering.
 - b. Where data is presented in the report especially in table, the period in which the data was collected and the source should invariably be indicated.
 - c. Where the documents provided are in a language other than English, an English translation should be provided.
 - d. The Questionnaire for environmental appraisal of thermal power projects as devised earlier by the Ministry shall also be filled and submitted.
 - e. The consultants involved in the preparation of EIA/EMP report after accreditation with Quality Council of India (QCI) / National Accreditation Board of Education and Training (NABET) would need to include a certificate in this regard in the EIA/ EMP reports prepared by them and data provided by other organization / Laboratories including their status of approvals etc. In this regard circular no. F.No. J-11013/77/2004-IA-II (I) dated 2nd December, 2009 is posted on the Ministry's website <http://www.moef.nic.in> may be referred.

In addition to the above, information on the following may also be incorporated in the EIA report.

1. Is the project intended to have CDM-intent?
 - (i) If not, then why?
 - (ii) If yes, then
 - a. Has PIN (Project Idea Note) (or PCN (Project Concept Note)) submitted to the ?NCA? (National CDM Authority) in the MoEF?
 - b. If not, then by when is that expected?
 - c. Has PDD (Project Design Document) been prepared?
 - d. What is the Carbon intensity? from your electricity generation projected (i.e. CO₂ Tons/MWH or Kg/KWH)

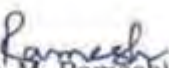
Ramesh

- e. Amount of CO₂ in Tons/year expected to be reduced from the baseline data available on the CEA's web-site (www.cea.nic.in)
2. Notwithstanding 1(i) above, data on (d) & (e) above shall be worked out and reported.
5. **The Environmental Clearance shall be applied only after fuel and water linkages are firmed up.**
6. After preparing the Draft EIA (as per the generic structure prescribed in Appendix-III of the EIA Notification, 2006) covering the above mentioned issues, the same shall be submitted to the SPCB for conducting the public hearing as per procedure of EIA notification 2006. The issues emerged during public hearing shall be further incorporated in the Draft EIA/EMP report. The final EIA/EMP report along with public hearing report and the requisite documents (*including written objections, if any*) shall be submitted to the Ministry for appraisal by the Expert Appraisal Committee for consideration of awarding environmental clearance under the provisions of Environmental Impact Assessment notification dated September 14, 2006.
7. The TORs prescribed shall be valid for a period of three years from the date of issue for submission of EIA/ EMP reports, after public consultation.


(Dr. M. Ramesh)
Scientist 'D'

Copy to:

1. The Chairman, Telangana State Pollution Control Board, Paryavaran Bhawan, A-3 Industrial Estate, Sanath Nagar, Hyderabad- 500 018.
2. The Additional PCCF (Central), Regional Office, Ministry of Environment, Forests and Climate Change, 1st & 2nd Floors, HEPC Building, 34, Cathedral Garden Road, Nungambakkam, Chennai- 600034.
3. The District Collector, Nalgonda District, Govt. of Telangana.
4. Guard file.
5. Website of MoEF&CC


(Dr. M. Ramesh)
Scientist 'D'

Copy of Standard ToRs prescribed of MoEF&CC Notification dated 10th April, 2015

STANDARD TERMS OF REFERENCE (TOR) FOR EIA/EMP REPORT FOR
PROJECTS/ACTIVITIES REQUIRING ENVIRONMENT CLEARANCE

**1(d):STANDARD TERMS OF REFERENCE FOR CONDUCTING
ENVIRONMENT IMPACT ASSESSMENT STUDY FOR THERMAL
POWER PLANTS PROJECTS AND INFORMATION TO BE
INCLUDED IN EIA/EMP REPORT**

- 1) The proposed project shall be given a unique name in consonance with the name submitted to other Government Departments etc. for its better identification and reference.
- 2) Vision document specifying prospective long term plan of the project shall be formulated and submitted.
- 3) Latest compliance report duly certified by the Regional Office of MoEF for the conditions stipulated in the environmental and CRZ clearances of the previous phase(s) for the expansion projects shall be submitted.
- 4) The project proponent needs to identify minimum three potential sites based on environmental, ecological and economic considerations, and choose one appropriate site having minimum impacts on ecology and environment. A detailed comparison of the sites in this regard shall be submitted.
- 5) Executive summary of the project indicating relevant details along with recent photographs of the proposed site (s) shall be provided. Response to the issues raised during Public Hearing and the written representations (if any), along with a time bound Action Plan and budgetary allocations to address the same, shall be provided in a tabular form, against each action proposed.
- 6) Harnessing solar power within the premises of the plant particularly at available roof tops and other available areas shall be formulated and for expansion projects, status of implementation shall also be submitted.
- 7) The geographical coordinates (WGS 84) of the proposed site (plant boundary), including location of ash pond along with topo sheet (1:50,000 scale) and IRS satellite map of the area, shall be submitted. Elevation of plant site and ash pond with respect to HFL of water body/nullah/River and high tide level from the sea shall be specified, if the site is located in proximity to them.
- 8) Layout plan indicating break-up of plant area, ash pond, green belt, infrastructure, roads etc. shall be provided.
- 9) Land requirement for the project shall be optimized and in any case not more than what has been specified by CEA from time to time. Item wise break up of land requirement shall be provided.
- 10) Present land use (including land class/kism) as per the revenue records and State Govt. records of the proposed site shall be furnished. Information on land to be acquired including coal transportation system, laying of pipeline, ROW, transmission lines etc. shall be specifically submitted. Status of land acquisition and litigation, if any, should be provided.
- 11) If the project involves forest land, details of application, including date of application, area applied for, and application registration number, for diversion under FCA and its status should be provided along with copies of relevant documents.

STANDARD TERMS OF REFERENCE (TOR) FOR EIA/EMP REPORT FOR PROJECTS/ ACTIVITIES REQUIRING ENVIRONMENT CLEARANCE

- 12) The land acquisition and R&R scheme with a time bound Action Plan should be formulated and addressed in the EIA report.
- 13) Satellite imagery and authenticated topo sheet indicating drainage, cropping pattern, water bodies (wetland, river system, stream, nallaha, ponds etc.), location of nearest habitations (villages), creeks, mangroves, rivers, reservoirs etc. in the study area shall be provided.
- 14) Location of any National Park, Sanctuary, Elephant/Tiger Reserve (existing as well as proposed), migratory routes / wildlife corridor, if any, within 10 km of the project site shall be specified and marked on the map duly authenticated by the Chief Wildlife Warden of the State or an officer authorized by him.
- 15) Topography of the study area supported by toposheet on 1:50,000 scale of Survey of India, along with a large scale map preferably of 1:25,000 scale and the specific information whether the site requires any filling shall be provided. In that case, details of filling, quantity of required fill material; its source, transportation etc. shall be submitted.
- 16) A detailed study on land use pattern in the study area shall be carried out including identification of common property resources (such as grazing and community land, water resources etc.) available and Action Plan for its protection and management shall be formulated. If acquisition of grazing land is involved, it shall be ensured that an equal area of grazing land be acquired and developed and detailed plan submitted.
- 17) A mineralogical map of the proposed site (including soil type) and information (if available) that the site is not located on potentially mineable mineral deposit shall be submitted.
- 18) Details of fly ash utilization plan as per the latest fly ash Utilization Notification of GOI along with firm agreements / MoU with contracting parties including other usages etc. shall be submitted. The plan shall also include disposal method / mechanism of bottom ash.
- 19) The water requirement shall be optimized (by adopting measures such as dry fly ash and dry bottom ash disposal system, air cooled condenser, concept of zero discharge) and in any case not more than that stipulated by CEA from time to time, to be submitted along with details of source of water and water balance diagram. Details of water balance calculated shall take into account reuse and re-circulation of effluents.
- 20) Water body/Nallah (if any) passing across the site should not be disturbed as far as possible. In case any Nallah / drain is proposed to be diverted, it shall be ensured that the diversion does not disturb the natural drainage pattern of the area. Details of proposed diversion shall be furnished duly approved by the concerned Department of the State.
- 21) It shall also be ensured that a minimum of 500 m distance of plant boundary is kept from the HFL of river system / streams etc. and the boundary of site should also be located 500 m away from railway track and National Highways.
- 22) Hydro-geological study of the area shall be carried out through an institute/ organization of repute to assess the impact on ground and surface water regimes. Specific mitigation measures shall be spelt out and time bound Action Plan for its implementation shall be submitted.

STANDARD TERMS OF REFERENCE (TOR) FOR EIA/EMP REPORT FOR PROJECTS/ACTIVITIES REQUIRING ENVIRONMENT CLEARANCE

- 23) Detailed Studies on the impacts of the ecology including fisheries of the River/Estuary/Sea due to the proposed withdrawal of water / discharge of treated wastewater into the River/Sea etc shall be carried out and submitted along with the EIA Report. In case of requirement of marine impact assessment study, the location of intake and outfall shall be clearly specified along with depth of water drawl and discharge into open sea.
- 24) Source of water and its sustainability even in lean season shall be provided along with details of ecological impacts arising out of withdrawal of water and taking into account inter-state shares (if any). Information on other competing sources downstream of the proposed project and commitment regarding availability of requisite quantity of water from the Competent Authority shall be provided along with letter / document stating firm allocation of water.
- 25) Detailed plan for rainwater harvesting and its proposed utilization in the plant shall be furnished.
- 26) Feasibility of near zero discharge concept shall be critically examined and its details submitted.
- 27) Optimization of Cycles of Concentration (COC) along with other water conservation measures in the project shall be specified.
- 28) Plan for recirculation of ash pond water and its implementation shall be submitted.
- 29) Detailed plan for conducting monitoring of water quality regularly with proper maintenance of records shall be formulated. Detail of methodology and identification of monitoring points (between the plant and drainage in the direction of flow of surface / ground water) shall be submitted. It shall be ensured that parameter to be monitored also include heavy metals. A provision for long-term monitoring of ground water table using Piezometer shall be incorporated in EIA, particularly from the study area.
- 30) Socio-economic study of the study area comprising of 10 km from the plant site shall be carried out through a reputed institute / agency which shall consist of detail assessment of the impact on livelihood of the local communities.
- 31) Action Plan for identification of local employable youth for training in skills, relevant to the project, for eventual employment in the project itself shall be formulated and numbers specified during construction & operation phases of the Project.
- 32) If the area has tribal population it shall be ensured that the rights of tribals are well protected. The project proponent shall accordingly identify tribal issues under various provisions of the law of the land.
- 33) A detailed CSR plan along with activities wise break up of financial commitment shall be prepared. CSR component shall be identified considering need based assessment study and Public Hearing issues. Sustainable income generating measures which can help in upliftment of affected section of society, which is consistent with the traditional skills of the people shall be identified. Separate budget for community development activities and income generating programmes shall be specified.
- 34) While formulating CSR schemes it shall be ensured that an in-built monitoring mechanism for the schemes identified are in place and mechanism for conducting annual social audit from the nearest

STANDARD TERMS OF REFERENCE (TOR) FOR EIA/EMP REPORT FOR PROJECTS/ ACTIVITIES REQUIRING ENVIRONMENT CLEARANCE

government institute of repute in the region shall be prepared. The project proponent shall also provide Action Plan for the status of implementation of the scheme from time to time and dovetail the same with any Govt. scheme(s). CSR details done in the past should be clearly spelt out in case of expansion projects.

- 35) R&R plan, as applicable, shall be formulated wherein mechanism for protecting the rights and livelihood of the people in the region who are likely to be impacted, is taken into consideration. R&R plan shall be formulated after a detailed census of population based on socio economic surveys who were dependant on land falling in the project, as well as, population who were dependant on land not owned by them.
- 36) Assessment of occupational health and endemic diseases of environmental origin in the study area shall be carried out and Action Plan to mitigate the same shall be prepared.
- 37) Occupational health and safety measures for the workers including identification of work related health hazards shall be formulated. The company shall engage full time qualified doctors who are trained in occupational health. Health monitoring of the workers shall be conducted at periodic intervals and health records maintained. Awareness programme for workers due to likely adverse impact on their health due to working in non-conductive environment shall be carried out and precautionary measures like use of personal equipments etc. shall be provided. Review of impact of various health measures undertaken at intervals of two to three years shall be conducted with an excellent follow up plan of action wherever required.
- 38) One complete season site specific meteorological and AAQ data (except monsoon season) as per latest MoEF Notification shall be collected and the dates of monitoring shall be recorded. The parameters to be covered for AAQ shall include PM10, PM2.5, SO2, NOx, CO and Hg. The location of the monitoring stations should be so decided so as to take into consideration the upwind direction, pre-dominant downwind direction, other dominant directions, habitation and sensitive receptors. There should be at least one monitoring station each in the upwind and in the pre - dominant downwind direction at a location where maximum ground level concentration is likely to occur.
- 39) In case of expansion project, air quality monitoring data of 104 observations a year for relevant parameters at air quality monitoring stations as identified/stipulated shall be submitted to assess for compliance of AAQ Standards (annual average as well as 24 hrs).
- 40) A list of industries existing and proposed in the study area shall be furnished.
- 41) Cumulative impacts of all sources of emissions including handling and transportation of existing and proposed projects on the environment of the area shall be assessed in detail. Details of the Model used and the input data used for modeling shall also be provided. The air quality contours should be plotted on a location map showing the location of project site, habitation nearby, sensitive receptors, if any. The windrose and isopleths should also be shown on the location map. The cumulative study should also include impacts on water, soil and socio-economics.
- 42) Radio activity and heavy metal contents of coal to be sourced shall be examined and submitted along with laboratory reports.

STANDARD TERMS OF REFERENCE (TOR) FOR EIA/EMP REPORT FOR
PROJECTS/ACTIVITIES REQUIRING ENVIRONMENT CLEARANCE

- 43) Fuel analysis shall be provided. Details of auxiliary fuel, if any, including its quantity, quality, storage etc should also be furnished.
- 44) Quantity of fuel required, its source and characteristics and documentary evidence to substantiate confirmed fuel linkage shall be furnished. The Ministry's Notification dated 02.01.2014 regarding ash content in coal shall be complied. For the expansion projects, the compliance of the existing units to the said Notification shall also be submitted
- 45) Details of transportation of fuel from the source (including port handling) to the proposed plant and its impact on ambient AAQ shall be suitably assessed and submitted. If transportation entails a long distance it shall be ensured that rail transportation to the site shall be first assessed. Wagon loading at source shall preferably be through silo/conveyor belt.
- 46) For proposals based on imported coal, inland transportation and port handling and rail movement shall be examined and details furnished. The approval of the Port and Rail Authorities shall be submitted.
- 47) Details regarding infrastructure facilities such as sanitation, fuel, restrooms, medical facilities, safety during construction phase etc. to be provided to the labour force during construction as well as to the casual workers including truck drivers during operation phase should be adequately catered for and details furnished.
- 48) EMP to mitigate the adverse impacts due to the project along with item - wise cost of its implementation in a time bound manner shall be specified.
- 49) A Disaster Management Plan (DMP) along with risk assessment study including fire and explosion issues due to storage and use of fuel should be carried out. It should take into account the maximum inventory of storage at site at any point of time. The risk contours should be plotted on the plant layout map clearly showing which of the proposed activities would be affected in case of an accident taking place. Based on the same, proposed safeguard measures should be provided. Measures to guard against fire hazards should also be invariably provided. Mock drills shall be suitably carried out from time to time to check the efficiency of the plans drawn.
- 50) The DMP so formulated shall include measures against likely Fires/Tsunami/Cyclones/Storm Surges/ Earthquakes etc, as applicable. It shall be ensured that DMP consists of both On-site and Off-site plans, complete with details of containing likely disaster and shall specifically mention personnel identified for the task. Smaller version of the plan for different possible disasters shall be prepared both in English and local languages and circulated widely.
- 51) Detailed scheme for raising green belt of native species of appropriate width (50 to 100 m) and consisting of at least 3 tiers around plant boundary with tree density of 2000 to 2500 trees per ha with a good survival rate of around 80% shall be submitted. Photographic evidence must be created and submitted periodically including NRSA reports in case of expansion projects. A shrub layer beneath tree layer would serve as an effective sieve for dust and sink for CO₂ and other gaseous pollutants and hence a stratified green belt should be developed.

STANDARD TERMS OF REFERENCE (TOR) FOR EIA/EMP REPORT FOR PROJECTS/ ACTIVITIES REQUIRING ENVIRONMENT CLEARANCE

52) Over and above the green belt, as carbon sink, plan for additional plantation shall be drawn by identifying blocks of degraded forests, in close consultation with the District Forests Department. In pursuance to this the project proponent shall formulate time bound Action Plans along with financial allocation and shall submit status of implementation to the Ministry every six months.

53) Corporate Environment Policy

- a. Does the company has a well laid down Environment Policy approved by its Board of Directors? If so, it may be detailed in the EIA report.
- b. Does the Environment Policy prescribe for standard operating process / procedures to bring into focus any infringement / deviation / violation of the environmental or forest norms / conditions? If so, it may be detailed in the EIA.
- c. What is the hierarchical system or Administrative order of the company to deal with the environmental issues and for ensuring compliance with the environmental clearance conditions. Details of this system may be given.
- d. Does the company has compliance management system in place wherein compliance status along with compliances / violations of environmental norms are reported to the CMD and the Board of Directors of the company and / or shareholders or stakeholders at large? This reporting mechanism should be detailed in the EIA report.

All the above details should be adequately brought out in the EIA report and in the presentation to the Committee.

54) Details of litigation pending or otherwise with respect to project in any Court, Tribunal etc. shall invariably be furnished.

Annexure 2: TOR Letter and Compliance Statement

Table 1: Compliance to Standard ToRs

Sl. No.	ToR Points	Compliance Remarks
1	The proposed project shall be given a unique name in consonance with the name submitted to other Government Departments etc. for its better identification and reference.	The proposed thermal power project is named as “ TSGENCO – (5 X 800 MW) Yadadri Thermal Power Station ” at Veerlapalem (V), Dameracherla (M), Nalgonda (Dist), Telangana State. The same is maintained in cover page and Section-1.3, Chapter 1 of the report.
2	Vision document specifying prospective long term plan of the project shall be formulated and submitted.	Telangana state will require installed capacity of 17,041 MW by the end of 2018-19 as per the 18th Electrical Power Survey conducted by CEA. Further to the above, Telangana state requires substantial capacity addition to meet the progressive power demand for other sectors viz., 9 hours power supply for agriculture sector, estimated demand of 7000 MW for lift irrigation schemes, 24/7 power supply etc., The broad vision of the TSGENCO is also mentioned in Section 9.3 of Chapter 9.
3	Latest compliance report duly certified by the Regional Office of MoEF&CC for the conditions stipulated in the environmental and CRZ clearances of the previous phase(s) for the expansion projects shall be submitted.	Not applicable, as the proposed thermal power project (5 x 800 MW) is a green field project
4	The project proponent needs to identify minimum three potential sites based on environmental, ecological and economic considerations, and choose one appropriate site having minimum impacts on ecology and environment. A detailed comparison of the sites in this regard shall be submitted.	Details of three alternative sites evaluated are provided in Section 5.1 of Chapter 5. After considering the 3 alternative sites, the proposed site is selected as: • The site is a degraded forest land • The site has got good road connectivity • Rail connectivity • Availability of nearby water source in the form of Krishna river • Availability of land • Existence of many cement industries in vicinity of the proposed power plant for utilization of fly ash
5	Executive summary of the project indicating relevant details along with recent photographs of the proposed site (s) shall be provided. Response to the issues raised during Public Hearing and the written representations (if any), along with a time bound Action Plan and budgetary allocations to address the same, shall be provided in a tabular form, against each action proposed.	Executive summary including recent photographs of the proposed site in English and Telugu is enclosed along with the EIA report. The photographs of the proposed site are provided as Figure 2.4 of Chapter 2. The proceedings of the Environmental Public hearing conducted on 31st May, 2016 along with the action plan and budgetary allocations



Annexure 2: TOR Letter and Compliance Statement

Sl. No.	ToR Points	Compliance Remarks
		were included in the final EIA report.
6	Harnessing solar power within the premises of the plant particularly at available roof tops and other available areas shall be formulated and for expansion projects, status of implementation shall also be submitted.	Details provided in Section 4.8.7 of Chapter 4.
7	The geographical coordinates (WGS 84) of the proposed site (plant boundary), including location of ash pond along with topo sheet (1:50,000 scale) and IRS satellite map of the area, shall be submitted. Elevation of plant site and ash pond with respect to HFL of water body/nallah/River and high tide level from the sea shall be specified, if the site is located in proximity to them.	The geographical coordinates (WGS 84) of the proposed site (plant boundary), including location of ash pond along with topo sheet (1:50,000 scale) are provided in Table 1.1 and Figure 1.3 of Chapter 1. The IRS satellite map is provided in Section 3.9.2 of Chapter 3. The details of elevation of plant site and ash pond with respect to HFL of Krishna river are discussed in Section 2.4.2 of Chapter 2.
8	Layout plan indicating break-up of plant area, ash pond, green belt, infrastructure, roads etc. Shall be provided.	The layout plan indicating plant area, ash pond, greenbelt, infrastructure, roads are shown in Figure 2.6 and are discussed in Section 2.8 of Chapter 2.
9	Land requirement for the project shall be optimized and in any case not more than what has been specified by CEA from time to time. Item wise break up of land requirement shall be provided.	Land required for the project is optimized as specified by CEA. The item wise break up of land is provided in Section 2.9.1 of Chapter 2. The total extent of the land considered is 2800 acres. As per CEA norms the land required is 0.69 acres/MW. For 4000 MW TPP the land required is 2760 acres. (or say 2800 acres). Hence optimized.
10	Present land use (including land class/kism) as per the revenue records and State Govt. records of the proposed site shall be furnished. Information on land to be acquired including coal transportation system, laying of pipeline, ROW, transmission lines etc. shall be specifically submitted. Status of land acquisition and litigation, if any, should be provided.	The total land required for the project is 2800 acres. 75 % of the land is forest land. The remaining land is mostly non-agricultural, uninhabited, partly agricultural, revenue land with isolated pockets of habitation. The acquisition of land required for connecting of railway from Vishnupuram Railway Station to plant site, which is at 8.5 kms, for laying of raw water pipeline from the proposed intake water structure at nearest water source available on the Krishna river etc., is under process. The details of Forest Clearance given by MoEF&CC, Govt of India in favor of TSGENCO are provided in Annexure 3. The details of acquisition of patta/Government/UDAFA land etc, fallen within the forest boundaries from the Revenue Department, Telangana State were provided as Annexure 4.
11	If the project involves forest land, details of application, including date of application, area applied for, and application registration number, for diversion under FCA and its status should be provided along with copies of relevant documents	The forest land to an extent of 1892.35 Ha (4676 Acres) under Veerlapalem forest block, Dameracherla Mandal, Nalgonda District is diverted in favor of TSGENCO Vide letter no. F.No. 8-07/2015/ FC dated 7 th July 2015 of MoEF&CC, GOI, New Delhi.



Annexure 2: TOR Letter and Compliance Statement

Sl. No.	ToR Points	Compliance Remarks
		The copy of Forest Clearance Letter is provided in Annexure 3 .
12	The land acquisition and R&R scheme with time bound action plan should be formulated and addressed in the EIA report.	An amount of Rs. 198.59164 Crores was paid towards cost of NPV of forest land and cost of compensatory afforestation to an extent of 4676 Acres was deposited with Principal Chief Conservator of Forest, Hyderabad. The letter in this regard is given as Annexure 3. An amount of Rs 285.81 Crores toward land compensation, R&R package and other charges was deposited with District Collector, Nalgonda on 4th January 2016 towards an extent of Acres 854-32 Guntas of Patta land and Acres 920-25 Guntas of ROFR land. The detailed R&R study has been conducted and R&R award passed by the District Collector, Nalgonda and is enclosed in Annexure 17.
13	Satellite imagery and authenticated topo sheet indicating drainage, cropping pattern, water bodies (wetland, river system, stream, nallahs, ponds etc.), location of nearest habitations (villages), creeks, mangroves, rivers, reservoirs etc. in the study area shall be provided.	The land use and land cover map based on the Satellite Imagery of IRS Resourcesat-2 LISS3 multispectral satellite data of 28 th January 2016 was provided in Section 3.9.2 of Chapter 3.
14	Location of any National Park, Sanctuary, Elephant/Tiger Reserve (existing as well as proposed), migratory routes / wildlife corridor, if any, within 10 km of the project site shall be specified and marked on the map duly authenticated by the Chief Wildlife Warden of the State or an officer authorized by him.	There are no National Park, Sanctuary, Elephant/ Tiger Reserve, migratory routes/ wildlife corridor, within 10 km of the project site. The authenticated map from the Chief Wild Warden is provided as Figure 3.19 in Chapter-3.
15	Topography of the study area supported by toposheet on 1:50,000 scale of Survey of India, along with a large scale map preferably of 1:25,000 scale and the specific information whether the site requires any filling shall be provided. In that case, details of filling, quantity of required fill material; its source, transportation etc. shall be submitted.	Topography of the study area supported by toposheet on 1:50,000 scale of Survey of India is given as Figure 1.3 of Chapter 1. The quantity of cutting is about 80,00,000 m³ and the quantity of filling required in the plant area is about 66,00,000 m³. The required filling quantity is less than the cutting quantity and hence, the same earth obtained from cutting will be used for filling in the plant area where ever required. No additional borrow earth is required for filling in the plant. The contour map of the project is provided as Figure 2.5 of Chapter 2.
16	A detailed study on land use pattern in the study area shall be carried out including identification of common property resources (such as grazing and community land, water resources etc.) available and Action Plan for its protection and management shall be formulated. If acquisition of grazing land is involved, it shall be ensured that	The total area of extent for establishment of proposed power project is 2800 Acres. Out of which 2095.28 Acres is forest land and the remaining land of 704.12 acres is mostly non-agricultural, uninhabited, partly agricultural, revenue land with isolated pockets of habitation.



Annexure 2: TOR Letter and Compliance Statement

Sl. No.	ToR Points	Compliance Remarks
	an equal area of grazing land be acquired and developed and detailed plan submitted.	Tungapadu vagu is passing through the proposed site. The action plan for protection of the stream is provided under compliance of Additional ToR point No -1. There is no grazing land involved in the project site.
17	A mineralogical map of the proposed site (including soil type) and information (if available) that the site is not located on potentially mineable mineral deposit shall be submitted.	The mineralogical map of the region as furnished by Assistant Director, Mines and Geology, Miryalaguda along with the report furnished by him is enclosed as Annexure 9. As per the map furnished the major area is covered with shales and partly by the lime stone.
18	Details of fly ash utilization plan as per the latest fly ash Utilization Notification of GOI along with firm agreements / MoU with contracting parties including other usages etc. shall be submitted. The plan shall also include disposal method / mechanism of bottom ash.	The details of fly ash utilization plan as per the latest fly ash Utilization Notification of GOI along with requirement of fly ash furnished by various cement industries is discussed in Section 4.8.4 of Chapter 4 and copy of willingness letters given by various cement industries for lifting of fly ash from proposed project are provided in Annexure 13. The mechanism of disposal method of fly ash and bottom ash is discussed in Section 2.8.12 of Chapter 2.
19	The water requirement shall be optimized (by adopting measures such as dry fly ash and dry bottom ash disposal system, air cooled condenser, concept of zero discharge) and in any case not more than that stipulated by CEA from time to time, to be submitted along with details of source of water and water balance diagram. Details of water balance calculated shall take into account reuse and recirculation of effluents.	The water requirement for the project is 9755 m³/hr and will be sourced from Krishna river. The specific water consumption limits stipulated by CEA will be complied by adopting concept of zero discharge and also by providing ash water recovery system to utilize the decanted water from ash pond. The details of water balance flow diagram are provided as in Section 2.9.2 of Chapter 2.
20	Water body/Nallah (if any) passing across the site should not be disturbed as far as possible. In case any Nallah / drain is proposed to be diverted, it shall be ensured that the diversion does not disturb the natural drainage pattern of the area. Details of proposed diversion shall be furnished duly approved by the concerned Department of the State	Tungapadu vagu is passing through the site. The vagu will not be diverted. Also action plan for protection of the stream as suggested by Sub Committee, EAC (Thermal), MoEF&CC is given as in Additional ToR action plan, Point-1.
21	It shall also be ensured that a minimum of 500 m distance of plant boundary is kept from the HFL of river system / streams etc. and the boundary of site should also be located 500 m away from railway track and National Highways.	The main plant boundary is kept at a distance of 2.40 km and the ash pond boundary is kept a distance of 1 km from HFL of Krishna River. As such, the project site is beyond 500m distance from Krishna river. No railway track and National Highway is located within 500 m.
22	Hydro-geological study of the area shall be carried out through an institute/ organization of repute to assess the impact on ground and surface water regimes. Specific mitigation	Detailed hydro-geological study of the area has been carried out by M/s Vimta Labs Ltd, Hyderabad which is provided as Annexure 12.



Annexure 2: TOR Letter and Compliance Statement

Sl. No.	ToR Points	Compliance Remarks
	measures shall be spelt out and time bound Action Plan for its implementation shall be submitted.	The mitigation measures along with the action plan are given in the study report.
23	Detailed Studies on the impacts of the ecology including fisheries of the River/Estuary/Sea due to the proposed withdrawal of water / discharge of treated wastewater into the River/Sea etc shall be carried out and submitted along with the EIA Report. In case of requirement of marine impact assessment study, the location of intake and outfall shall be clearly specified along with depth of water drawl and discharge into open sea	Ecological data of the region is provided in Section 3.10 of Chapter 3. Since the unit will be operating on zero discharge process, no adverse impact on aquatic ecology is envisaged. The plant drainage system will be suitably designed such that the storm water does not carry any pollutants.
24	Source of water and its sustainability even in lean season shall be provided along with details of ecological impacts arising out of withdrawal of water and taking into account inter-state shares (if any). Information on other competing sources downstream of the proposed project and commitment regarding availability of requisite quantity of water from the Competent Authority shall be provided along with letter / document stating firm allocation of water.	The water requirement for the proposed thermal power plant of 5 x 800 MW will be about 9,755 m³/hr shall be sourced from the Krishna river. The intake water structure is proposed on Krishna river, located at a distance of about 10 km away from the site. About 3.03 TMC/annum of water is required for the proposed thermal power plant. Whereas, the I&CAD Department, Telangana state government has allocated 6.6 TMC/annum of water from the Krishna river. As the Krishna river is a perennial river, the water will be available in lean season also and the Govt of Telangana has allocated 6.6 TMC of water per annum for the above project after taking all inter states shares into consideration.
25	Detailed plan for rainwater harvesting and its proposed utilization in the plant shall be furnished.	Details provided in Section 4.8.2, Chapter 4.
26	Feasibility of near zero discharge concept shall be critically examined and its details submitted	The water balance diagram is shown in Figure-2.9 of Chapter-2. The treated waste water along with RO reject water will be reused for cooling tower make up, ashing purpose, dust suppression in coal stock yard, coal conveyors system, floor wash and green belt development. Ash water recovery system will be provided to recover the decanted water from ash pond and will be treated and reused for ashing purpose. Accordingly zero discharge will be ensured.
27	Optimization of Cycles of Concentration (COC) along with other water conservation measures in the project shall be specified.	The optimum COC of cooling tower water is considered as 5 after evaluating several factors and experience gained in the existing stations. As COC increases beyond 5, fouling potential is very high with more scaling and corrosion tendencies, deposition of organic matter. Consumption of more acid, antiscalent and biocides with no proportionate advantage



Annexure 2: TOR Letter and Compliance Statement

Sl. No.	ToR Points	Compliance Remarks
		in saving water. For example, if COC increased from 5 to 6, the additional chemicals consumption will be significantly high and the saving of water will be at the level of 52.5 m ³ /hr. The additional chemical consumption will be a potential hazard for scaling and also corrosion tendencies. Hence, optimum COC of 5 is preferred.
28	Plan for recirculation of ash pond water and its implementation shall be submitted.	It is proposed to install ash water recovery system at the outlet point of decanted water from the ash pond. The decanted water recovered will be treated in the treatment plant and it will be reused for ashing purpose. Thus no ash water will be discharged in to nearby water bodies.
29	Detailed plan for conducting monitoring of water quality regularly with proper maintenance of records shall be formulated. Detail of methodology and identification of monitoring points (between the plant and drainage in the direction of flow of surface / ground water) shall be submitted. It shall be ensured that parameter to be monitored also include heavy metals. A provision for long-term monitoring of ground water table using Piezometer shall be incorporated in EIA, particularly from the study area.	It is proposed to monitor ground water quality at twelve locations by construction of piezometers around the ash pond periodically. Details of monitoring are given in Table 6.2 of Chapter-6. Water quality will be monitored regularly and records will maintained. The test reports will be submitted to TSPCB and regional office MoEF&CC as per prescribed norms.
30	Socio-economic study of the study area comprising of 10 km from the plant site shall be carried out through a reputed institute / agency which shall consist of detail assessment of the impact on livelihood of the local communities.	A detailed Socio-economic survey to assess the impact on the livelihood of local communities is carried out by M/s Centre for Management & Social Research, Hyderabad and enclosed as Annexure 16. The details of Demography and socio economic studies are given in Section 3.11 of chapter-3. The findings and additional socio economic measures suggested by M/s. CMSR under CSR to improve the socio economic conditions of the local people are presented in Section-8.3.5, Chapter-8 A detailed action plan as prepared by an expert agency i.e., M/s Centre for Management & Social Research, Hyderabad will be implemented. The Assessment of socio-economic impacts are presented in Section-4.3.9 of chapter-4.
31	Action Plan for identification of local employable youth for training in skills, relevant to the project, for eventual employment in the project itself shall be formulated and numbers specified during construction & operation phases of the Project.	There are about 584 contenders under project affected families seeking employment in the proposed thermal power plant under R & R policy. Permanent employment will be provided to all the 584 members as per their eligibility and qualification after the project is declared for commercial operation. Further, the un employed youth who are not possessing ITI qualification from project



Annexure 2: TOR Letter and Compliance Statement

Sl. No.	ToR Points	Compliance Remarks
		affected families and local un employed youth from surrounding villages have been advised to take ITI training course in different trades for acquiring them ITI qualification from a Government ITI college. The District Collector, Nalgonda has been requested to take necessary steps to provide admissions to the unemployed youth both from project affected families and surrounding villages, to acquire ITI qualification in different trades such as electrician, fitter, mechanic, plumber, welder, etc., so as to utilize their services in the proposed plant during construction stage as well as operation stage.
32	If the area has tribal population it shall be ensured that the rights of tribals are well protected. The project proponent shall accordingly identify tribal issues under various provisions of the law of the land.	There is also tribal population in surrounding villages of the proposed project and the tribal issues will be taken care in consultation with the district administration. The District Administration will be requested to form the VTDA Societies, so that labour oriented works like maintenance of plantations, lawns, up keeping of various buildings in the plant and other labour oriented works can be provided to them under annual contract system. The developmental works such as providing of pucca roads and drainage system, expansion of existing school buildings, providing safe drinking water, and other developmental works as proposed by District Collector will be taken up in the tribal villages. Action will be taken to implement the resolutions made according to R&R committee for development of tribals of the area.
33	A detailed CSR plan along with activities wise break up of financial commitment shall be prepared. CSR component shall be identified considering need based assessment study and Public Hearing issues. Sustainable income generating measures which can help in upliftment of affected section of society, which is consistent with the traditional skills of the people shall be identified. Separate budget for community development activities and income generating programmes shall be specified.	Detailed CSR report has been prepared by M/s Centre for Management & Social Research, Hyderabad and enclosed as Annexure 16. Action plan for implementation of CSR activities are given in Chapter-8 for which a provision of Rs. 100.40 crores was made in the project cost under capital budget. Once the project construction activities commences, the developmental works in the surrounding villages as proposed by M/s Centre for Management & Social Research, Hyderabad and also The District Collector, Nalgonda will be taken up.

Annexure 2: TOR Letter and Compliance Statement

Sl. No.	ToR Points	Compliance Remarks
34	While formulating CSR schemes it shall be ensured that an in-built monitoring mechanism for the schemes identified are in place and mechanism for conducting annual social audit from the nearest the nearest government institute of repute in the region shall be prepared. The project proponent shall also provide Action Plan for the status of implementation of the scheme from time to time and dovetail the same with any Govt. scheme(s). CSR details done in the past should be clearly spelt out in case of expansion projects.	A Station Level Committee would be constituted to review the progress of CSR activities once in every six months. In addition, annual evaluation and social audits of CSR activities would be carried out by an independent agency of high repute.
35	R&R plan, as applicable, shall be formulated wherein mechanism for protecting the rights and livelihood of the people in the region who are likely to be impacted, is taken into consideration. R&R plan shall be formulated after a detailed census of population based on socio economic surveys who were dependant on land falling in the project, as well as, population who were dependant on land not owned by them.	The detailed R&R study has been conducted and R&R awards passed by the Distric Collector, Nalgonda are given at Annexure 17 . An amount of Rs. 285.81 Crores was deposited with the Distirct Collector, Nalgonda for the implementation of R&R policy.
36	Assessment of occupational health and endemic diseases of environmental origin in the study area shall be carried out and Action Plan to mitigate the same shall be prepared.	Details provided in Section-7.8 of Chapter-7.
37	Occupational health and safety measures for the workers including identification of work related health hazards shall be formulated. The company shall engage full time qualified doctors who are trained in occupational health. Health monitoring of the workers shall be conducted at periodic intervals and health records maintained. Awareness programme for workers due to likely adverse impact on their health due to working in non-conductive environment shall be carried out and precautionary measures like use of personal equipments etc. shall be provided. Review of impact of various health measures undertaken at intervals of two to three years shall be conducted with an excellent follow up plan of action wherever required.	Details provided in Section-7.8 of Chapter-7.
38	One complete season site specific meteorological and AAQ data (except monsoon season) as per latest MoEF&CC Notification shall be collected and the dates of monitoring shall be recorded. The parameters to be covered for AAQ shall include PM10, PM2.5, SO2, NOx, CO and Hg. The location of the monitoring stations should be so decided so as to take into consideration the upwind direction, pre-dominant downwind direction, other dominant directions, habitation and sensitive receptors. There should be at least one monitoring station each in the upwind and in the pre - dominant downwind direction at a location where maximum ground level concentration is likely to occur.	The details of site specific meteorological and AAQ data as per MoEF Notification dated 16.11.2009 are given in section-3.3.2 of Chapter-3. The meteorological parameters recorded at the site are given in section -3.2.2 of Chapter-3 of the EIA report.
39	In case of expansion project, air quality monitoring data of 104 observations a year for	Not applicable



Annexure 2: TOR Letter and Compliance Statement

Sl. No.	ToR Points	Compliance Remarks
	relevant parameters at air quality monitoring stations as identified/stipulated shall be submitted to assess for compliance of AAQ Standards (annual average as well as 24 hrs).	
40	A list of industries existing and proposed in the study area shall be furnished.	1.India Cements 2.Parasakti Cements 3.Penna Cements 4.Deccan Cements 5.Andhra Cements
41	Cumulative impacts of all sources of emissions including handling and transportation of existing and proposed projects on the environment of the area shall be assessed in detail. Details of the Model used and the input data used for modeling shall also be provided. The air quality contours should be plotted on a location map showing the location of project site, habitation nearby, sensitive receptors, if any. The windrose and isopleths should also be shown on the location map. The cumulative study should also include impacts on water, soil and socio-economics.	Cumulative impact of all sources of emission data are given in Section-4.3.4 of Chapter-4. The model used for GLC's prediction is AERMOD and its details are given in Section-4.3.4 of Chapter-4.
42	Radio activity and heavy metal contents of coal to be sourced shall be examined and submitted along with laboratory reports.	The certified copy of the values obtained for radioactive elements in coal from M/s Bhabha Atomic Research Centre and Heavy metal analysis from M/s Vimta Labs are given in Annexure 8 .
43	Fuel analysis shall be provided. Details of auxiliary fuel, if any, including its quantity, quality, storage etc should also be furnished.	Fuel quantity, quality, storage details are given in Chapter-2
44	Quantity of fuel required, its source and characteristics and documentary evidence to substantiate confirmed fuel linkage shall be furnished. The Ministry's Notification dated 02.01.2014 regarding ash content in coal shall be complied. For the expansion projects, the compliance of the existing units to the said Notification shall also be submitted	The quantity of coal required for the proposed project is 13.81 MTPA (50% domestic +50% imported) Source: 50% quantity of Domestic coal will be sourced from M/s SCCL and the balance 50% of coal will be from foreign origin. Accordingly an MOU is entered with M/s SCCL for supply of 50% domestic coal of G9 grade which has GCV of 4600 Kcal/Kg. With regard to imported coal M/s MSTC, a Government of India under taking has given consent for supply of required quantity and quality of imported coal. TSGENCO is in the process of entering long term MoU with M/s MSTC for supply of imported coal. The Coal analysis results are given in Table-2.6 of Chapter-2.
45	Details of transportation of fuel from the source (including port handling) to the proposed plant and its impact on ambient AAQ shall be suitably assessed and submitted. If transportation entails a long distance it shall be ensured that rail transportation to the site shall be first assessed. Wagon loading at source shall preferably be through silo/conveyor belt.	Fuel will be transported to plant site by rail and hence no impact on AAQ .



Annexure 2: TOR Letter and Compliance Statement

Sl. No.	ToR Points	Compliance Remarks
46	For proposals based on imported coal, inland transportation and port handling and rail movement shall be examined and details furnished. The approval of the Port and Rail Authorities shall be submitted.	Imported coal will be transported from nearest ports to plant site by Indian railways net work system. The issue regarding movement of both domestic and imported coal has been discussed with South Central Railways on 08.07.2015. S.C Railways informed TSGENCO that coal rakes both domestic and imported coal will be moved through the existing railway network. The minutes of SC Railways and TSGENCO in this regard are enclosed as Annexure 9. The existing infrastructural facilities at Kakinda/Krishnapatnam/Gangavaram port will be utilized for imported coal.
47	Details regarding infrastructure facilities such as sanitation, fuel, restrooms, medical facilities, safety during construction phase etc. to be provided to the labour force during construction as well as to the casual workers including truck drivers during operation phase should be adequately catered for and details furnished.	TSGENCO will provide infrastructure facilities such as sanitation, fuel, restrooms, medical facilities, safety during construction phase to work force and contract labour including truck drivers at required locations in the construction site. Dispensary will also be made available to all the construction workers and contract labourers during construction and operation stage supported by 24 hours ambulance facility. Regular health checkups will be carried out for all the workers once in six months.
48	EMP to mitigate the adverse impacts due to the project along with item - wise cost of its implementation in a time bound manner shall be specified.	The EMP along with the budgetary allocation for environmental protection measures is given in Chapter-6. TSGENCO proposes to invest about Rs. 2410 crores on pollution control and monitoring systems. In addition recurring cost, Rs. 65 crores per annum will be spent on pollution control activities and greenbelt development etc. The budgetary cost provision for environmental measures are given in Table-6.3 of Chapter-6
49	A Disaster Management Plan (DMP) along with risk assessment study including fire and explosion issues due to storage and use of fuel should be carried out. It should take into account the maximum inventory of storage at site at any point of time. The risk contours should be plotted on the plant layout map clearly showing which of the proposed activities would be affected in case of an accident taking place. Based on the same, proposed safeguard measures should be provided. Measures to guard against fire hazards should also be invariably provided. Mock drills shall be suitably carried out from time to time to check the efficiency of the plans drawn.	Section 7.7 of Chapter 7



Annexure 2: TOR Letter and Compliance Statement

Sl. No.	ToR Points	Compliance Remarks
50	The DMP so formulated shall include measures against likely Fires/Tsunami/Cyclones/Storm Surges/ Earthquakes etc, as applicable. It shall be ensured that DMP consists of both On-site and Off-site plans, complete with details of containing likely disaster and shall specifically mention personnel identified for the task. Smaller version of the plan for different possible disasters shall be prepared both in English and local languages and circulated widely.	Section 7.7 of Chapter 7
51	Detailed scheme for raising green belt of native species of appropriate width (50 to 100 m) and consisting of at least 3 tiers around plant boundary with tree density of 2000 to 2500 trees per ha with a good survival rate of around 80% shall be submitted. Photographic evidence must be created and submitted periodically including NRSA reports in case of expansion projects. A shrub layer beneath tree layer would serve as an effective sieve for dust and sink for CO ₂ and other gaseous pollutants and hence a stratified green belt should be developed.	The details of green belt development are given in Figure-4.26 of chapter-4.
52	Over and above the green belt, as carbon sink, plan for additional plantation shall be drawn by identifying blocks of degraded forests, in close consultation with the District Forests Department. In pursuance to this the project proponent shall formulate time bound Action Plans along with financial allocation and shall submit status of implementation to the Ministry every six months.	Details of green belt development in the proposed project area is given in Section-4.8 of Chapter-4
53	Corporate Environment Policy	
	Does the company has a well laid down Environment Policy approved by its Board of Directors? If so, it may be detailed in the EIA report.	TSGENCO Corporate environmental policy is given in Annexure 18 .
	Does the Environment Policy prescribe for standard operating process / procedures to bring into focus any infringement / deviation / violation of the environmental or forest norms / conditions? If so, it may be detailed in the EIA.	Yes
	What is the hierarchical system or Administrative order of the company to deal with the environmental issues and for ensuring compliance with the environmental clearance conditions. Details of this system may be given.	Yes
	Does the company has compliance management system in place wherein compliance status along with compliances / violations of environmental norms are reported to the CMD and the Board of Directors of the company and / or shareholders or stakeholders at large? This reporting mechanism should be detailed in the EIA report. All the above details should be adequately brought out in the EIA report and in the presentation to the Committee	Yes

Annexure 2: TOR Letter and Compliance Statement

Sl. No.	ToR Points	Compliance Remarks
54.	Details of litigation pending or otherwise with respect to project in any Court, Tribunal etc. shall invariably be furnished.	No litigation is pending

Source: EIA Report



Table 2: Additional TOR and Action Plan

S. No.	Recommendations	Action Plan
i.	The Tungapadu vagu should not be diverted but it should be preserved and protected, and enhanced it's flow.	Accepted. The Tungapadu Vagu will not be diverted and it will be maintained to it's original shape and section. The vagu will be strengthened by providing suitable size and section of earthen bunds on either side of the banks. Also, it's natural flow will be maintained by removing silt and any other blockages, etc, from the vagu within the plant premises. This will be done in consultation with the Irrigation Department, Govt. of Telangana.
ii.	The PP should leave a minimum of 100 m buffer on either side of the banks and this buffer should be developed into native forest .	Accepted. On either side of the banks of the vagu, a minimum of 100 m buffer will be left and the same will be developed into native forest with in the plant premises in coordination and guidance from the state forest department.
iii.	No effluent should be discharged into the rivulet or Krishna River.	Accepted. It is proposed to construct Effluent Treatment Plant with zero discharge concept duly providing recycling system and the treated water will be used for cooling tower makeup, greenbelt development, dust suppression system in coal storage yard and coal conveyors, floor wash etc within the power plant premises. Further ash water recovery system is also planned at the discharge point of the decanted water of the ash pond and the recovered water will be used for ashing purpose. Hence no plant effluents will be discharged into the rivulet or Krishna River.
iv.	In areas where the banks are breached, the breaches should be plugged and strengthened .	Accepted. Where ever the banks of the Tungapadu vagu are breached within the premises of the project area, they will be plugged and strengthened as recommended by the sub-committee in consultation with Irrigation Department.
v.	In areas where the river bed is silted/ partial blocked due to land slides, the blocks and the silt should be removed in a way that the original gradient is maintained .	Accepted. The stagnated silt and partial blockages due to any land slides will be removed at regular intervals and it's natural gradient will be maintained to have a free flow of water in the stream.
vi.	No water from the stream should be extracted	Accepted. No water from the stream will be extracted since the water required for the project is allocated from the Krishna River at 6.6 TMC per annum vide G.O.Ms No.13, Dt. 30-01-2015 of Irrigation & CAD (reforms) department , Govt. of Telangana.

Annexure 2: TOR Letter and Compliance Statement

S. No.	Recommendations	Action Plan
	To sustain the downstream ecology of the Tungapadu vagu, the irrigation department should release minimum ecological flows from the reservoirs constructed in the upstream.	The Irrigation Department will be informed duly enclosing the Sub-Committee's report and will be requested to take the necessary action for release of minimum ecological flows from the reservoirs constructed in the upstream.
vii.	The plateaus and their slopes with in the project area, which are not used for the project purpose, are highly degraded. These should be restored to their original natural forest eco system and should be used for the conservation of rare and endemic plants and animals found in the plateaus of project area. These forests not only serve as green belt to mitigate fugitive emissions, CO2 and other pollutants but also serve as a conservation area.	Multi tier plantation will be taken up on either side of the vagu and also on the slopes of the bunds within the project area in coordination with the local Forest Department. Further the PCCF, Telangana State will be addressed on the recommendations given by the subcommittee, EAC (T&C), MoEF&CC, New Delhi to restore the original natural forest ecosystem and for conservation of rare and endemic plants and animals found in the plateaus of the project area.
viii.	The reserve forest that demarcates the project boundary on the south is also highly degraded. These intact patch should be restored to it's original forest ecosystem and should be connected to the forest ecosystem of the project area and other reserve forest in the area. This would not only serve as buffer for the project but also acts as a corridor for wildlife and enhance stream flow. For this purpose the PP should provide grants to the state forest department and work should start within a reasonable time of 1-2 years after preparing a detailed site specific action plan.	TSGENCO has already deposited an amount of Rs.118.46 crores towards Net Present Value (NPV) of Forest Land diverted in favour of TSGENCO and Rs. 80.13 Crores towards maintaining the Compensatory Afforestation in CA land. Hence, the PCCF, Telangana State will be addressed duly enclosing the recommendations of the subcommittee, EAC (T&C), MoEF&CC, New Delhi to restore the original forest ecosystem in the leftover forest land on south side of the project area and also in other reserve forest in the area so as to act as corridor for wild life and enhance the stream flow.
ix.	The PP should create a permanent corpus fund for tribal welfare and also provide adequate compensation for the land losers irrespective of their status besides best possible R&R package and extending social welfare schemes and health care system for local communities.	The District Collector, Nalgonda has raised a demand note vide his letter dt. 02-12-2015 for deposition of an amount of Rs. 285.81 crores towards LA compensation, R&R benefits for Project Displaced Families & Project Affected Families, infrastructure and unforeseen items, etc., which is worked out as per LA and R&R Act, 2013. TSGENCO has deposited an amount of Rs. 285.81 Crores vide Lr. No. CE/C/Th/SE/C/TCD-I/F. No.259/2015-16, Dt. 04.01.2016 (Copy enclosed). Further, an amount of Rs 100.4 Crores budget for implementing CSR activities is provided in project cost towards taking up of development activities in surrounding villages of project.

Annexure 2: TOR Letter and Compliance Statement

S. No.	Recommendations	Action Plan
x.	Cumulative impact assessment of air, water, soil and socio-economics should be carried out in view of a number of cement plants already established/operating in the vicinity of the proposed plant.	The cumulative impact assessment of air, water, soil and socio-economics is carried out duly considering all the industries located in study area (Cement Industries) and the same is provided in the Section 4.3 of Chapter 4 of the EIA report.
xi.	As agreed by the PP, the area for ash pond shall be minimized by shifting it towards North. Further, a minimum distance of 500 m buffer shall be maintained between the proposed ash pond and Tungapadu Vagu. The buffer shall be developed into thick green belt/natural forest.	Accepted. The location of ashpond is shifted 500 m away from Tungapadu vagu and the area is also reduced from 485 Acres to 400 Acres as per the optimum requirement. Further, the left over space between Thungapadu vagu and ash pond will be developed with green belt with the guidance of forest department and it will be maintained at the cost of TSGENCO.
xii.	As agreed, the impervious lining for the ash pond shall be over and above the clay lining.	HDPE film will be provided over the clay lining as per design standards.
xiii.		
xiv.		

4.	General Points	
i	Is the project intended to have CDM-intent	Yes
	If Yes, then (a) Has PIN (Project Idea Note) [or PCN (Project Concept Note)] submitted to the NCA (National CDM Authority) in the MoE&F	Yet to be prepared
	If not, then by when is that expected	6 months
	Has PDD (Project Design Document) been prepared	No
	What is the Carbon intensity from your electricity generation projected (i.e CO ₂ Tons/MWH or Kg/KWH)	0.885 CO ₂ Tons/MWh



Annexure 2: TOR Letter and Compliance Statement

	Amount of CO ₂ in Tons/year expected to be reduced from the baseline data available on the CEA	3,47,936 tCO ₂ /annum (Baseline emission factor is 0.944 tCO ₂ /MWh)



Annexure 3
Forest Clearance Letter and Payment

P. No. 8-07/2015-FC
Government of India
Ministry of Environment, Forests & Climate Change
(FC Section)

Indira Paryavaran Bhawan
Aliganj, Jor Bagh Road
New Delhi 110003
Dated: 7th July, 2015

To
The Principal Secretary (Forest)
Government of Telangana,
Hyderabad.

Subj: Diversion of 1,892.35 ha (4334.01 ha proposed originally) of forest land in favour of TSGENCO for the establishment of Coal Based Thermal Power Station of capacity 4400 MW at Veerlapalem (V) and 2400 MW at Dilawarpur (V) of Dameracherla (M), in Nalgonda District in the State of Telangana.

Sir,

I am directed to refer to the State Government of Telangana's 0063/FOR.I (1)/2014-1 dated 29th January, 2015 on the subject mentioned above seeking prior approval of the Central Government under section-2 of the Forest (Conservation) Act, 1980 and letter no. 0063/FOR.I (1)/2014-2 dated 16.04.2015 forwarding additional information as sought by the Ministry vide its letter of even number dated 9.04.02015. After careful consideration of the proposal by the Forest Advisory Committee constituted by the Central Government under section 3 of the said Act, "in-principle" approval to the proposal was granted vide this Ministry's letter of even number dated 27th April 2015 subject to fulfillment of certain conditions prescribed therein. The State Government has furnished compliance report in respect of the conditions stipulated in the in-principle approval and has requested the Central Government to grant final approval.

In this connection, I am directed to say that on the basis of the compliance report furnished by the State Government of Telangana vide their letter no. 63/FOR.I (1)/2015 dated 21.05.2015 and letter no. 63/For.I(1)/2015-4 dated 20.06.2015, final approval of the Central Government is hereby granted for diversion of 1,892.35 ha (4334.01 ha proposed originally) of forest land in favour of TSGENCO for the establishment of Coal Based Thermal Power Station of capacity 4400 MW at Veerlapalem (V) and 2400 MW at Dilawarpur (V) of Dameracherla (M), in Nalgonda District in the State of Telangana subject to fulfillment of the following conditions:

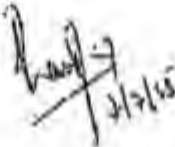
- (i) Legal status of the diverted forest land shall remain unchanged;
- (ii) Compensatory afforestation over the non-forest land, equal in extent to the forest land being diverted, shall be raised and maintained by the State Forest Department from the funds already provided by the User Agency;
- (iii) The non-forest land transferred and mutated in favour of the State Forest Department shall be notified by the State Government as RF under Section-4 or PF under Section-29 of the Indian Forest Act, 1927 or under the relevant section(s) of the local Forest Act, latest within a period of six months from the date of issue of Stage-II approval. The

Annexure 3
Forest Clearance Letter and Payment

- (iv) The User Agency shall pay the additional amount of NPV, if so determined, as per the final decision of the Hon'ble Supreme Court of India;
- (v) The User Agency shall obtain the Environment Clearance as per the provisions of the Environmental (Protection) Act, 1986, if required;
- (vi) The User Agency shall ensure that ash disposal is carried out as per the detailed plan prepared for the purpose, and in accordance with all environmental safeguards.
- (vii) Following activities shall be undertaken by the user agency under the supervision of the State Forest Department at the project cost:
 - a. Mitigative measures to minimize the soil erosion and choking of streams, as per approved plan, shall be implemented.
 - b. Planting of adequate drought hardy plant species and sowing of seeds to arrest soil erosion.
 - c. Construction of check dams, retention/toe walls to arrest sliding down of the excavated material along the contour.
- (viii) Wherever possible and technically feasible, the User Agency shall undertake by involving local community, the afforestation measures in the blanks within the project area being diverted under this approval, in consultation with the State Forest Department at the project cost.
- (ix) The user agency shall take all measures to prevent pollution by effluents, particulate matters etc at the project cost.
- (x) The user agency shall develop a green belt along the power station and also along the water pipe line/channel
- (xi) The forest clearance to the project is accorded without any guarantee on coal linkages.
- (xii) No residential area shall be built on forest land diverted.
- (xiii) No labour camp shall be established on the forest land;
- (xiv) The User Agency shall provide fuels, preferably alternate fuels, to the labourers and the staff working at the site so as to avoid any damage and pressure on the nearby forest areas;
- (xv) The boundary of the diverted forest land shall be demarcated on ground at the project cost, by erecting four feet high reinforced cement concrete pillars, each inscribed with its serial number, forward and back bearing and distance from pillar to pillar;
- (xvi) The layout plan of the proposal shall not be changed without the prior approval of the Central Government;
- (xvii) The forest area to be diverted may not be used for any other purpose than the power plant.

Annexure 3
Forest Clearance Letter and Payment

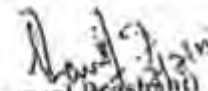
- (vi) Following conditions shall be complied with:
- State Forest Department at the project site shall ensure the following:
- a. Mitigative measures to minimize the soil erosion and choking of streams as per approved plan, shall be implemented.
 - b. Planting of adequate drought hardy plant species and sowing of seeds to arrest soil erosion.
 - c. Construction of check dams, retention/toe walls to arrest sliding down of the excavated material along the contour.
- (vii) Wherever possible and technically feasible, the User Agency shall undertake by involving local community, the afforestation measures in the blanks within the project area being diverted under this approval, in consultation with the State Forest Department at the project cost.
- (ix) The user agency shall take all measures to prevent pollution by effluents, particulate matters etc at the project cost.
- (x) The user agency shall develop a green belt along the power station and also along the water pipe line/channel.
- (xi) The forest clearance to the project is accorded without any guarantee on coal linkages.
- (xii) No residential area shall be built on forest land diverted.
- (xiii) No labour camp shall be established on the forest land;
- (xiv) The User Agency shall provide fuels, preferably alternate fuels, to the labourers and the staff working at the site so as to avoid any damage and pressure on the nearby forest areas;
- (xv) The boundary of the diverted forest land shall be demarcated on ground at the project cost, by erecting four feet high reinforced cement concrete pillars, each inscribed with its serial number, forward and back bearing and distance from pillar to pillar;
- (xvi) The layout plan of the proposal shall not be changed without the prior approval of the Central Government;
- (xvii) The forest area to be diverted may not be used for any other purpose than the power plant proposed;
- (xviii) The forest land shall not be used for any purpose other than that specified in the proposal;
- (xix) The forest land proposed to be diverted shall under no circumstances be transferred to any other agency, department or person without prior approval of the Central Government;
- (xx) No damage to the flora and fauna of the adjoining area shall be caused;


21/2/15

Annexure 3
Forest Clearance Letter and Payment

- (xxi) Any tree felling shall be done only when it is unavoidable and that too under strict supervision of the State Forest Department;
- (xxii) The user agency in consultation with the State Government shall create and maintain alternate habitat/home for the avifauna, whose nesting trees are to be cleared in this project. Bird's nests artificially made out of eco-friendly material shall be used in the area, including forest area and human settlements, adjoining the forest area being diverted for the project;
- (xxiii) The user agency shall submit the annual self compliance report in respect of the above conditions to the State Government and to the concerned Regional Office of the Ministry regularly.
- (xxiv) Any other condition that the concerned Regional Office of this Ministry may stipulate, from time to time, in the interest of conservation, protection and development of forests & wildlife, and
- (xxv) The User Agency and the State Government shall ensure strict compliance of all conditions for which undertakings have been obtained from the User Agency and also compliance to provisions of the all Acts, Rules, Regulations and Guidelines, for the time being in force, as applicable to the project.

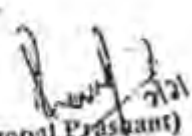
Yours faithfully,


(Rajagopal Prashant)

Assistant Inspector General of Forest (FC)

Copy to:

1. The Principal Chief Conservator of Forests, Government of Telangana, Hyderabad.
2. The Addl. PCCF (Central), Regional Office, Chennai.
3. The Nodal Officer (FCA), O/o the PCCF, Government of Telangana, Hyderabad.
4. User Agency for Information.
5. Monitoring Cell, FC Division, MOEF&CC, New Delhi.
6. Guard File


(Rajagopal Prashant)

Assistant Inspector General of Forest (FC)

Annexure 3
Forest Clearance Letter and Payment

GOVERNMENT OF TELANGANA
ENVIRONMENT, FORESTS, SCIENCE AND TECHNOLOGY (For.) DEPARTMENT

Letter No.0063/FOR.I(1)/2014-1

Dated: 29.01.2015

From:

The Prl. Secretary to Govt.,
Environment, Forests, Science & Technology Dept.,
Telangana State Secretariat,
Hyderabad.

To

The Secretary to Govt. of India,
Ministry of Environment & Forests,
Paryavaran Bhavan, CGO Complex, Lodhi Road,
NEW DELHI - 110 003 (w.e.)

Sir,

Sub: Forest (Conservation) Act - diversion of 4334.01 ha of forest land for the "proposed Damercherla Coal Based Thermal Power Station of capacity 4400 MW at Veerlapalem (V), and 2400 MW at Dilwarpur (V) of Damercherla (M), Nalgonda Dist, Telangana State in favour of TSGENCO - Furnishing of statutory proposals in duplicate for approval of Govt - Reg.

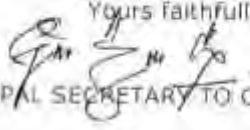
Ref: From the Prl. CCF, Telangana, Hyderabad Ref. No. 11064/2014/ FCA-3, Dated. 16.01.2015.

I am directed to enclose a copy of the letter cited together with statutory proposal with necessary enclosures, in duplicate, under Forest (Conservation) Act, 1980, submitted by the Principal Chief Conservator of Forests, Telangana State, Hyderabad, for diversion of 4334.01 ha of forest land for the proposed Damercherla Coal Based Thermal Power Station of capacity 4400 MW at Veerlapalem (V), and 2400 MW at Dilwarpur (V) of Damercherla (M), Nalgonda Dist, Telangana State in favour of Telangana State Power Generation Corporation Limited (TSGENCO).

2. I am to inform that the power demand in Telangana State is increasing rapidly, and there is huge gap between the demand and the supply. To meet the power demand, Telangana State is proposing capacity additions by establishing a Coal Based Thermal Power Station of 4400 MW capacity at Veerlapalem (V), and 2400 MW capacity at Dilwarpur (V) of Damercherla (M), Nalgonda Dist. The proposed power plant is essentially require to meet the ever increase power demand of the state and also for future development of the State.

3. I am, therefore, to request you to obtain and communicate the approval of Government of India for the proposal in para 1 above, under Forest (Conservation) Act, 1980, at an early date.

Yours faithfully,


For PRINCIPAL SECRETARY TO GOVERNMENT

Copy to:

The Principal Chief Conservator of Forests, TS, Hyderabad
The CMD, GENCO, Telangana, Hyderabad. (User Agency)
The Energy (Budget) Department.

Annexure 3
Forest Clearance Letter and Payment

A. AJAY, B.Tech, F.I.E
Chief Engineer/ Civil / Thermal



**TELANGANA STATE
POWER GENERATION CORPORATION LTD.**
(A Govt. of Telangana State Undertaking)
Vidyut Soudha, Khairatabad, Hyderabad-500 082.
Off : 040-23499417, Fax : 040-23499418
Res : 040-23050516, Cell : 8333820516
Email: cecthermal2@yahoo.com
aindala_ajay@yahoo.com
Website: www.tsgenco.telangana.gov.in

To,
The Divisional Forest Officer,
SFS, Nalgonda.

Lr.No:CE/C/Thermal/SE/C/TCD-I /F. Forest land/D.No. 58 /15, Dt. 16.05.2015

Sir,

Sub: TSGENCO- Diversion of 1892.35 Ha (4334.01 Ha proposed originally) of forest land in favour TSGENCO for establishment of Proposed Coal based thermal power station of capacity 6800 MW at Veerlapalem (v), Dameracherla Mandal, Nalgonda District, Telangana State"- Condition wise Compliance Report for the Conditions stipulated in the Letter F. No.8-07/2015-FC, dated. 27.04.2015 of MoEF&CC, GOI, New Delhi - Furnished- Reg.

- Ref: 1. Lr.No:CE/C/Thermal/SE/C/TCD-I /F. Forest land/D.No.105/14,
Dt. 12.01.2015
2. Lr.No. F. No.8-07/2015-FC, dated. 27.04.2015 of MoEF&CC, GOI, New Delhi
3. Lr. R.C No. 11064/2014/FCA-3, Dt. 28.04.2015 of Pril. Chief Conservator of Forests (I/C), Head of Forest Force, Telangana State addressed to DFO, Nalgonda and copy marked to the Dist Collector, Nalgonda.
4. Lr. No. R.C. No. 6296/2014/S5, dt. 29.04.2015 of DFO, Nalgonda
5. Lr. No. R.C. No. 6296/2014/S5, dt. 28.04.2015 of DFO, Nalgonda

With reference your letter 4th cited, the condition wise Compliance Report for the Conditions stipulated in the Letter F. No.8-07/2015-FC, dated. 27.04.2015 of MoEF&CC, GOI, New Delhi in connection with the "in principle" approval accorded for diversion of 1892.35 Ha (4334.01 Ha proposed originally) of forest land in favour of TSGENCO under Veerlapalem forest block, Dameracherla Mandal, Nalgonda Dist. for establishment of 6800 MW coal based thermal power plant along with following documents in six (6) sets each are submitted herewith.

Contd...p-2

Annexure 3
Forest Clearance Letter and Payment

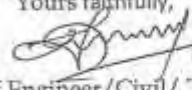
-2-

1. Undertaking for various conditions- six (6) sets.
2. Mutation Certificates(Pahanies) and other documents such as sketches, village maps and panchanamas of the non forest CA lands in original along with their copies in six (6) sets as handed over by the District Collector, Nalgonda.
3. Drawings pertaining to CA land marked in Survey of India topo sheet of 1:50000 scale- six (6) sets.
4. Copy of Water allocation orders vide G.O. Ms. No. 13, dt. 30.01.2015-six(6) sets.

Further, an amount of Rs. 80.13053 Crores towards raising and maintaining compensatory afforestation in CA lands and Rs. 118.46111 Crores towards Net Present Value (NPV) of Forest land to an extent of 1892.35 Ha totaling to Rs. 198.59164 Crores was deposited in the Account of Telangana Compensatory Afforestation Fund/ Telangana State Compensatory Afforestation Fund Managment & Planning Authority (CAMPA) on 02.05.2015 through RTGS as per the demand note raised vide letter 5th cited.

In view of the above, it is requested to arrange to accord Stage - II clearance (final approval) for diversion of above forest land in favour of TSGENCO immediately under Section - 2 of the Forest (Conservation) Act., 1980.

Encl:- As above

Yours faithfully,

16/5/2015
Chief Engineer/Civil/ Thermal

Copy to:

- 1) The Principal Chief Conservator of Forests (HoFF), Hyderabad, Telangana State.
- 2) The Conservator of Forest, Hyderabad, Telangana State.
- 3) The District Collector, Nalgonda.
- 4) The DII/Tech to the Chairman & Managing Director/TSGENCO/Vidyut Soudha/Hyd
- 5) The Revenue Divisional Officer, Miryalaguda Division, Nalgonda.
- 6) The A.S. to the Director/Projects/TSGENCO/Vidyut Soudha/Hyderabad

Annexure 3
Forest Clearance Letter and Payment

...tion for the

✓

TELANGANA STATE POWER GENERATION CORPORATION LIMITED

From To

The Senior Accounts Officer,
Banking and Resources
TSGENCO., Vidyut Soudha,
Hyderabad.

The Chief Manager,
State Bank of Hyderabad,
Gunfoundry,
Hyderabad.

Lr.No.FA&CCA/DyCCA(Res)/SAO(B&R)/D.NO. 86 /15, dated 02.05.2015

Sir,

Sub:- TSGENCO – Transfer of funds through RTGS – Request – Reg.

Ref:- TSGENCO - CC Account Number: 62348690735

:: :: ::

It is requested to debit an amount of Rs. 198,59,16,400=00 (Rupees one hundred ninety eight crores fifty nine lakhs sixteen thousand and four hundred only) from TSGENCO Ce Account No: 62348690735 maintained at State Bank of Hyderabad, Gunfoundry Branch, Hyderabad and remit the same to Corporation Bank, CGO complex, Lodhi Road, New Delhi – 110 003. The details of the account are as under:

Name of the Beneficiary: Telangana Compensatory Afforestation Fund /
Telanagana State Compensatory Afforestation
Fund Management & Planning Authority (CAMPA)

Beneficiary Bank : Corporation Bank, CGO complex, Lodhi Road,
New Delhi – 110 003.

Account Number : **037100101029963**

Bank's IFSC Code : **CORP 0000371**

Yours faithfully,


Senior Accounts Officer
Banking and Resources.





Forest Clearance Letter and Payment

TELANGANA STATE POWER GENERATION CORPORATION LIMITED

From:
The Chief Engineer/ Civil,
Thermal, TSGENCO,
Vidyut Soudha, Hyderabad

To:
The District Collector,
Nalgonda District

Lr.No.CE/C/Thermal/TSGENCO/SE/TCDD-I/F.YTPS /D.No.259/2015-16, Dt.04.01.2016.

Sir,

Sub: TSGENCO – Yadadri Thermal Power Station (5x800 MW) at Veerlapalem (V), Damacherla (M) in Nalgonda Dist. Deposition of an amount of Rs. 285.81 Crores (Rupees Two Hundred Eighty Five Crores Eighty One Lakhs Only) towards Land compensation, R&R package and other charges – Reg

Ref: 1) Lr. No. CE/C/Thermal/SE/C/TCD-L/F. Putta Land/D. No. 96/15, Dt. 09.07.2015
2) Lr.No.G1/R&R/4680/2015 Dt. 02.12.2015 from District Collector, Nalgonda

◆◆◆◆◆

With reference to your letter 2nd cited, please find herein enclosed Cheque No. 863136, Dt. 04.01.2016 of State Bank of Hyderabad, Vidyut Soudha, Hyderabad for Rs. 285.81 Crores (Rupees Two Hundred Eighty Five Crores Eigthy One Lakhs Only) towards Land compensation, R&R package and other charges.

In view of the above, it is requested, please arrange to handover the patta lands and ROFR lands as requisitioned in this office letter 1st cited for going ahead with the project construction works.

The receipt of above cheque may please be acknowledged.

Encl: A/a

Yours faithfully,

09/01/2016
Chief Engineer/Civil/Thermal

Copy to:

- 1) The Commissioner, Rehabilitation & Resettlement, Hyderabad.
- 2) The Joint Collector, Nalgonda.
- 3) The Revenue Divisional Officer, Miryalaguda Division, Nalgonda
- 4) The SE/Tech to the Chairman & Managing Director/TSGENCO/Vidut Soudha/Hyd
- 5) The A.S. to the Director/Projects/TSGENCO/Vidut Soudha/Hyderabad
- 6) The FA&CCA /TSGENCO/Vidut Soudha/Hyderabad

[Handwritten notes:]

o/c
Received - Longinty
Ch. No 263136 dt
4.01.2016. Rn-285-21
Crossed S. Shuruk
C.S. Suresh
Deputy Tahasildar (H.A.)
Collectorate, Nalgonda.

(H) T A 49 (ee)(dki)-tail-of-blommed-Letter-13-CAD.doc



Annexure 3
Forest Clearance Letter and Payment



Annexure 4
Land Acquisition Details from Revenue Department

GOVERNMENT OF TELANGANA
REVENUE DEPARTMENT

From
B. Kishan Rao, M.Com.,
Revenue Divisional Officer,
Miryalaguda.

To
The Chief Engineer/Civil/Thermal
TSGENCO, Vidyut Soudha,
HYDERABAD - 500 082.

Lr No. E/1698/2015.

Date : 10-06-2015.

Sir,

Sub: TSGENCO - Diversion of forest land in favour of TSGENCO for establishment of Thermal Power Plant of capacity 4000 MW at Veerlapalem (V) Damaracherla Mandal, Nalgonda District, Telangana State - Acquisition of Patta / Government / Udafa etc lands fallen within the forest boundaries - Details of Survey Nos - survey expenditure details for reimbursement - submitted - Reg.

Ref: 1) The Chief Engineer, Civil, Thermal, TSGENCO, Vidyut Soudha, Hyderabad Lr No. CE/C/Thermal/SE/C/TCD-I/F.Forest Land/D.No.43/15, Date: 06.05.2015.
2) The District Collector, Nalgonda Procs No. A1/20/14, Dated: 28.12.14.
3) The Revenue Divisional Officer, Miryalaguda Procs No. A/3382/14, Dated: 23.12.14.
4) The Revenue Divisional Officer, Miryalaguda Procs No. A/3385/2014, Dated: 09.05.15.

I invite your attention to the reference cited and to inform that as per the instruction of the District Collector, Nalgonda the forest lands survey in Veerlapalem and other forest blocks of Damaracherla Mandal have been conducted with the (22) teams consisting of Tahsildars, Dy. Inspector of Survey, Surveyors, Village Revenue Officers along with Forest beat officers from 26.12.2014 to 03.01.2015 and as per the requisition submitted by Chief Engineer, TSGENCO vide reference 1st cited, the teams consisting of (3) Dy Inspectors of Survey (6) Surveyors, AE GENCO, Concerned VROs are deputed for conducting survey and subdivision of DForm lands/ Patta Lands / Udafa Lands/ Government Lands falls within the perview of Veerlapalem Forest block. Apart from this (1) another team i.e. Tahsildar, Deputy Tahsildar, Dy.SO, Dy.EE R&B), AE (R&B) (2) ASOs are deputed for conduct of Socio ECONomic Survey of effected families of Mudugulakunta and Kapura Thandas of Veerlapalem Village from 12.05.2015 to 18.05.2015, after completion of survey and sub-division work the following lands are coming under acquisition for establishment of Thermal Power Plant at Veerlapalem.

ABSTRACT								
Sl No	Name of the Village	Nature of Land						Total (Ac. Sq)
		Patta	D Form Patta	Udafa Patta	Udafa Kharaj Khata	Udafa Inam	Government Land (Assigned)	
1	Thimmapur	0 00	0 00	0 00	33 26	0 00	0 00	33 26
2	Kallepalli	0 00	0 00	56 30	25 01	10 23	0 00	92 14
3	Kothapally	0 00	0 00	33 21	19 00	0 00	0 00	52 21
4	TV Gudern	0 00	0 00	0 00	9 10	0 00	0 00	9 10
5	Veerlapalem	192 37	153 10	125 11	83 30	0 00	120 09	554 17
Total		192 37	153 10	215 22	180 27	10 23	120 09	771 08

Annexure 4
Land Acquisition Details from Revenue Department

ABSTRACT								
Sl No	Name of the Village	Nature of Land						Total
		Patta	D Form Patta	Udafa Patta	Udafa Kharaj Khata	Udafa Inam	Government Land	
1	Thimmapur	0.00	0.00	0.00	33.26	0.00	0.00	33.26
2	Kallapalli	0.00	0.00	56.30	25.01	10.23	0.00	92.14
3	Kothapally	0.00	0.00	33.21	19.00	0.00	0.00	52.21
4	TV Gudem	0.00	0.00	0.00	9.10	0.00	0.00	9.10
5	Veerlapalem	192.37	159.10	125.11	93.30	0.00	120.09	691.17
	Total	192.37	159.10	215.22	86.37	10.23	213.39	879.08

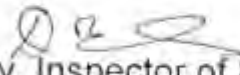

Dy. Inspector of Survey,
Miryalaguda

AREA STATEMENT OF UDAFA GOVT LANDS OF THIMMAPUR VILLAGE OF DAMARACHERLA MANDAL, NALGONDA DISTRICT			
Sl N	Sy No	Extent	Remarks
1	1	2.08	Kharaj Khata
2	2	7.36	Kharaj Khata
3	3	10.28	Kharaj Khata
4	4	5.13	Kharaj Khata
5	5	7.21	Kharaj Khata
TOTAL :-		33.26	


Dy. Inspector of Survey
Miryalaguda

Annexure 4
Land Acquisition Details from Revenue Department

AREA STATEMENT OF UDAFA PATTI LANDS OF KALLEPALLI VILLAGE OF DAMARACHERLA MANDAL, NALGONDA DISTRICT			
Sl N	Sy No	Extent	Remarks
1	7	8.39	Patta
2	8	4.04	Patta
3	9	6.18	Sarkari
4	10	7.28	Sarkari
5	11	1.33	Patta
6	12	3.24	Patta
7	13	10.35	Sarkari Kharaj Khata
8	14	3.02	Patta
9	15	1.03	Patta
10	16	1.05	Patta
11	17	0.24	Patta
12	18	1.39	Patta
13	19	4.21	Patta
14	20	4.23	Patta
15	21	7.16	Patta
16	22	9.00	Patta
17	23	10.23	Inam Sethsindhi
18	24	4.37	Patta
TOTAL :-		92.14	


Dy. Inspector of Survey
Miryalaguda

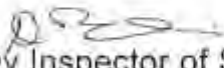
Annexure 4
Land Acquisition Details from Revenue Department

AREA STATEMENT OF UDAFA PATTA LANDS OF KOTHAPALLI VILLAGE OF DAMARACHERLA MANDAL, NALGONDA DISTRICT			
SI N	Sy No	Extent	Remarks
1	1	8.31	Patta
2	2	1.04	Patta
3	3	1.24	Patta
4	4	0.30	Patta
5	5	1.13	Patta
6	6	2.04	Patta
7	7	0.34	Patta
8	8	1.30	Patta
9	9	1.18	Patta
10	10	1.24	Patta
11	11	1.11	Patta
12	12	1.17	Patta
13	13	1.12	Patta
14	14	1.15	Patta
15	15	0.29	Patta
16	16	0.15	Patta
17	17	1.29	Kharaj Khata
18	18	2.39	Patta
19	19	2.02	Kharaj Khata
20	20	2.31	Patta
21	21	0.34	Kharaj Khata
22	23	1.18	Kharaj Khata
23	24	6.07	Kharaj Khata
24	25	6.30	Kharaj Khata
TOTAL :-		52.21	


Dy. Inspector of Survey
Miryalaguda

Annexure 4
Land Acquisition Details from Revenue Department

AREA STATEMENT OF UDAFA PATTA LANDS OF THALLA VEERAPPA GUEDEM VILLAGE OF DAMARACHERLA MANDAL, NALGONDA DISTRICT			
SI No	Sy No	Extent	Remarks
1	3	5.29	Udafa Kharajkhata
2	4	3.21	Udafa Kharajkhata
TOTAL :-		9.10	


Dy Inspector of Survey
Miryalaguda

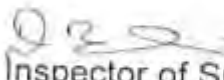
Annexure 4
Land Acquisition Details from Revenue Department

AREA STATEMENT OF PATTI LANDS OF VEERLAPALEM VILLAGE OF DAMARACHERLA MANDAL, NALGONDA DISTRICT			
Sl N	Sy No	Extent	Remarks
1	66	6.20	Patta
2	67	6.25	Patta
3	68	5.32	Patta
4	69	1.06	Patta
5	70	10.15	Patta
6	71	3.34	Kharaj Khata
7	72	6.07	Patta
8	73	13.00	Patta
9	74	7.29	Patta
10	75	7.35	Patta
11	77	4.00	Patta
12	78	14.00	Patta
13	79	6.27	Patta
14	81	3.30	Patta
15	82	8.06	Patta
16	83	11.04	Patta
17	84	5.12	Patta
18	85	7.20	Patta
19	86	8.23	Patta
20	87	5.23	Patta
21	88	11.06	Patta
22	89	21.20	Patta
23	91	2.05	Patta
24	93	6.24	Patta
25	94	2.27	Patta
26	95	9.01	Patta
	Total :-	196.31	


Dy. Inspector of Survey
Miryalaguda

Annexure 4
Land Acquisition Details from Revenue Department

AREA STATEMENT OF GOVERNMENT LANDS OF VEERLAPALEM VILLAGE OF DAMARACHERLA MANDAL, NALGONDA DISTRICT			
SI N	Sy No	Extent	Remarks
1	76	13.12	Kharaj Khata
2	80	1.35	Kharaj Khata
3	90	98.20	Poramboke
4	92	2.28	Kharaj Khata
TOTAL :-		116.15	


Dy. Inspector of Survey
Miryalaguda

AREA STATEMENT OF D FORM PATTAS OF VEERLAPALEM VILLAGE OF DAMARACHERLA MANDAL, NALGONDA DISTRICT			
SI N	Sy No	Extent	Remarks
1	90	10.00	D Form Patta
2	96	149.10	D Form Patta
TOTAL :-		159.10	


Dy. Inspector of Survey
Miryalaguda

Annexure 4
Land Acquisition Details from Revenue Department

AREA STATEMENT OF UDAFA PATTA LANDS OF VEERLAPALEM VILLAGE OF DAMARACHERLA MANDAL			
Sl N	Sy No	Extent	Remarks
1	1	3.23	Patta
2	2	2.07	Patta
3	3	5.16	Kharaj Khata
4	4	2.25	Kharaj Khata
5	5	7.22	Kharaj Khata
6	6	5.24	Kharaj Khata
7	7	4.08	Kharaj Khata
8	8	5.01	Kharaj Khata
9	9	4.27	Kharaj Khata
10	10	0.20	Kharaj Khata
11	11	1.29	Patta
12	12	3.33	Patta
13	13	8.13	Patta
14	14	2.24	Kharaj Khata
15	15	5.00	Kharaj Khata
16	16	3.01	Kharaj Khata
17	17	5.17	Patta
18	18	3.05	Kharaj Khata
19	19	8.04	Patta
20	20	5.12	Patta
21	21	3.09	Patta
22	22	4.06	Patta
23	23	2.32	Kharaj Khata
24	24	3.39	Patta
25	25	1.02	Kharaj Khata
26	26	1.13	Kharaj Khata
27	27	1.17	Patta
28	28	8.21	Kharaj Khata
29	29	14.06	Kharaj Khata
30	30	3.15	Patta
31	31	5.04	Patta
32	32	11.28	Kharaj Khata
33	33	4.35	Kharaj Khata
34	34	5.24	Patta
35	35	13.24	Patta
36	36	3.21	Patta
37	37	9.37	Patta
38	38	14.10	Patta
39	39	3.14	Patta
40	40	4.23	Patta
41	41	10.30	Patta
TOTAL -		219.01	

Dy Inspector of Survey



Annexure 5
Details of High Flood Level of River Krishna

BY HAND

फोन/Phone: 040-23308641 फैक्स/Fax: 040-23308642

भारत सरकार/Government of India
केंद्रीय जल आयोग/Central Water Commission
कृष्णा एवं गोदावरी बेसिन संगठन/Krishna & Godavari Basin Organisation
मुख्य अभियंता कार्यालय/Office of the Chief Engineer
232, कृष्णा गोदावरी भवन/Krishna Godavari Bhavan
11-4-648, ए सी गार्ड/A C Guard,
हैदराबाद/Hyderabad - 500 004.

संख्या.45/2/1/2012/RDC/CE (KGB)/AP/ १६१३ - ६१३ दिनांक: 2 MAR 2015

सेवा में
The Chief Engineer (Civil/Thermal),
TSTGENCO,
Vidyuth Soudha,
Khairathabad,
Hyderabad-500 082

विषय:TSGENCO-Establishment of 4400MW Thermal Power Plant at Veerlapalem (V)
Dameracherla (M), Nalgonda District-HFL of river Krishna near
Mudimanikyam village of Dameracherla Mandal-reg.

संदर्भ: LetterNo.NIL Dated: 26.02.2015

महोदय,

With reference to the letter cited above, we are in receipt of Bankers Cheque bearing No. 057163 dated 26.02.2015 for Rs 50/- towards media charges for supply of HFL data and daily discharge data of river Krishna at site Pondugala since inception to closure of site (from 13.11.1975 to 10.05.2007.

The data is here with sent in CD for your information.

संलग्नक:संशोधन

भण्डारी,
डा. कृष्णा राव
(ए. कृष्णा राव)
उप निदेशक

Copy to:
The Executive Engineer, LGD, CWC, Hyderabad along with DD bearing No. 057163 dated 26.02.2015 for Rs 50/-.The receipt of the demand draft may be acknowledged.

Chief Engineer/Civil/Thermal
TSGENCO
INWARD No 2360
04 MAR 2015
SE/CD-I ✓ SE/CD-II ✓
AEE+Tech ✓ CE/CD-I ✓

10/3/15
R-3
4/3
SE/CD-I
H
5/3/15

(ए. कृष्णा राव)
उप निदेशक

Annexure 5
Details of High Flood Level of River Krishna



Annexure 5

Details of High Flood Level of River Krishna

Annual Highest Flood Level for the period 1975-2007

Station Code : AK000E7 (Pondugala) Division: Lower Krishna Divn., Hyderabad
 Local River : Krishna Sub-Division: Lower Krishna SD 1, N.S.Dam
 YEAR WISE HFL OBSERVED AT SITE PONDUGALA Site Location

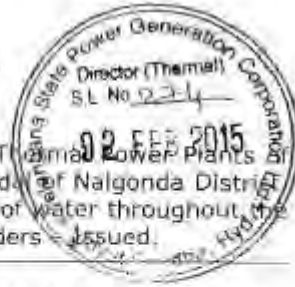
Year	Highest Flood Level (m)	Date
1975	47.374	11/14/1975
1976	55.074	8/10/1976
1977	51.779	8/1/1977
1978	56.914	10/1/1978
1979	56.254	9/30/1979
1980	55.424	7/13/1980
1981	53.914	9/24/1981
1982	51.154	8/23/1982
1983	56.054	8/29/1983
1984	52.434	10/30/1984
1985	45.894	8/20/1985
1986	45.694	8/12/1986
1987	46.984	11/4/1987
1988	55.354	9/29/1988
1989	55.354	9/28/1989
1990	54.984	8/24/1990
1991	54.854	8/2/1991
1992	50.334	9/11/1992
1993	54.734	10/11/1993
1994	55.784	7/23/1994
1995	45.534	10/18/1995
1996	56.634	10/3/1996
1997	60.334	3/6/1997
1998	60.934	10/15/1998
1999	60.334	3/5/1999
2000	51.284	8/23/2000
2001	49.484	9/30/2001
2002	45.314	10/5/2002
2003	44.284	8/22/2003
2004	45.804	10/4/2004
2005	56.994	8/7/2005
2006	56.534	8/16/2006

HFL

Annexure 6
Copy of Water Allocation letter from I & CAD Department

GOVERNMENT OF TELANGANA
ABSTRACT

I & CAD Department - TSGENCO - Establishment of Thermal Power Plants of 5200 MW at Veerlapalem village of Dameracherla Mandal of Nalgonda District, TS - Allocation of 208 Cusecs (i.e. 6.60 TMC per year) of water throughout the year from River Krishna - Permission - Accorded - Orders - Issued.



IRRIGATION AND CAD (REFORMS) DEPARTMENT

G.O.Ms.No. 13

Dated: 30-01-2015

Read the following:



1. From the Chairman & Managing Director, TSGENCO, Hyd., Lr.No. CMD/ CE/C/Ther./TS GENCO/F./ D.No. 81/14, dt. 27.12.2014.
2. Govt. Memo.No. 94/Reforms/A2/2015, Dated: 07.01.2015.
3. From ENC (Irrigation) Hyderabad, Lr. No. ENC(1)/DCE-I/ OT2/AEE3 TSGENCO /NSP/ TSGENCO/ Dameracherla/2014, Dt: 13-01-2015.
4. G.O.Ms.No.124, I&CAD(PW:REFORMS)Department, Dt: 15-11-2010

@@@@@

SENT CD-4
ORDER SENT CD-11
AEE/Tech

In the reference 1st read above, the Chairman & Managing Director, Telangana State Power Generation Corporation Limited, Hyderabad has requested the Government to arrange to allocate 208 cusecs (i.e. 6.60 TMC per year) of water throughout the year from the nearest and feasible location of River Krishna to meet the requirement of water for the proposed 5200 MW power plant at Veerlapalem village of Dameracherla Mandal of Nalgonda District.

2. In the reference 3rd read above the Engineer-in-Chief (Irrigation) Hyderabad has stated that the requirement of 6.6 TMC can be met out of the savings and replacement of surface water by ground water as per requirement of irrigation after completion of modernisation of NSP and he has requested the Government may allocate 6.6 TMC of water per year from Krishna River to TSGENCO for their proposed thermal power projects of 5200 MW at Veerlapalem village of Dameracherla (M) of Nalgonda District subject to normal conditions of G.O.Ms.No.39 and its amendments. He has further stated that the feasible location point for drawl of water may be near Veerlapalem village of Damerachela Mandal or any suitable point that can be decided in consultation with the officials of TGENCO as per their convenience.

3. Government after careful examination of the matter hereby accord permission for drawl of 208 cusecs (i.e. 6.60 TMC per year) of water throughout the year from the nearest and feasible location of river Krishna to meet the requirement of water for the proposed 5200 MW power plant at Veerlapalem village of Dameracherla Mandal of Nalgonda District, Telangana State, subject to payment of water charges and with usual terms and conditions. The feasible location point for drawl of water should be near Veerlapalem village of Damerachela Mandal or any suitable point that can be decided in consultation with the officials of TGENCO as per their convenience.



Annexure 6
Copy of Water Allocation letter from I & CAD Department

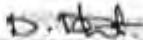
4. The Engineer- In- Chief (Irrigation), Hyderabad shall take further necessary action accordingly.

(BY ORDER AND IN THE NAME OF THE GOVERNOR OF TELANGANA)

Dr. SHAILENDRA KUMAR JOSHI
PRINCIPAL SECRETARY TO GOVERNMENT

TO
The Engineer-in-Chief (Irrigation), I & CAD Department, Hyderabad.
The Chief Engineer, Irrigation Projects, Khammam.
✓ The CMD, TS GENCO, Hyderabad.
Copy to :
The Chief Engineer, Hydrology, Hyderabad.
The Managing Director, TS Pollution Control Board, Hyderabad.
The P.S. to Prl.Secy to Government (I&CAD Department)
The P.S. to Prl.Secy to Government (Energy)
The P.S. to Minister (Irrigation)
The P.S. to Prl Secy to CM
Sf/Sc.

//FORWARDED::BY ORDER//


SECTION OFFICER

MEMORANDUM OF UNDERSTANDING
BETWEEN
TSGENCO AND SCCL
FOR SUPPLY OF COAL TO YADADRI THERMAL POWER
STATION
(5x800 MW)

Annexure 7
Coal MoUs and Consent Letter



తెలంగాణ తెలంగాణ TELANGANA

Date: 27/04/2016, 03:36 PM Serial No: 5.044 Denomination: 100 A 580450

Purchased By:
K.VENKATESHWARLU
S/O K.R.H.SHARMA
R/O HYD

For Whom
TSGENCO, VIDYUT SOUDHA, HYD

[Signature]
27/4/16
Sub Registrar
Ex. Office Stamp Vendor
SRO: S.R.Nagar

MEMORANDUM OF UNDERSTANDING

This Memorandum of Understanding is made on this 27th day of April 2016 (the "MOU") at Hyderabad.

BETWEEN

A. The Singareni Collieries Company Limited, an existing company under the Companies Act, 2013, having its registered office at Kothagudem Collieries (PO) 507 101, Khammam District, Telangana (hereinafter referred to as the "Seller" which expression shall, unless the context otherwise specifies mean and include its successors and permitted assigns) of the FIRST PART

AND

[Signature]
G.M. (Mktg.)
SCCL, Hyderabad

1

[Signature]
K. Venkateshwarlu
Sub Registrar
Ex. Office Stamp Vendor
SRO: S.R.Nagar

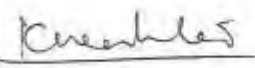
Annexure 7

Coal MoUs and Consent Letter

- 3.0 SCCL shall open new cost plus mines for this power plant and the schedule of opening of such mine shall link to the commissioning of TSGENCO Power Plant which is expected to be commissioned by March 2019 and also Washeries to wash the raw coal as per the requirement of Yadadri TPS. The supply of coal shall commence from January 2019 tentatively. Upon delay in commissioning of the cost plus mines and washery, due to force majeure reasons, coal shall be supplied from other sources on weighted average e-auction prices, on best effort basis.
- 4.0 The Purchaser shall intimate exact date of commissioning of the plant to Seller in advance (i.e 3 months) so that SCCL shall initiate proposal for entering into FSA which shall indicate the modalities for supply of coal.
- 5.0 The Purchaser shall furnish year wise requirement of coal to Seller sufficiently in advance to supply of coal.
- 6.0 **Settlement of Disputes:** In the event of any dispute or difference touching the MOU between the parties shall be settled in accordance with the following guidelines.
- ARBITRATION:** In the event of any difference or dispute between the parties thereto, such dispute or difference shall be resolved amicable by mutual consultation. Any difference or dispute arising between the parties under this agreement shall be settled through Arbitration in accordance with the provisions of the Arbitration and Conciliation Act 1996. In such event the Tribunal shall consist of three Arbitrators, one each to be nominated by the Seller and Purchaser and the Third Arbitrator shall be nominated by the two Arbitrators nominated by the Purchaser and the Seller. The venue of Arbitration shall be decided mutually between the parties.
- 7.0 **Severability and Renegotiation:** In the event any part or provision of this Agreement becomes, for any reason, unenforceable or is declared invalid by a Competent Court of Law or Tribunal the rest of this agreement shall remain in full force and effect as if the unenforceable or invalid portions had not been part of this agreement and in such eventuality the parties agree to negotiate with a view to amend or modify this agreement for achieving the original intent of the parties.


G.M. (Mktg.)
SCCL, Hyderabad

3

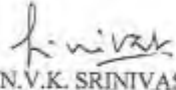
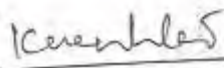
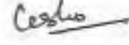

TSGENCO
Hyderabad

Annexure 7
Coal MoUs and Consent Letter

8.0 Termination of MOU: The MOU shall stand terminated after payment of consequential damages liable to Seller or Purchaser, as the case may be. Such consequential damages shall be as per the decision of competent authority of Seller / Purchaser as the case may be.

9.0 Effective Date: This MOU will be effective from the date of signing and can be amended/ supplemented or replaced by another document signed by the Parties.

IN WITNESS WHEREOF THE PARTIES THOROUGH THEIR AUTHORISED REPRESENTATIVES HAVE SET THEIR HANDS ON THE DAY, MONTH AND YEAR FIRST ABOVE WRITTEN.

<u>For and on behalf of Seller</u> (SCCL)  (J.NAGAI AH) G.M. (Marketing) G.M. (Mktg.) SCCL, Hyderabad Witness:  (N.V.K. SRINIVAS) DGM (Marketing)	<u>For and on behalf of Purchaser</u> (TSGENCO)  (K.VENKAESWARLU) CE (Coal & Commercial) (Coal & Commercial) TSGENCO, Vidyut Soudha, HYDERABAD - 500 082. Witness:  (C. Srinivas Rao) Sef. Mg.





Annexure 7

Coal MoUs and Consent Letter



MSTC
MINI RATNA
A J C DODGE ROAD, KOLKATA - 700 030, INDIA
PHONE : 01 33 2200 0064, 2287 0627 / 7657 / 0668
FAX : 2287-8547/2290-7211/2281-3069, 2287-4915 (ERC)
website : www.mstcindia.co.in • www.mstccommerce.com



Ref: MSTC/MKTG/TSGENCO/2014-15/4317/865 Date: 17.06.2016

The Chairman and Managing Director,
Telangana State Power Generation Corporation Ltd (TSGENCO),
Vidyal Souda,
Hyderabad,
TELANGANA,
PIN-500 082

Director Cof India Coal
SEPP
M. P. S.

Sub: Offer for supply of imported coal

Dear Sir,

We take this opportunity to introduce MSTC Limited, a Central Public Sector Undertaking (PSU) under the administrative control of the Ministry of Steel, Government of India. The company has undergone a metamorphic change in terms of its profile and job assignments. From its role as a canalizing agency for import of ferrous scrap, today the company is a major importer of bulk industrial raw materials like thermal coal, coking coal, steel scrap, crude oil etc and a leading e-Commerce service provider offering e-aalo and e-procurement services to many government departments and PSUs. The growth of the company in terms of volume of business and profit earned has been phenomenal in the last decade which has helped MSTC to earn its Mini Ratna Category-I status.

It is pertinent to mention here that MSTC is one of the largest sellers of coal in the country being the service provider for sale of coal on behalf of M/s. Coal India Limited (CIL) and its subsidiaries through e-auction since 2004-05.

Apart from that MSTC through its empanelled associate supplier(s) has supplied Imported (Non-Coking) Steam Coal to various power plants in the country under Andhra Pradesh Power Generation Company (APGENCO), Karnataka Power Corporation Limited (KPCCL), Maharashtra Power Generation Co. Limited (MAHAGENCO), Tamilnadu Power Generation Corporation Limited (TANGENCO), Rajasthan Rajya Vidyut Utpadan Nigam Limited (RRVUNL), Haryana Power Generation Corporation Limited (HPGCL), NLC Tamilnadu Power Limited (NTPL), etc., MSTC has supplied more than 5 million MT of imported coal in the year 2014-15 and more than 5.5 million MT in 2015-16.

In view of MSTC's expertise and experience in supply of imported coal as per the requirements of the end user plant, we would like to offer our services to TSGENCO for procurement and supply of imported non-coking steam coal for your various power plants including the upcoming ones.

Office of the Chief Engineer
(Coal & Commerce)
TSGENCO, V.S. Hyd-02
BWARD No. 106
20

Signature: _____
SE Commercial & Coal
TSGENCO

REPORTER (AIR) (MAY/JUN/2016)
TSGENCO, V.S. Hyd-02
20 JUN 2016

Signature: _____
Director Cof India Coal

Certified as ISO 9001:2008 & ISO 14001:2004
+ CMMI Level 3 Appraisal

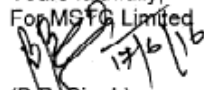
Annexure 7
Coal MoUs and Consent Letter

- 2 -

MSTC has its own empanelled associate supplier selected through a transparent and open tender system and MSTC shall be supplying imported non coking steam coal to TSGENCO through its empanelled associate supplier. It is therefore requested that TSGENCO may give an opportunity to MSTC for supply of imported non-coking coal after working out the modalities for the same.

It will be an honour for us to get your audience to explain the modalities and discuss our various activities to establish a long and mutually beneficial business relationship for both the companies.

Thanking you,

Yours faithfully,
For MSTC Limited

(B B Singh)

Chairman and Managing Director

Annexure 8
Copy of Coal Analysis Reports

/ Tel. : 022 - 2559 2885 (कार्या./Off.) 022 - 2550 8278 (लैब/Lab) Grams: BARC - MUMBAI, CHEMBUR तार : बार्क - मुंबई, चेंबुर फैक्स / Fax : 91-22-2550 5151 91-22-2550 5313	 सत्यमेव जयते	क्र.सं./SR.NO.: M 142 14107 ट्रॉम्बे, मुंबई - 400 085, TROMBAY, Mumbai - 400 085.																										
भारत सरकार / GOVERNMENT OF INDIA भाभा परमाणु अनुसंधान केंद्र / BHABHA ATOMIC RESEARCH CENTRE स्वास्थ्य भौतिकी प्रभाग / HEALTH PHYSICS DIVISION विकिरणसक्रियता परीक्षण प्रमाणपत्र / RADIOACTIVITY TEST CERTIFICATE																												
Dr. P. M. Ravi Head, ESS																												
Ref.: BARC: HPD: LLCL: D: 43: C: 02: 2015/1180		September 18, 2015																										
This is regarding the sample of Coal received from TSGENCO, sent for analysis vide your letter ref. no. coal sample/D.No.312/15 dated 29.07.2015.																												
The sample was analysed for Uranium-238, Radium-226, Thorium-232, Potassium-40, Cesium-137 activities. The result of the analysis is given below:																												
<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"><thead><tr><th rowspan="2">S.No.</th><th rowspan="2">Sample Id.</th><th rowspan="2">Sample Name.</th><th colspan="5">ACTIVITY (Bq/kg)</th></tr><tr><th>²³⁸U</th><th>²²⁶Ra</th><th>²³²Th</th><th>⁴⁰K</th><th>¹³⁷Cs</th></tr></thead><tbody><tr><td>1.</td><td>D - 43_2015</td><td>Coal</td><td>≤ 3.2</td><td>≤ 2.1</td><td>≤ 2.1</td><td>8.2 ± 0.9</td><td>≤ 0.3</td></tr></tbody></table>								S.No.	Sample Id.	Sample Name.	ACTIVITY (Bq/kg)					²³⁸ U	²²⁶ Ra	²³² Th	⁴⁰ K	¹³⁷ Cs	1.	D - 43_2015	Coal	≤ 3.2	≤ 2.1	≤ 2.1	8.2 ± 0.9	≤ 0.3
S.No.	Sample Id.	Sample Name.	ACTIVITY (Bq/kg)																									
			²³⁸ U	²²⁶ Ra	²³² Th	⁴⁰ K	¹³⁷ Cs																					
1.	D - 43_2015	Coal	≤ 3.2	≤ 2.1	≤ 2.1	8.2 ± 0.9	≤ 0.3																					
 (P. M. RAVI)																												
TELANGANA STATE POWER GENERATION CORPORATION LTD. 1 st Floor, Vidyut Soudha, TSGENCO, Hyderabad - 500 082.																												



Annexure 8
Copy of Coal Analysis Reports

Annexure-A

The coal analysis for the design of steam generator and auxiliaries will be as follows:

	Design Coal (50% Indian & 50% imported)	Imported Coal (Best Coal as 100%)	Indian Coal (Worst Coal as 100%)
Proximate Analysis (% by weight) (As received basis)			
Fixed Carbon	35.00	44.70	25.31
Volatile Matter	25.60	34.62	16.49
Moisture	11.00	12.00	10.00
Ash	28.40	8.68	48.20
Gross calorific value (kcal/kg)	4375	5750	3000
Ultimate Analysis (% by weight) (As received basis)			
Carbon	46.40	60.36	32.39
Hydrogen	2.50	3.49	1.54
Sulphur	0.70	0.58	0.81
Nitrogen	1.10	1.47	0.67
Oxygen (by diff.)	9.90	13.42	6.39
Moisture	11.00	12.00	10.00
Ash	28.40	8.68	48.2
Hard Grove Index	49	49	98 49



Annexure 8
Copy of Coal Analysis Reports

Typical

Analysis of Imported & Indigenous F Grade Coal:

Item	Type of Coal			
	Indigenous (F Grade)	Imported Coal (Type-I)	Imported Coal (Type-II)	Imported Coal (Type-III)
Fixed Carbon %	25	40	40	40
Ash %	40	10	15	10
Volatile Matter %	25-30	25-45	25-45	25-45
Total Moisture %	12	16	25	15
Sulphur %	<0.5	<0.8	<0.9	<0.8
HGI	50	45-60	45-60	45-60
GCV(HHV) Kcal/Kg	3400	6300	5700	6000

Item	Blending Analysis of 50% Indigenous + 50% Imported coal		
	With Type-I	With Type-II	With Type-III
Fixed Carbon %	33	33	33
Ash %	25	28	25
Total Moisture %	14	18.5	13.5
Volatile Matter %	31	31	31
Sulphur %	0.65	0.7	0.65
HGI	50	50	50
GCV(HHV) Kcal/Kg	4850	4550	4700



Annexure 8
Copy of Coal Analysis Reports



Test Report

ISSUED TO:
CHIEF ENGINEER/COAL/COMMERICAL
TSGENCO, VIDYUT SOUDHA,
HYDERABAD-500 082
PH : 040-23499417

Report Number : 14086/15/VLL/000/01
Issue Date : 2016-03-15
Your Ref : TRF
And Date : 2016-01-30

Page 1 of 1

Sample Particulars: Coal Samples

Sample Registration Date: 2016-01-30
Analysis starting: 2016-02-04
Analysis Completion date: 2016-02-26

Sample Details: Coal Samples

Tests required: Cd ,Cr ,Cu ,Fe ,Co ,Mn ,Ni ,Pb ,Zn ,As ,Hg ,Ti ,Sb ,V ,Tl ,Sn.

SAMPLES NOT COLLECTED BY VIMTA LABS LIMITED

LAB REF.: EC

TEST RESULTS

S.No	Parameters	Units	Coal Sample (Manuguru site)	Coal Sample (KTPS Site)
Heavy Metals				
1	Cadmium as Cd	mg/kg	<0.1	<0.1
2	Chromium as Cr	mg/kg	151.2	132.3
3	Copper as Cu	mg/kg	14.6	14.2
4	Iron as Fe	%	0.25	1.76
5	Cobalt as Co	mg/kg	9.7	<0.1
6	Manganese as Mn	mg/kg	53.7	254.4
7	Nickel as Ni	mg/kg	87.8	61.1
8	Lead as Pb	mg/kg	<0.1	<0.1
9	Zinc as Zn	mg/kg	48.8	35.6
10	Arsenic as As	mg/kg	<0.1	<0.1
11	Mercury as Hg	mg/kg	<0.1	<0.1
12	Titanium as Ti	mg/kg	631.2	607.6
13	Antimony as Sb	mg/kg	<0.1	<0.1
14	Vanadium as V	mg/kg	14.6	10.2
15	Thallium as Tl	mg/kg	<0.1	<0.1
16	Tin as Sn	mg/kg	<0.1	<0.1

Method Of Testing: As per USEPA 3050B
Instrument Used: ICP - MS(Agilent - 7500), Detection Limit - 0.1 mg/kg

Dr. Subba Reddy Mallampati
Sr. Scientist-Environment

Note: This report is subject to the terms and conditions mentioned overleaf
Vimta Labs Ltd., Analytical Division, Life Sciences Campus, # 5, Alexandria Knowledge Park
Genome Valley, Hyderabad - 500 078. INDIA. T+91 40 6740 4040

NO: LSF-B401193



Annexure 9
MoM – SCR and TSGENCO

Minutes of the Meeting held on 08.07.2015 with TSGENCO

Members Present:

Railways: S/Sri

1.	J. N. Jha	COM/SCR
2.	G.J. Prasad	CTPM/SCR
3.	D. Satyanarayana	DyCOM/FOIS & Plg/SCR

TSGENCO: S/Sri

1.	M. Sachidanandam	Director /Thermal TSGENCO
2.	A. Ajay	CE/Civil/TSGENCO
3.	B. Devdas	CE/Coal Comm/TSGENCO
4.	Srinivas	SE/TSGENCO
5.	Ch.M. Raju	JGM/RITES/Civil
6.	S.P.V. Mahesh	DGM/RITES/Civil
7.	Sadiq Ali	AM/RITES/Traffic

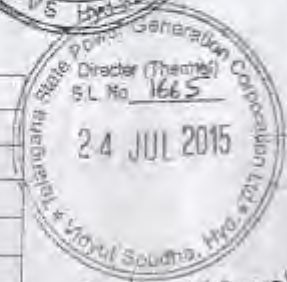
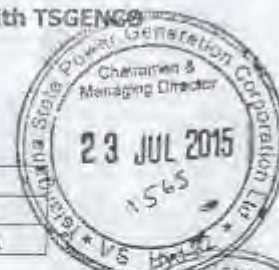
Background:

CMD/TSGENCO, in his letter to COM, vide letter No.CMD/CE(C&C)/F.SCR/Lys/D.No.271/2015, dated 30.06.2015 communicated that the following Thermal Power Projects are planned for commissioning in the next 3/ 4 years.

S.N o.	Name of the Project	100% Domestic	100% Imported	50% Domestic + 50% Imported	Scheduled date of commissioning
1.	Bhadradri TPS (4X270MW) Manuguru, Khammam Dist.	5.80	3.25	3.85	2016-17
2.	Kothagudam TPP Stage-VII (1X800MW) Paloncha Khammam Dist.	4.00	2.40	2.85	2017-18
3.	Yadhadri TPS (5X800MW) Dameracherla, Nalgonda Dist.	19.90	11.35	14.20	2018-19
Total (5880MW)		29.70	17.00	20.90	

However, no siding proposals have been submitted by TSGENCO for Bhadradri (4X270MW) and Yadadri (5X800MW) Thermal Power Projects. For Kothagudam Stage-VII (1X800MW), TSGENCO was advised to submit revised Feasibility/Conceptual Plan as discussed in the Minutes of the Meeting held on 10.09.2014 and 24.03.2015.

The meeting was held in this background.



DISCUSSION:

I. Kothagudem TPP Stage-VII (1X800MW) Paloncha, Khammam (Dist.).

During August 2014, M/s TSGENCO submitted Feasibility Report for Unit VII expansion of their siding for Kothagudem Thermal Power Station served by Gajulagudem on DKJ- MUGR section, SC Division.

Subsequently, a meeting was held on 10.09.2014 where in the Feasibility Report was discussed and the Party/Consultant were advised to submit revised Feasibility Report/Conceptual Plan duly incorporating the modifications as discussed in the meeting.

However, even after lapse of 6 months, the same have not been submitted. In the meeting held on 24.03.2015, representatives of M/s TSGENCO stated that they have submitted the revised Feasibility Report/Conceptual Plan to M/s BHEL for their concurrence and the same is awaited.

Since the unit is scheduled for commissioning by December 2017, M/s TSGENCO was once again advised to expedite obtaining the concurrence and submit the revised Feasibility Report/Conceptual Plan at the earliest.

II. Bhadadri TPS (4X270MW) Manuguru, Khammam (Dist.).

The Plant will be located in Ramanujavaram village, about 22 Km from Manuguru and is planned for commissioning by December 2016. TSGENCO stated that RITES have conducted alignment study and suggested five alternatives. The best alternative is passing through SCCL's land, for which discussions are being held with M/s SCCL authorities.

Since the plant is scheduled for commissioning by December 2016, M/s TSGENCO was requested to submit the siding proposal immediately as the lead time is long for approval of DPR/Plan and construction of siding.

III. Yadadri TPS (5X800MW) Damercherla, Nalgonda (Dist.).

The plant will be located in Damercherla village for which Vishnupuram station on Guntur Division will be the nearest Rail Head. Phase I (2X800MW) is planned for commissioning by December 2018. Phase-II (2X800MW) and Phase-III (800 MW) will be commissioned by June 2019 and December 2019 respectively.

M/s TSGENCO stated that approximately 50% of coal requirement will be sourced from SCCL and 50% will be imported coal. Imported coal will be handled from Machilipatnam Port after its commissioning.

Annexure 9
MoM – SCR and TSGENCO

It was explained to TSGENCO that coal rakes, both SCCL and imported coal, will be primarily moved from Motumari end, that the section is currently commissioned up to Mellacheruvu and that the line between Mellacheruvu – Janpahad is under construction. It was also explained to them that electrification is commissioned up to Mellacheruvu and is under commissioning upto Janpahad. Janpahad - Vishnupuram section is on Diesel traction only and there is no sanctioned work for electrification of this section.

IV. Proposed siding for Kakatiya Thermal Power Plant taking off from Bisugirshariff on Kazipet – Ballharsha section :

In the meeting held on 10.09.2014, representatives of M/s TSGENCO stated that since the lead line of the proposed siding taking off from Bisugirsharif station on Kazipet – Ballarsha section is approximately 40 kms, the cost of the project has become very high and therefore the proposal was kept on hold. In the meanwhile, Ministry of Railways sanctioned new line project of Manuguru – Ramagundam at a cost of Rs. 1112 Crs in the year 2013-14. The nearest rail head for the power plant on this new line may be Chelpuru or Bhupalpally. TSGENCO is therefore contemplating to take off its siding from a convenient rail head on Manuguru – Ramagundam section.

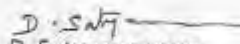
In the meeting on 10.09.2014, TSGENCO were informed that given the cost of the new line project and Budget outlay, it will take considerable time for completion of the new line project and the project can be expedited if TSGENCO and other users participate in the project by cost sharing.

Since Unit – II of 600 MW is planned to be commissioned by September 2015 M/s TSGENCO was advised to quickly decide on the issue of rail connectivity for the power plant.

Till such time the siding is planned, either from Bisugirsharif station or from a convenient station on Manuguru – Ramagundam new line, the coal rakes will have to be handled at Uppal (OPL) station itself which may increase significantly after commissioning of Unit-II of 600 MW.

Representatives of TSGENCO stated that for Unit-II of 600 MW, approximately 50% of the coal requirement (4000 tonnes per day) will be sourced from local Tadicherla Mines and the balance 50% will be sourced from M/s SCCL, which will be unloaded at Uppal.

M/s TSGENCO had earlier conveyed their acceptance for providing of Cross over to the siding at Uppal towards Ballarsha end and electrification of the siding on deposit terms and have requested to communicate the cost estimates at the earliest.


D. Satyanarayana
Dy.COM/FOIS & Plg.
For Chief Traffic Planning Manager

Annexure 9
MoM – SCR and TSGENCO



Annexure 10
Minutes of Board meeting on latest norms of MoEF&CC by TSGENCO

TELANGANA STATE POWER GENERATION CORPORATION LIMITED
VIDYUT SOUDHA :: HYDERABAD - 500 082

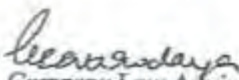
From
The Company Law Advisor,
TSGENCO,
Vidyut Soudha,
Hyderabad 500 082.

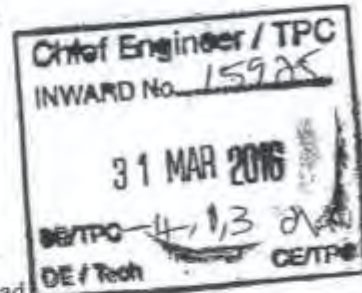
Sir,

Sub: - Minutes of 16th Board Meeting – Request – Reg.

I am herewith enclosing certified copy of true extract of particular items from 16th Board Meeting minutes for your perusal and for further action please. The Action Taken Report may please be forwarded to enable me to appraise the Board in the next meeting.

Yours faithfully,


Company Law Advisor
31-03-2016



To
The FA&CCA/(Accounts)/TSGENCO/VS/Hyderabad.
The Chief Engineer/Civil/Thermal/TSGENCO/VS/Hyderabad.
The Chief Engineer/Civil/Hydel & General Services/TSGENCO/VS/Hyderabad.
The Chief Engineer/Coal & Commercial/TSGENCO/VS/Hyderabad.
✓ The Chief Engineer/TPC/TSGENCO/VS/Hyderabad.
The Chief General Manager/Adm.IS&ERP/TSGENCO/VS/Hyderabad.
The Chief Engineer/HPC&HP/TSGENCO/VS/Hyderabad.

ENG-10
22
31/3/2016
567 7864

Annexure 10
Minutes of Board meeting on latest norms of MoEF&CC by TSGENCO

TELANGANA STATE POWER GENERATION CORPORATION LIMITED
VIDYUT SOUDHA, SOMAJIGUDA, HYDERABAD-500 082.
CIN: U40102TG2014SGC094070, FAX No.040 23317663
Phone No. 9849000010 Email: cmdtgenco@gmail.com

TRUE EXTRACT OF THE MINUTES OF 16TH BOARD MEETING
OF THE COMPANY HELD ON 14.03.2016

17. Implementation of new standards for Suspended Particulate Matter, NO_x and Sox emissions and specific water consumption as per Notification of Ministry of Environment, Forest and Climate Change dt.07/12/2015.

The Chief Engineer/Thermal Projects Construction has placed a note on the subject for perusal and consideration of the Board.

The Chief Engineer/Thermal Projects Construction has stated that:

1) The new standards are parameters to the new Thermal Power Projects to be installed after 01.01.2017 (i.e.1x800MW Kothagudem Thermal Power Station, 4x270MW Bhadradi Thermal Power Station and 5x800 MW Yadadri Thermal Power Station) as per Notification of Ministry of Environment, Forest and Climate Change dt-07.12.2015 are as: —

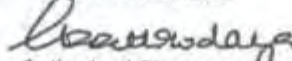
Particular matter : 30 mg/Nm³
SO₂ : 100mg/Nm³
NO_x : 100mg/Nm³
Hg (Mercury) : 0.03mg/Nm³
Specific Water : 2.5m³/MWh
Consumption

Zero waste water discharge to be achieved.

The Board perused the norms notified by the Ministry of Environment, Forest and Climate Change and decided to follow in-principle the steps to be taken by NTPC, New Delhi in this regard.

// CERTIFIED COPY //

For Telangana State Power Generation
Corporation Limited


Authorised Signatory



HYDRO-GEOLOGICAL STUDIES
FOR
YADADRI THERMAL POWER STATION (5X800 MW)
VEERALAPALEM VILLAGE, DAMERACHERLA MANDAL
NALGONDA DISTRICT, TELANGANA STATE

FINAL REPORT

Project Proponent:

M/s Telangana State Power Generation Corporation Limited
Hyderabad

Hydro-Geo Survey Consultants :

M/s Hydro-Geo Survey Consultants
Jodhpur

Environment Consultant:



Vimta Labs Ltd.
Plot No.142,IDA,
Phase-II, Cherlapally,
Hyderabad – 500 051, Telangana State
www.vimta.com, env@vimta.com

June, 2016

1.0 INTRODUCTION

Telangana State Power Generation Corporation Ltd, (TSPGCL) is proposing to set up a 5 x 800 MW Super Critical Coal based power project near village Veerlapalem, taluka/Mandal Damarcherla, district Nalgonda, Telanagna. The water requirement of the plant has been estimated as 9755 m³/hr which will be drawn from Krishna river which is about 5 kilometres from the plant at the confluence of Krishna river and Tungapahad Vaghu near village Kottapalli, taluka Damarcherla.

Hydro-Geosurvey Consultants Pvt. Ltd., Jodhpur (HCPL) were retained by M/s Vimta Labs Ltd., to conduct out hydrological and hydrogeological surveys and to take up comprehensive hydrogeological assessment studies of plant, its ash pond area and their 10 km radius buffer zone indicating the impact of the plant and ash pond on the water regime along with designing of rain water harvesting program. The scope also included carrying out in-situ permeability and infiltration tests in the proposed ash pond area. All these studies were asked under Terms of Reference issued by MOEF&CC.

The 5 x 800 MW Yadadri Thermal Power Station project of TSGENCO (Project co-ordinates 16°40'19"N, 79°35' 18"E ; 16°41' 42"N, 79° 36' 13"E; 16° 42' 38"N, 79° 35' 46"E; 16° 41' 53"N, 79° 33' 15"E; 16° 40' 41"N, 79° 33' 54"E) covers an area of 1173 hectares and lies in the Survey of India toposheet Nos. 56P/5, 6, 9 and 10. HCPL carried out the comprehensive hydrogeological assessment of the core and buffer zones and determined the present status of ground water development. HCPL conducted the assessment studies by collecting hydrogeological data of key wells by visiting them in the field, studying the present ground water conditions, estimating the long term ground water recharge, present ground water withdrawal and status of ground water development. The pre-monsoon and post monsoon hydrological data from 30 key wells was collected for the year 2015-16. The fluctuation of water levels in the surrounding area of plant as recorded through monitoring

wells was interpreted in relation to ground water recharge. Although, the entire Nalgonda District lies in the safe zone and has surplus ground water potential for future ground water development, a rain water harvesting program has been designed for the plant area so that there is no depletion of static ground water reserves during the drought years or due to extensive ground water exploitation for irrigation and industrial use in future.

The present report embodies the findings of detailed hydrological and hydrogeological studies carried out for core and buffer zones of Yadadri Thermal Power station of 5 x 800 MW project and the impact of the plant on the water regime of the area. Depending on the availability of rain water within the plant from different buildings and open area, a rain water harvesting program has also been designed to augment the ground water storage of the plant.

2.0 HYDROLOGY

2.1 Physiography of Krishna river basin

The study area falls in the Krishna river basin which extends over an area of 58,948 km² and is nearly 8% of total geographical area of the country. The basin lies in the states of Karnataka (113,271 km²), Andhra Pradesh & Telangana (76,252 km²) and Maharashtra (69,425 km²). It river flows in a general northeasterly direction for a total of distance of 1250 kms before debouching into Bay of Bengal near Vijayawada. After traversing 304 kms, it enters Karnataka and flows for about 290 km before entering Andhra Pradesh and flowing for about 600 kms before entering Bay of Bengal. The drainage area is 2.59 lakh km² out of which 26.8% is in Maharashtra, 29.4% in Andhra Pradesh and remaining 43.8% is in Karnataka.

Krishna river basin comprises rolling and undulating country barring a series of ridges and valleys interspersed with low hill ranges along the upper reaches of the river. The Western Ghats are well defined and continuous. The middle range of Krishna river basin is a plateau,

the greater part of which is lying between elevation 300 m and 800 m above MSL. This plateau is sloping eastwards. Great undulating plains divided from each other by flat-topped ranges of hills are the characteristic features of this plateau.

The Krishna is the third longest river within India, yet it has a rather poor water wealth because of fairly low rainfall in the basin. The river has two large tributaries-the Bhima and the Tungabhadra and four smaller tributaries-the Ghataprabha, the Malprabha the Musi and the Muneru.

The basin consists largely of Archaean formations, parts of which are covered by Deccan trap lavas, Cuddapah and Vindhyan basins and faulted blocks of Gondwanas. The delta region along coastal area is largely a flat terrain.

2.2 Physiography of the buffer zone

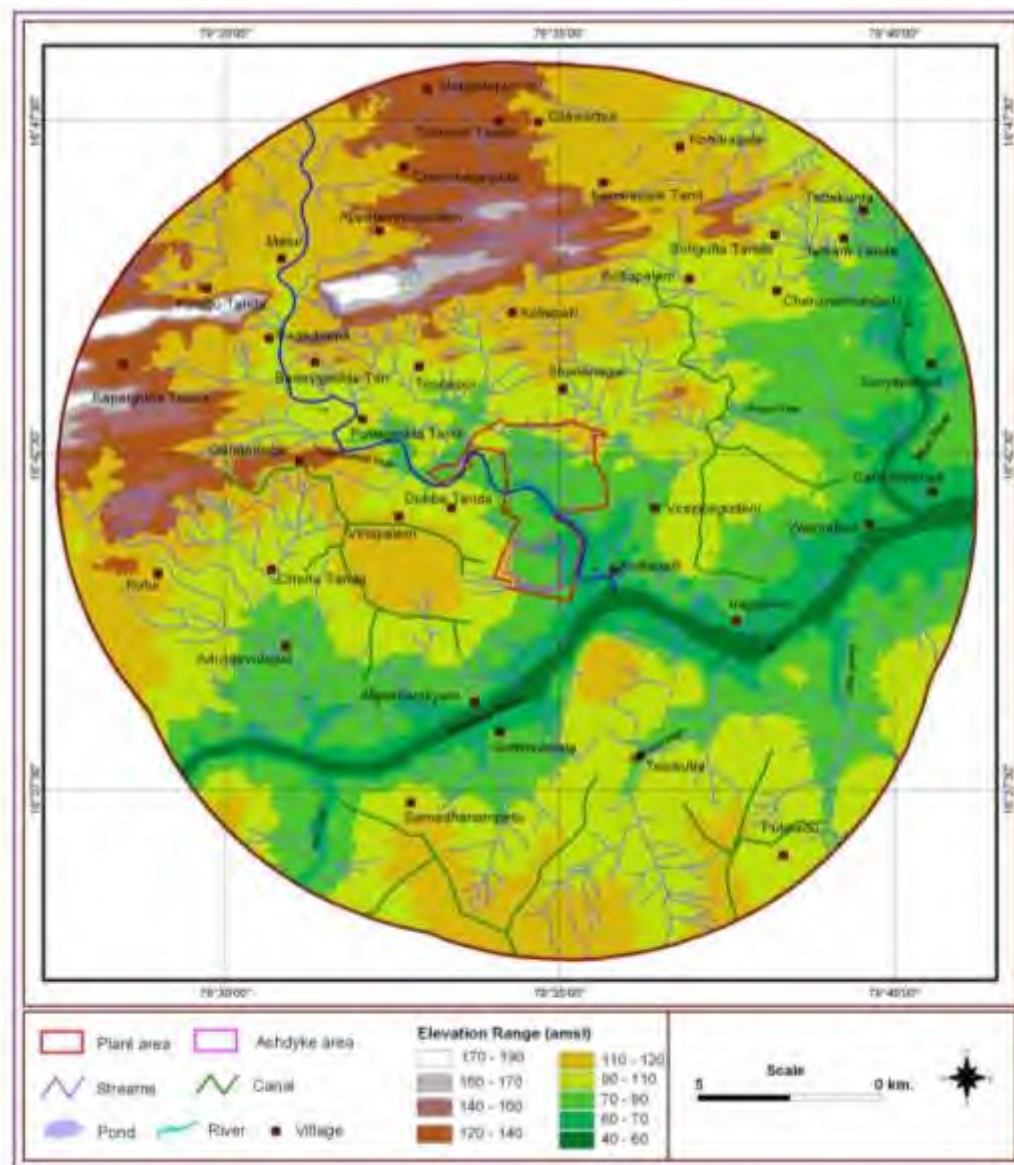
The buffer zone forms a part of Bandam watershed (code –4D1G1, Watershed atlas of India) which has an area of 92894 hectares and lies in Bandam river sub-basin, a tributary of Krishna river. The study area drains towards south east and is characterized by scattered hill ranges with intervening valleys and plains. The elevation within the study area varies from 72 m in west to 93 m above MSL in the south eastern part of the area where as the buffer zone elevations range in the order of 40 to 190 above MSL (**Figure-1**).

Regionally, the area forming a part of peninsular shield has four recognized physiographic features as:

1. Coastal Plains
2. Eastern Ghats'
3. Interior uplands and plains encompassing the Rayalaseema region, and
4. Northwestern Plateau and plains forming the Talangana region

The project area forms a part of the last division i.e. the Northwestern plateau, locally referred as Deccan plateau in Hyderabad area which attains an average elevation of about 82 m above m.s.l. and is a non-descript, monotonous plains interspersed with granite tors and isolated sedimentary hillocks / residual hills largely underlain by Archaean rocks.

Figure-1. Digital Elevation Model (DEM) of buffer zone of plant area



2.3 Drainage system of buffer zone

The Nalgonda district is drained by the River Krishna along with tributaries Musi, Aler, Dindi, Halia and Peddavagu rivers. Krishna River forms the southern boundary of the district and enters the south western part of the district and flows along the southern boundary for a distance of about 85 kms. The Musi River is the main tributary of river Krishna. The Palar river drains eastern part of the district. The directions of all the three river courses are controlled by two major lineaments in east-west and northwest-southeast directions. All other lower order streams and nallas are controlled by minor lineaments. The district is divided into 64 micro-water sheds. The major river Krishna is perennial and all other rivers are seasonal and ephemeral. The overall drainage pattern in the district is dendritic to sub-dendritic and rectangular. The drainage pattern of the buffer zone is shown in **Figure -2**

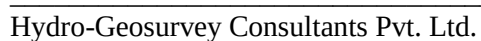
2.3.1 Micro-watersheds in the buffer zone and in Krishna watershed.

Entire buffer zone falls in one watershed of Krishna river where in total, there are five micro-watersheds. There are two micro-watersheds in northern part of the buffer zone and north of Krishna river while there are three micro-watersheds in southern part of the buffer zone and south of Krishna river.

Two micro -watershed which are located in north of Krishna river are Tungpahad river micro-watershed in north-western part while another micro-watershed is of Musi river micro-watershed in the north -eastern part of the buffer zone.

There are three micro-watersheds in southern part of the buffer zone and are Gol Vagu micro-watershed in the south western part, Golidela micro-watershed in south-central part while there is Dangi micro-watershed in the south-eastern side. All these five micro-watershed are part of Krishna watershed. Among these only two watersheds of Tungpahad

Figure-2. Drainage map of buffer zone

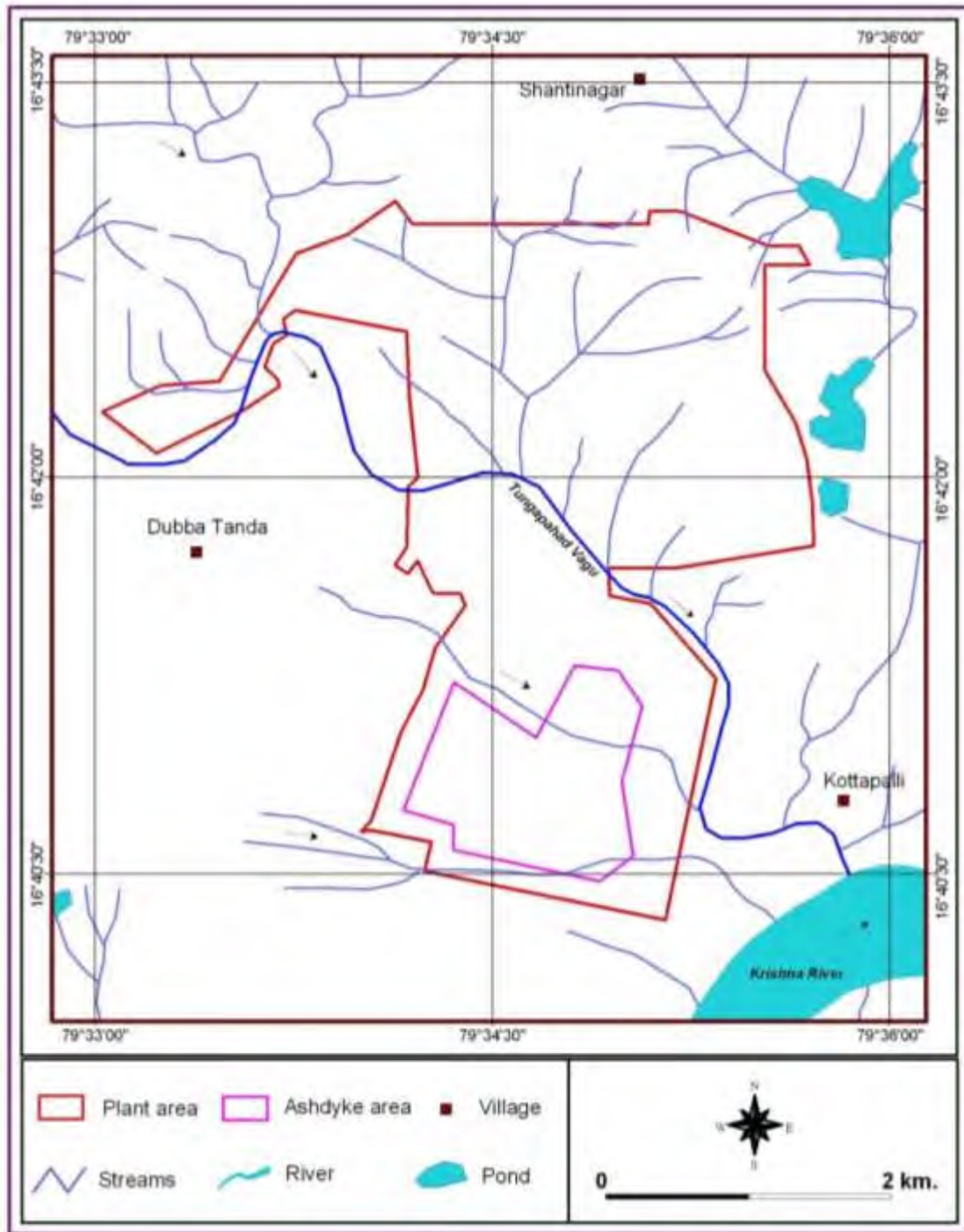


2.3.2 Drainage system of power plant area

The present drainage pattern in the plant area is shown in **Figure-3**. It is observed that Tungapahad Vagu (stream), an ephemeral stream, passes through the centre of the plant area taking south-easterly course. This is big stream having significant catchment area outside the plant in north western side.

There are some streamlets flowing through the plant area which meet Tungapahad Vagu. These streamlets which originate due to rainfall in the plant area will stop flowing as Storm water drainage system will be designed before constructing the plant and it will be allowed to meet the Vagu as and where feasible. There is a stream with limited catchment area entering in the ash pond area which has to be diverted to join another stream flowing in the south. Another streamlet just passes through the southern part of the ash pond and will be allowed to flow undisturbed and the ash pond will be formed away from the streamlet. The drainage pattern, after the setting up of the plant is discussed along diversion program in the chapter dealing with the impact of the plant on natural drainage system.

Figure-3. Drainage system before setting the plant



2.4 Climate

There is no IMD meteorological station near the plant area, the nearest station being at Rentachintala, district Guntur which is about 14 km from plant. However, the climatic conditions excluding the rainfall are not different than recorded at Rentachintala.

Based on Koppen classification of climatic pattern, the area may be classified tropical wet and dry. The year is divided into four seasons. The region experiences hot and dry summer throughout the year except during the South West Monsoon season. The period from December to February is the dry, comparatively cool season. The summer season is from March to May which is followed by the southwest monsoon season from July to September. October and November constitute the post monsoon or the retreating monsoon season.

2.4.1 Temperature

The period from March to May is marked by continuous increase in the temperatures. April/May are the hottest months of the year with a mean daily maximum and minimum temperature (in May) of 41.7°C and 28.8°C respectively. With the onset of southwest monsoon by about mid-June, the temperatures go down considerably. From November onwards, both the day and night temperatures decrease and December, the coldest month, with daily maximum and minimum temperatures of 28.8°C and 17.8°C.

2.4.2 Rainfall

Average annual rainfall based on rainfall data recorded at Nalgonda, for last 17 years has been observed as 683 mm. Rains are received almost in all the months of the year but rains are minimum to nil during summer months. The yearly rainfall as recorded at Nalgonda district headquarter is shown in **Table-1**.

Table-1. Yearly rainfall recorded at Nalgonda district headquarter

S. No.	Year	Rainfall (mm)
1.	1999	487
2.	2000	785
3.	2001	670
4.	2002	469
5.	2003	697
6.	2004	538
7.	2005	962.1
8.	2006	630.4
9.	2007	741.7
10.	2008	622.1
11.	2009	507.5
12.	2010	1012
13.	2011	522
14.	2012	674
15.	2013	1146
16.	2014	521
17.	2015	624.2

2.4.3 Humidity

Relative humidity during the southwest monsoon is generally over 55%. During the rest of the year, air is normally dry. Relative humidity was observed in the range between 50% and 74%. **(Table-2).**

2.4.4 Winds

Winds are generally light to moderate, except during the south west monsoon season, when these are moderate to strong. From January to May, winds blow mostly from east. In the post monsoon and winter months, winds are mostly from direction lying between southwest and west. West being the prominent wind direction (28% readings). Mean wind speed is highest in July and August (30 km/hour) and lowest in November (11 km/hour).

2.4.5 Cloudiness

Skies are generally moderately to heavily clouded during southwest monsoon season, being overcast on some days. During the rest of the year, the skies are normally clear to lightly clouded. During the months of June-September, the mean cloudiness (in Oktas) is usually more than 4, being generally higher in the evenings than the mornings.

Table-2. Meteorological data as recorded at IMD Rentachintala

(IMD, 30 years average)

Month	Temperature		Relative Humidity		Mean Cloudiness	
	Mean Daily Max °C	Mean Daily Min °C	08:30%	17:30%	08:30O ktas	17:30 Oktas
Jan.	31.2	17.7	83	48	2.4	2.5
Feb.	34.5	20.3	75	41	2.2	2.2
Mar.	37.6	23.4	71	38	2.2	2.0
Apr.	40.2	26.6	68	37	2.7	3.1
May	41.7	28.8	58	35	3.4	4.0
Jun.	38.1	27.9	65	46	5.4	5.8
Jul.	35.0	26.4	71	56	6.3	6.6
Aug.	33.8	25.9	74	60	6.2	6.4
Sep.	34.0	25.3	78	64	5.6	6.2
Oct.	33.3	25.5	80	62	4.3	5.0
Nov.	31.3	20.3	80	59	3.6	4.2
Dec.	30.5	17.8	82	53	3.1	3.3
Annual mean	35.1	23.7	74	50	3.9	4.3

2.5 Quality of surface water

The quality of surface water is good as the rocks are mostly sedimentaries and matamorphics having thin alluvial cover. The rainfall being moderate and the area having adequate drainage, the surface water remains free from salinity. Water sample collected from streams shows total dissolved salts around 300 mg/l and all constituents are within permissible limits of drinking, industrial and irrigation purposes.

2.6 Seismicity

The project area falls in Zone II of the Seismic-zoning map of India (IS 1893-2002) forming a part of peninsular shield area, which is considered to be of low to moderately seismic.

The catalogue of the earthquakes compiled by various authorities of Peninsular shield area from earlier days indicate a total of more than 1000 events of $M > 3$. The area has experienced the Bhadrachalam EQ of 1969 whose epicenter was 200 km NW of the site, Koyna EQ (May 1967, M 6.5), Killari EQ (Sep. 1993, M 6.3, 350 km away). A suitable seismic factor based on the seismic history of the area and BIS provision needs to be adopted in the designs.

3.0 HYDROGEOLOGY

3.1 Regional Geology

The project area forms the northeastern part of the Peninsular Indian shield and exposes the igneous and metamorphic Archaean rocks and the sedimentary Cuddapah and Kurnool group of rocks belonging to Upper Precambrian and Lower Paleozoic age.

The geological succession observed and established by the workers for the area is as follows:-

Table-3. Geological Succession of Cuddapah Supergroup

System	Series	Stage of formation
Recent and sub-recent	Superficial deposit	Alluvium and soil
-----U N C O N F O R M I T Y-----		
Kurnool Group Late Proterozoic (600-1100 m.y.)	Kundair Series	Nandyal shaly limestones
		Koilkuntla limestones
	Jammalamadugu Series	Auk Shales
		Narjee Limestone
		Banganapalli Limestone
-----U N C O N F O R M I T Y-----		
Cuddapah Supergroup	Krishna Series	Srisailem Quartzite

Middle Proterozoic (1100-1400 m.y.)	-----U N C O N F O R M I T Y-----	
	Nallamali Series	Cumbum Shales and Phyllite
		Bairankonda Quartzite
	-----U N C O N F O R M I T Y-----	
	Chitravati Series	Pullumpet (Tadipatri) Shales
		Nagari Quartzite
	-----U N C O N F O R M I T Y-----	
	Papaghani Series	Vempalli Dolomites & Shales
Gulcheru Quartzite		
-----E P A R C H E A N U N C O N F O R M I T Y-----		
Archaeans (2400 m.y.)	Crystallines	Granite, Gneisses and Schists

3.2 Hydrogeology of 10- km area (Buffer zone)

The geology of the core and major part of the buffer zones is occupied by limestone of Late Proterozoic tapped by both dug wells and bore wells. The northern part of the buffer zone comes under the Archaean granite and gneisses.

The consolidated meta-sedimentary rocks of Kurnool system comprising limestone, quartzite and shale occupy most of the buffer zone specifically in the southern part. The crystalline rocks (granites) are inherently devoid of primary porosity. However, subsequently, with dynamic process of weathering, the rocks undergo fracturing and fissuring and joints over a period of time, lead to the development of secondary porosity, which forms the repository for ground water. The ground water occurs under water table conditions in weathered zone and semi-confined and confined conditions in fractured zone.

3.3 Nature of occurrence of ground water

Ground water occurs under water table conditions in limestone and granite and is transmitted in granite through the weathered rock, joints and fractures. In the limestone formation, the ground water occurs along bedding plains, joints, weathered zones and also in solution cavities etc.

Both the limestone and granite are impervious in nature and have developed secondary porosity or fracture porosity. The secondary porosity decreases with depth due to overlying weight of the rocks which reduces the secondary openings.

The depth to water table in power plant area ranges from 14 to 35 metres below land surface during pre monsoon period and 8 to 26 metres during post-monsoon period. The depth to water in buffer zone ranges from 1.5 to 30.0 m b.g.l. during post-monsoon period while it is deeper ranging from 3.5 to 36.61 m b.g.l during pre-monsoon. However, the water levels are shallow near streams, ponds and low lying areas in buffer zone where it ranges from 0.5 to 3 metres.

Figure-4. Hydrogeological map of buffer zone of plant area



3.4 Movement of ground water

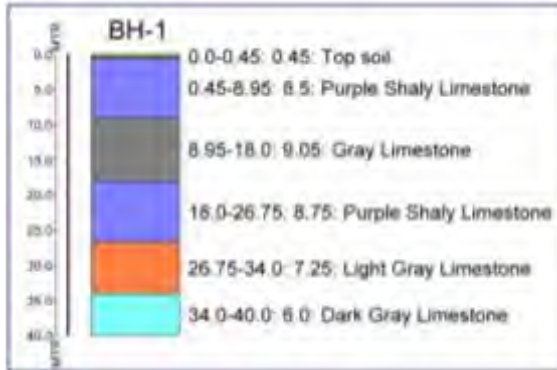
Ground water movement is controlled mainly by the hydraulic conductivity of the aquifers and hydraulic gradient. The ground water movement in limestone and granite is mainly through the joint and fractures.

A review of the topography and drainage pattern in the major part of the buffer zone reveals that the general slope of the area is towards south and south east i.e. river Krishna. The ground water flow in the buffer zone is also towards south and south east with hydraulic gradient as 5.88 m/km (**Figure-5**) during pre-monsoon and 6.05 m/km (**Figure-6**) during post monsoon as calculated from the monitoring of wells of the area. Six bore wells (**Table-4 & Plate-1**) were also drilled in the core zone for more precise water table flow direction.

Table-4. Co-ordinates of boreholes drilled

Borehole	Easting			Northing		
	79°	35'	9.20"	16°	41'	44.0"
BH-1	79°	35'	9.20"	16°	41'	44.0"
BH-2	79°	35'	16.4"	16°	42'	01.8"
BH-3	79°	34'	12.4"	16°	40'	47.6"
BH-4	79°	34'	25.6"	16°	40'	44.1"
BH-5	79°	34'	45.3"	16°	40'	35.5"
BH-6	79°	34'	35.1"	16°	40'	35.1"

Plate-1. Litholog of borehole drilled



3.5 Nature of hydraulic conductivity

The principal aquifers of the area are composed of limestone and granite in the north which both being hard in character have low hydraulic conductivity mainly developed due to secondary openings like fractures and joints. General depth of wells ranges from 8 to 20 metres.

Although, there are large number of irrigation wells mostly bore wells driven by electric motors in the area, pump tests to find out hydraulic conductivity had not been conducted. However, a pump test carried out in nearby area on a bore well tapping limestone has indicated hydraulic conductivity (K) of 0.5 to 0.80 m/day which can be classified as very low.

Figure-5. Ground water contour map of buffer zone of plant area (Pre-monsoon period)

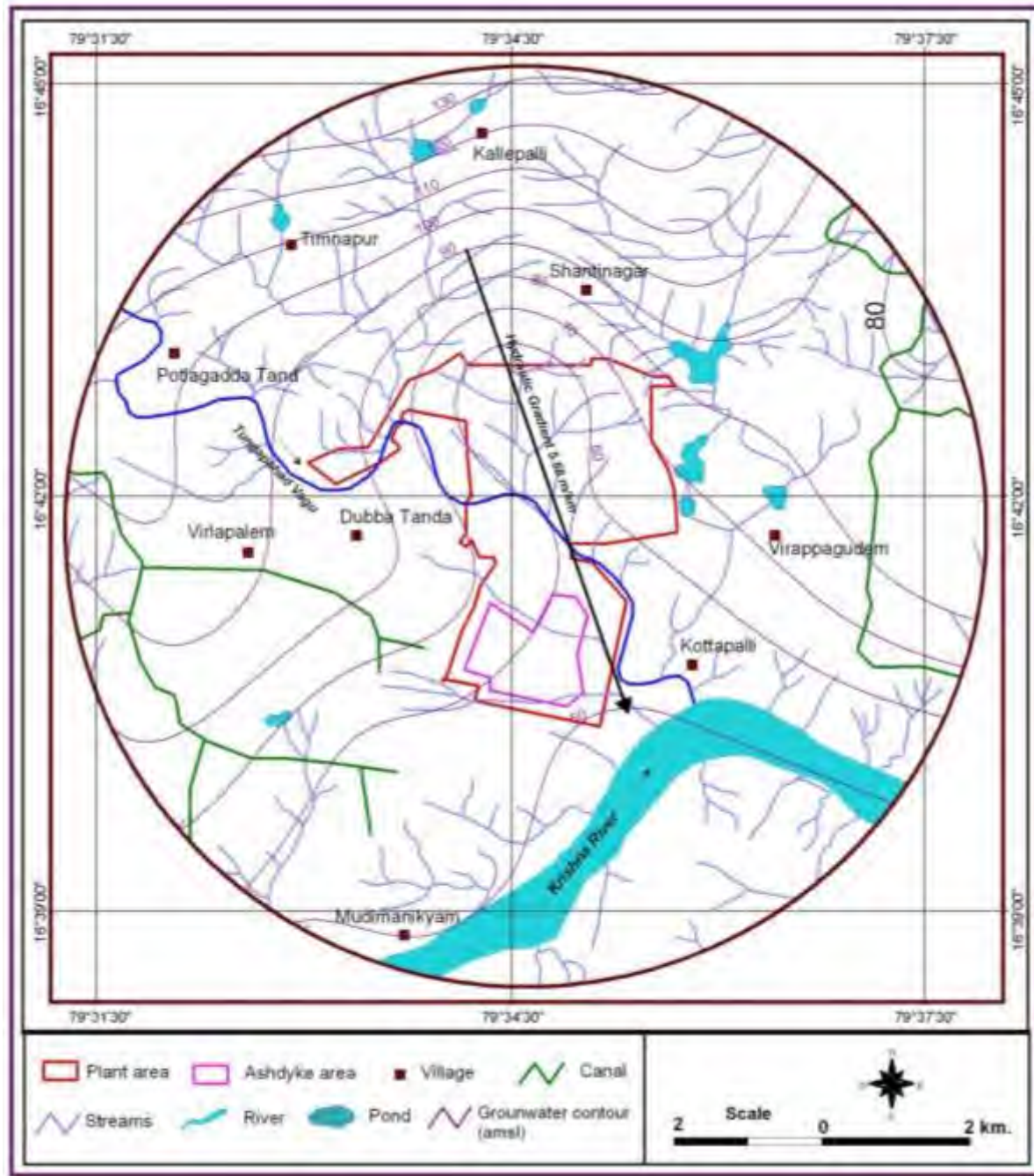
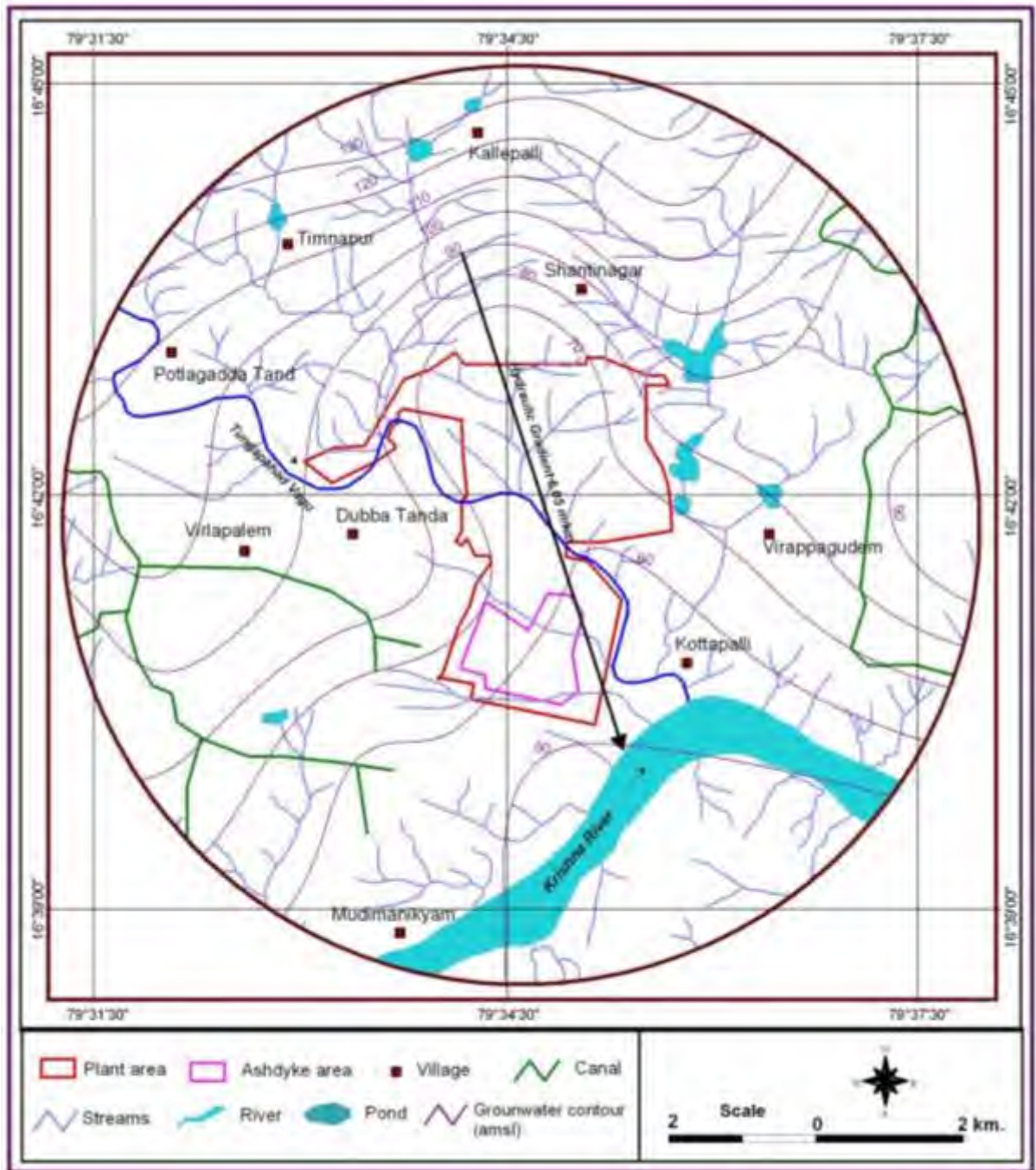


Figure-6. Ground water contour map of buffer zone of plant area (Post-monsoon period)



3.6 Yield of wells

There are large number of bore wells and open dug wells in the buffer zone tapping limestone and granite aquifers for irrigation and hand pumps mostly used for drinking purpose in villages. Hand pumps have been constructed by the govt. by deploying DTH rigs. The yield of such hand pumps is not much and is just sufficient to meet the drinking water requirement. The yield of such hand pumps range from 500-1,000 litres per hour of potable quality of water.

Open wells are generally 8-20 m deep and are operated mostly by electrically driven centrifugal pumps or by diesel engines and do not sustain pumping and go dry after few hours of pumping. Average yield of open wells with pump tapping limestone and granite has been observed as 60-100 m³/day. Bore wells tapping limestone yield 4-12 m³/hr.

3.7 Quality of ground water

In general, the ground water in the district of Nalgonda is found to be suitable for domestic and irrigation purposes. The general range of Electrical conductivity is between 1500 and 2500 micro Seimen/cm at 25 °C. However it is reported that Fluoride concentration is more than permissible limits of 1.5 mg/l in the South Western part of Nalgonda district

4.0 GROUND WATER RECHARGE

The main source of ground water recharge is by the rainfall by direct percolation to the zone of saturation. As already indicated, there is well developed drainage in the area due to moderate rainfall and loamy soils. A significant part of the rainfall is lost as runoff from the area while a limited percentage of rainfall therefore reaches zone of saturation and becomes the part of ground water storage after meeting the evaporation and evapo-transpiration losses. There is also ground water recharge from the return flow of irrigation water pumped from

bore wells and dug wells operated by the cultivators. The ground water recharge from return flow of irrigation is normally taken as 20% of the total water applied for irrigation this percentage has been suggested by the Ground Water Estimation Committee for ground water assessment for this part of the state.

4.1 Ground water recharge of core zone (Plant area)

The core zone covers 1173 hectares area of the power plant including the ash pond, mostly composed of thin alluvium cover underlain by limestone. There are a few bore wells being operated in the area for irrigation by the cultivators.

The recharge from rainfall infiltration as per the guidelines of the Ground Water Estimation Committee, Govt. of India (1997) has also been calculated just for counter check.

4.1.1 Increment in ground water storage

Increment in the ground water storage in the core zone (area covering 1173 hectares) was determined by recording the water levels in the wells in the plant area and very close to the plant area during pre and post-monsoon periods of 2015. Average rise of water level in the limestone due to rainfall was found as 3.86 m. Taking the specific yield value of 3% for the limestone , the ground water recharge is estimated as under:

$$11.73 \times 1,000 \times 1,000 \times 0.03 \times 3.86 = 1.36 \text{ mcm (Million cubic metres)}$$

This ground water recharge has taken place due to rainfall of 624.2 mm for the year 2015 but when normalized to average annual rainfall of 683 mm, it amounts to **1.48 mcm**.

4.1.2 Rainfall infiltration

The Ground Water Resource Estimate Committee, formed by Govt. of India has proposed rainfall infiltration factor to be used for estimation of ground water recharge for the areas where monitoring of wells cannot be done or has not been done.

The committee has suggested 10-20% as the rainfall infiltration factor for consolidated sedimentary area having fractured, jointed and well bedded limestone. The upper limit can be taken for the areas having favorable hydrogeological conditions of ground water recharge as for this area, where rainfall is moderate and area is well drained. Taking the value of infiltration as 20%, the ground water recharge from rainfall for core zone has been estimated as 1.46 mcm.

$$11.73 \times 1,000 \times 1,000 \times 0.20 \times 0.624 = \mathbf{1.46 \text{ mcm}}$$

This value of ground water recharge calculated from rainfall infiltration matches very well with the value calculated on the basis actual increment in ground water storage by rainfall.

4.2 Ground water recharge of buffer zone (10 km radius area)

Buffer zone has limestone and granite as water bearing formations. The total area of the buffer zone is 486.27 km² (498 – 11.73 km² of plant area) (**Figure-1**) and falls in Damarcherla taluka of Nalgonda district. There is canal irrigation in almost 9 % the buffer zone but major part of the cultivable area is irrigated by bore wells and open wells.

The ground water fluctuation of water table during pre and post-monsoon periods were recorded for the year 2015 from the 30 key wells (**Annexure-I**) as per the guidelines of the Ministry of Environment & Forests and taking specific yield values of 3% for limestone and 1.5% for granite, the ground water recharge by rain fall has been calculated as under.

4.2.1 Increment in ground water storage

Ground water recharge from rainfall for the year 2015, which was almost the average rainfall year for the area, has been calculated by measuring the rise of water levels in the key wells of the 486.27 km² area of buffer zone (**Figure-2**). The water levels were recorded during pre-monsoon period and again during post monsoon period of the year 2015. The rise of water level indicates the quantity of water percolated to zone of saturation due to recharge from rainfall.

The aerial rise of water has been computed by contour method for different water bearing formations and rise was noted as 4.28 m in limestone and 2.88 m in granite respectively. Such a high value of rise of water level is due to low fracture porosity of rocks. Taking specific yield value of 3% for limestone, 1.5% for granites, the ground water recharge has been calculated for the area covered by different water bearing formations. The limestone covers an area of 344.97 km²(excluding core zone) while granite covers 142.30 km².

$$344.97 \times 1,000 \times 1,000 \times 0.03 \times 4.28 = 44.29 \text{ mcm (for limestone)}$$

$$142.30 \times 1,000 \times 1,000 \times 0.015 \times 2.88 = 6.15 \text{ mcm (for granite)}$$

The total ground water recharge of the buffer zone has been calculated as 50.44 mcm against the rainfall of 624.2 mm recorded during the year 2015-16 which when normalized for average rainfall of 683 mm amounts to 55.18 mcm.

4.2.2 Rainfall infiltration

The Ground Water Resource Estimate Committee, formed by Govt. of India has proposed rainfall infiltration factor to be used for estimation of ground water recharge for the areas where monitoring of wells has not been done. The committee has suggested 10-20% as the rainfall infiltration factor for consolidated sedimentaries. The higher limit can be taken for

the areas having favorable hydrogeological conditions as in this area. The ground water recharge from rainfall in buffer zone is calculated as under:

$$486.27 \times 1,000 \times 1,000 \times 0.20 \times 0.624 = 60.68 \text{ mcm}$$

The ground water recharge calculated by fluctuation method matches well with the rainfall infiltration method.

4.2.3 Return flow of irrigation

The norms prescribed by the Estimate Committee for return seepage from the irrigation fields for loamy soils has been suggested as 20% of the total water applied for the irrigation. There are a number of open wells and bore wells in the buffer zone being operated for irrigation. In addition, 9 % (4,300 hectares) of land is being irrigated by canals, providing 10.5 mcm of water during the year 2015-16. Taking 20% as return flow to saturation zone, ground water recharge by seepage amounts to 4.37 mcm.

$$(1.3+16.16) \times 0.20 = 3.49 \text{ mcm}$$

$$(\text{Surface water} + \text{Ground water}) \times \text{return flow} = \text{recharge}$$

The total ground water recharge therefore amounts to **53.93 mcm** after including recharge from return flow of irrigation water.

5.0 GROUND WATER DISCHARGE

5.1 Ground water discharge in core zone (plant area)

At present, there are around 15 bore wells in the plant area being operated for irrigation. This land will be acquired by the Company for power generation purposes. As TSGENCO's water

requirement will be met by Krishna river, there will not be any around water withdrawal and as such no discharge from core area will take place.

5.2 Ground water discharge in buffer zone (10-km radius area)

The ground water discharge takes place mainly by evapo-transpiration and by withdrawal from bore wells and open dug wells operated mainly for irrigation.

There are 35 open wells tapping limestone along with 1065 bore wells. Granite is being tapped by 38 open wells with pumps along with 426 bore wells. Average yield of open wells with pump tapping limestone has been taken as 80 m³/day while tapping granite are yielding 40 m³/day. Bore wells tapping limestone yield 90 m³/day while those tapping granite yield 60 m³/day. Taking these values the discharge from each zone is estimated as under.

$$35 \times 80 \times 120 = 0.336 \text{ mcm (Open wells with pumps tapping limestone)}$$

$$\text{No. of wells} \times \text{average yield/day} \times \text{Rabi irrigation} = \text{Withdrawal}$$

$$1065 \times 90 \times 120 = 11.50 \text{ mcm (Bore wells tapping limestone)}$$

$$\text{No. of B/ws} \times \text{average yield/day} \times \text{Rabi irrigation} = \text{Withdrawal}$$

$$38 \times 40 \times 120 = 0.168 \text{ mcm (Open wells with pumps tapping granite)}$$

$$\text{No. of wells} \times \text{average yield/day} \times \text{Rabi irrigation} = \text{withdrawal}$$

$$426 \times 60 \times 120 = 3.06 \text{ mcm (Bore wells tapping granite)}$$

$$\text{No. of B/ws} \times \text{average yield/day} \times \text{Rabi irrigation} = \text{Withdrawal}$$

In addition, the drinking and livestock water requirement of around 35 villages is met by bore wells, open dug wells and hand pumps and is around 1.1 mcm, the total ground water discharge therefore amounts to **16.16 mcm**.

6.0 PRESENT STATUS OF GROUND WATER DEVELOPMENT

The present study reveals that against the total ground water recharge of **53.95** mcm, including recharge from return flow of irrigation water, the ground water discharge is **16.16** mcm indicating the status of ground water development of buffer zone as 29.95 %. The buffer zone therefore appears to be safe. As the core zone will not be exploited for ground water, the area will further advance into safe category.

The Central Ground Water Board in association with state ground water organization carry out estimation of dynamic ground water reserves of every taluka of the state by monitoring the water levels in key wells during pre and post monsoon periods every year along with estimation of ground water draft. The report is published once in two years and last report has been released for the dynamic ground water reserves as on 31.3.2011. This report places all the taluka in different categories like safe, semi-critical, critical and over-exploited depending on the status of ground water development and long term water level trend. This report has indicated that Damarcherla taluka comes under safe category i.e. ground water development is less than 70% of the long term ground water recharge. This is also revealed by the present study carried out for the buffer zone area.

7.0 FINDINGS OF GEO-TECHNICAL STUDIES CARRIED OUT INSIDE AND OUTSIDE THE PROPOSED ASH POND AREA

7.1 In- situ-permeability tests

There are various methods to determine in-situ permeability of soils but only following two methods are most commonly used.

- Constant and falling head tests.
- Laboratory permeability test.

Constant and falling head tests

This field test is usually carried out in bore holes to determine permeability of substrata and is most reliable. In the constant head method, the water level in the test hole is maintained constant and the permeability is computed from the data of steady state constant discharge whereas in the falling head method, the water level in the test hole is allowed to fall and the equivalent permeability is computed from the data of the rate of fall of water level. The falling head method was adopted for the field studies in the ash pond area.

Laboratory permeability test

Few thin walled samples are obtained from the site and laboratory permeability testing is carried out. This method gives specific values of the site from where the samples were collected and its application over a large area has its limitations. If the clay / sub soil is very dry and hard, attempting thin walled sampling often disturbs the sample either during sampling or sample extraction prior to testing. Therefore the method was not considered useful in this case.

7.1.1 In-situ permeability test

By falling head method:

The coefficient of permeability is usually evaluated on the basis of Darcy's law which states that the rate of flow through a porous medium is proportional to the hydraulic gradient. This relationship is applicable for steady and laminar flow through saturated formations.

Ten 500 cm deep 100 mm diameter holes were drilled using a DTH drilling rig and cased up to 100 to 200 cm. The holes were pre-soaked 1 to 3 hours prior to testing. Tests were carried out at 8 locations in ash pond and 2 locations in the plant area (**Figure-7**). The permeability

by falling head method for 3.0 and 4.0 metre test horizon (1-5 and 2-5 m) was computed by the following relation:

$$K = \frac{d^2}{8L} (\log_e L/R) (\log_e h_1 / h_2) / (t_2 - t_1)$$

Where k= coefficient of permeability

d= diameter of intake pipe

L= length of test zone

h_1 = head of water in pipe at time t_1

h_2 = head of water in pipe at time t_2

R= radius of hole

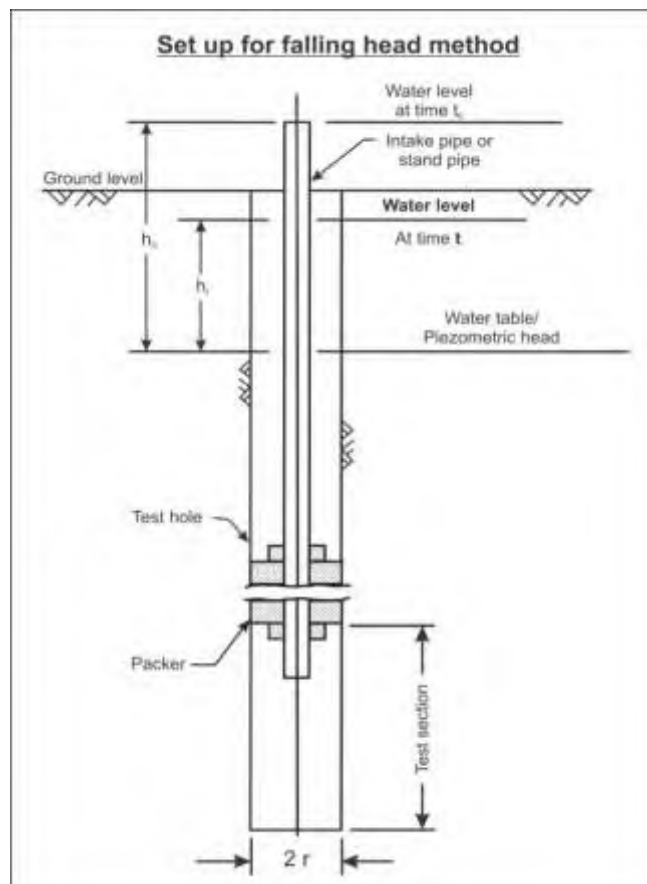
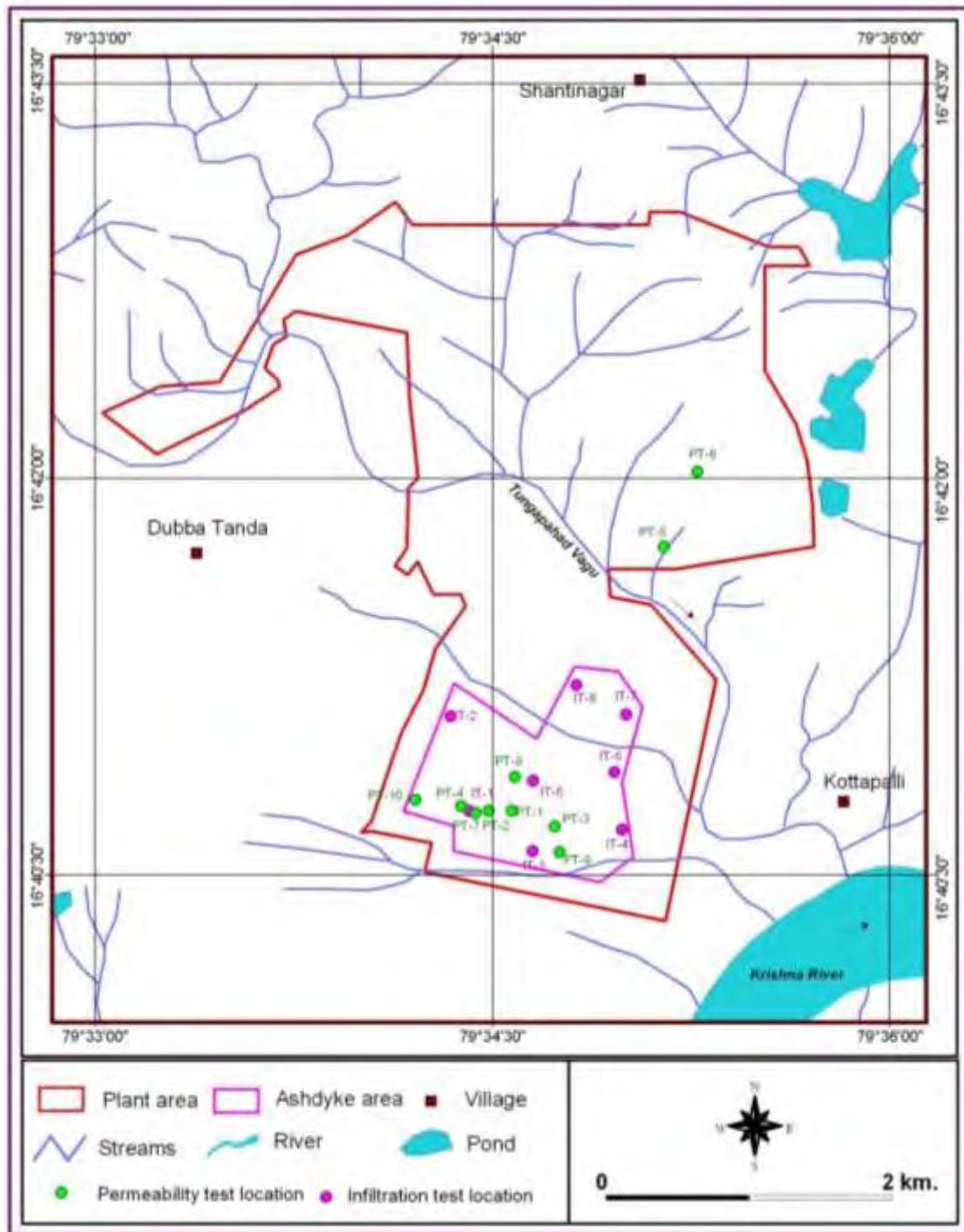


Figure-7. Map showing location of permeability & infiltration test locations



Results:

In general, the permeability was calculated from the first 60 minutes drawdown.

**Table-5. Coefficient of permeability in ash pond area
(Based on Falling head method).**

Location	Depth tested below ground level (m)	K (cm/sec)
P-1	2.0 to 5.0	5.47E-06
P-2	2.0 to 5.0	5.76E-06
P-3	2.0 to 5.0	1.49E-05
P-4	2.0 to 5.0	1.25E-05
P-5	2.0 to 5.0	4.59E-07
P-6	2.0 to 5.0	2.09E-06
P-7	2.0 to 5.0	1.18E-05
P-8	2.0 to 5.0	4.60E-06
P-9	1.0 to 5.0	2.07E-06
P-10	1.0 to 5.0	2.39E-06

7.2 Infiltration test

The infiltration tests were conducted using double ring infiltrometers. The double ring infiltrometer is a way of measuring saturated hydraulic conductivity of the surface layer, and consists of an inner and outer ring inserted into the ground. Each ring is supplied with a constant head of water manually. Hydraulic conductivity can be estimated for the soil when the water flow rate in the inner ring is at a steady state.

It works by directing water on to a known surface area due to the parameters of the inner ring. The rate of infiltration is determined by the amount of water that infiltrates into the soils per surface area, per unit of time. Infiltration can be measured by either a single or double ring infiltrometer, with preference usually lying with the double ring because the outer ring helps in reducing the error that may result from lateral flow in the soil.

Table-6. Soil infiltration rates in ash pond area

Location	Steady State Infiltration Rate (mm/hr)	Saturated Hydraulic Conductivity (K_{sat})		
		(mm/hr)	(m/day)	(cm/sec)
I-1	2.5	3.625	0.087	1.01E-04
I-2	2.9	4.205	0.10092	1.17E-04
I-3	2.8	4.06	0.09744	1.13E-04
I-4	2.5	3.625	0.087	1.01E-04
I-5	3.7	5.365	0.12876	1.49E-04
I-6	3.2	4.64	0.11136	1.29E-04
I-7	2.6	3.77	0.09048	1.05E-04
I-8	2.4	3.48	0.08352	9.67E-05

Analysis of Data:

Data is gained by a drop in water height, giving an infiltration of water over time. These data points are plotted in a graph of infiltration versus time. Theoretically once the soil becomes saturated, a steady state infiltration rate will be reached, which is seen on a graph as a section of data points infiltrating showing linearity. Once this linear section is identified other outlying data points can be excluded from the analysis and a line of best fit can be fitted to the applicable data. The gradient of this fitted line gives the steady state infiltration rate for that particular soil. The steady state infiltration rate can then be multiplied 1.45, to obtain the hydraulic conductivity (K_{sat}), of that soil. This is a measure of how conductive a soil is at saturation, which is a measure of permeability. Accordingly soil infiltrations tests were conducted at 8 sites in ash pond area (**Figure-7**) and the soil infiltration rates were determined (**Table-6**).

Interpretation of base line data:

Boreholes augured up to maximum depth of 5.0 metres below the ground level in the area, reveal the thickness of top soil as 0.15 to 0.35 metres followed by limestones having water table at a depth of 15 to 35 metres below ground level. The in-situ permeability values range from 1.25×10^{-5} to 4.59×10^{-7} cm/sec for the fractured shale and limestone, between depth from 1 to 5 metres (**Table-5**). The underlying shale/limestone are weathered and fractured and therefore would exhibit higher permeability values.

The infiltration rates of soil as 3.5 to 5.4 mm/hr (9.67×10^{-5} to 1.49×10^{-4} cm/sec) observed in the pond areas will have still slower rate of flow after the ponds become operational due to turbid nature of water with higher density as compared to clean water and after compaction of the base.

8.0 IMPACT OF ASH POND ON GROUND WATER

The ground water assessment studies carried out in ash pond areas indicate that the present status of ground water development is and will remain nil. The ash pond area therefore lie in safe category. It is therefore concluded that there will not be any impact of the ponds on ground water regime. More over as there is silty clay horizon from surface to depth of about half a metre followed by shales and limestone with low permeability which may not isolate the ground water from the ash pond and will allow some seepage from ash pond to reach zone of saturation which is at the average depth of 35 metres below ground level during post monsoon period. As the values of permeability have been found around 10^{-6} cm/day, it is proposed that to be on safe side, the ash pond area after compaction, may be provided with natural clay layer of 300 mm of permeability value of 10^{-7} to 10^{-9} cm/sec or HDPE lining for making it a fool proof impervious barrier.

9.0 IMPACT OF ASH POND ON WATER QUALITY

With the laying of natural clay layer/HDPE lining in addition to compacted lateritic horizon, the quality of surface and ground water is not likely to be affected. However, it is proposed that piezometers for monitoring the water levels and water quality may be constructed around the ash ponds to study any variation in water quality and quantity.

10.0 CONTAMINATION FROM BOTTOM ASH & FLY ASH

Indian coals are rich in ash content. Increased coal requirement for thermal power plants has ushered large scale mechanized mining which can poorly sort out shales from coal with consequent increase of ash in coal supplied to power plants. The feed coal in case of this plant will have 50% imported coal as well and taking the given maximum ash content as 35%, a 4000 MW thermal power plant burning 44,505 TPD of coal will generate 11,682 (75 %) TPD of fly ash and 3894 TPD (25%) of bottom ash.

Ash generated by thermal power plant is either disposed in the form of a slurry in ash pond (wet disposal) or in dry condition (dry disposal) as ash mounds. The physical and chemical properties of ash have great influence on the impact on the environment. In coal fired thermal power plant, about 20% of the ash collected is in form of bottom ash and 80% is fly ash. The fly ash is mostly lifted by cement plants and only bottom ash is stored in ash ponds.

Looking to the potential pollution hazards of bottom ash, it becomes necessary to prevent the seepage from the ash ponds to ground water. If ash pond area does not have natural clay with permeability value of 10^{-9} cm/sec to 10^{-7} cm/sec then it becomes necessary to lay either a clay liner or HDPEL. However, in the present case, there is a good thickness of impervious layer of shaly limestone having the permeability values of 10^{-5} to 10^{-7} cm/sec, it might work as an effective impervious barrier after compaction. However, to make a complete 100% impervious layer and taking no chances of any seepage to ground, it is proposed that a 300

mm thick pure clay, having hydraulic conductivity in the range of 10^{-7} cm/sec to 10^{-9} may be laid on the surface and fully compacted below ash pond area.

11.0 HFL SECTION SHOWING THE HEIGHT AND DISTANCE OF THE PLANT FROM KRISHNA RIVER.

With a view that elevation and distance of the plant from the HFL of nearby perennial river is within the permissible limit, HFL section has been prepared along a section line shown in **Figure-8**. The HFL level of nearby perennial river Krishna has been obtained officially from the Chief Engineer, covering Krishna and Godavari Basin Organization, Central Water Commission, Government of India which has reported it as 60.934 m amsl as on 15th October 2015, the maximum of last 32 years, from 1975 to 2006 (Station Code AK000E7, Pondugala, Sub-Division Lower Krishna SD1, N.S. Dam).

Based on this information, HFL section has been prepared (**Figure-9**) which shows that the nearest point of ash pond and plant is 12 metres above HFL and its distance is around 790 metres. So, there is no possibility of ash pond and the plant being affected by Krishna river during any flood.

Figure-8. Section along which the HFL of Krishna river and elevation and distance of ash pond and plant has been prepared

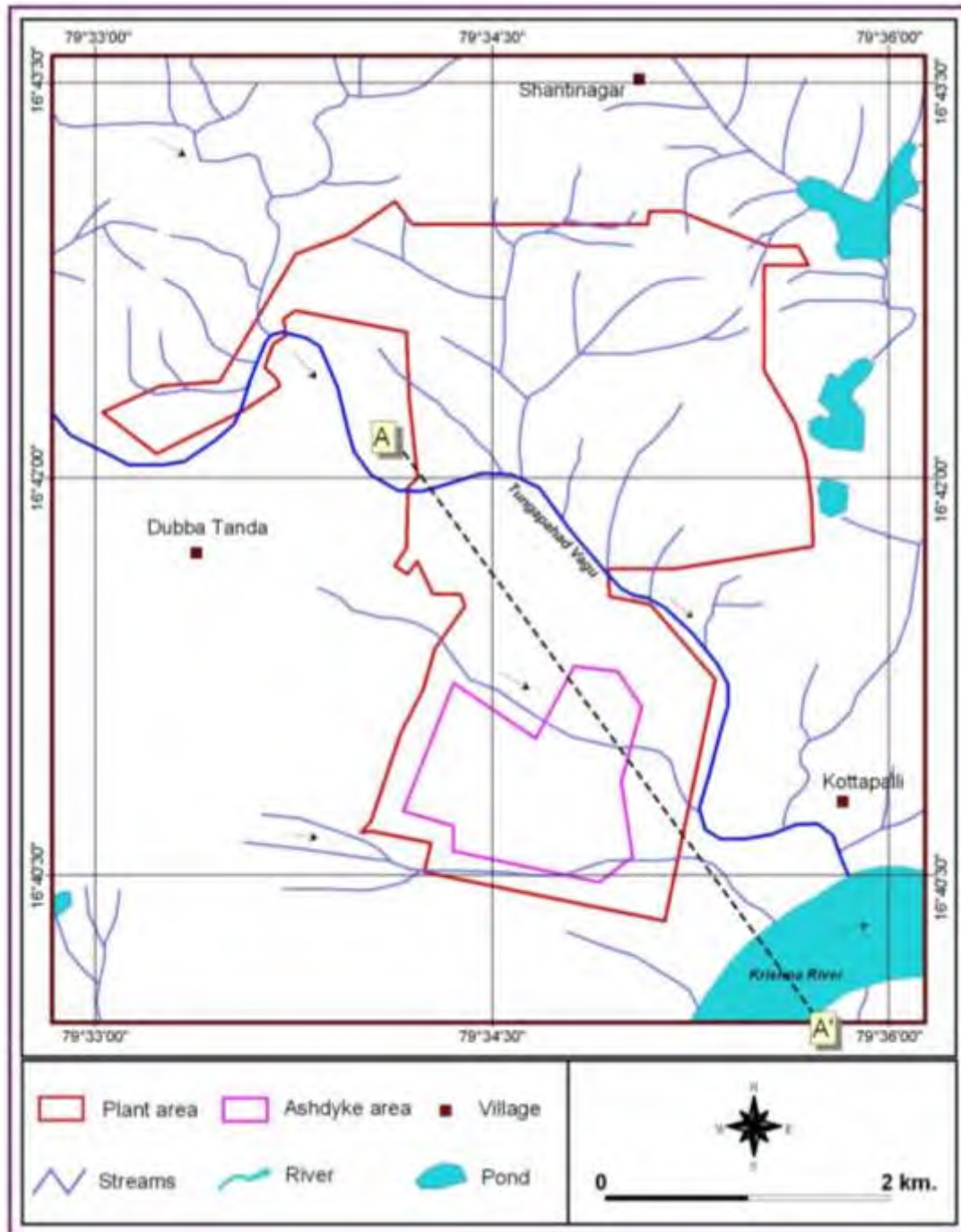
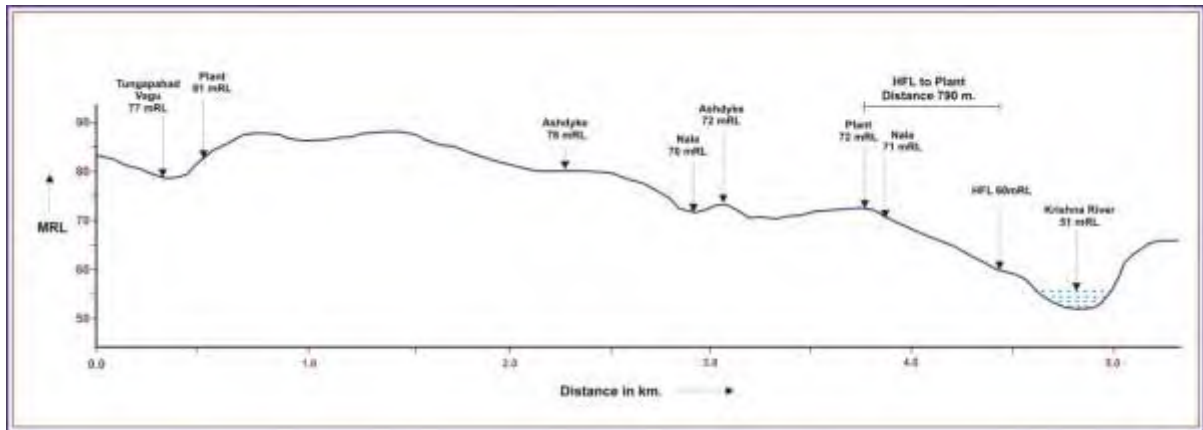


Figure-9. Cross Section showing the HFL of Krishna river and elevation and distance of ash pond and plant



11.1 lean flow and impact of surface water withdrawal from Krishna river in the down stream side

Water is required for process cooling in the condenser, ash disposal, removal of heat generated in plant auxiliaries, and various other plant consumptive uses. For power plants located on main land, the raw water is generally drawn from fresh water source such as river, lake, canal, reservoir, and barrage. The proposed power plant at Veerlapalem requires 2.71 cumec for plant activities. I& CAD, Govt of Telengana has approved to draw water from river Krishna at Kothapalle village of Nalgonda district. In order to carry out water availability study, long time series of daily discharge data at proposed site is required. As discharge data is not available at the proposed site, discharge data at Pondugala GD site maintained by CWC has been taken and given under as **Table-7**. The location of the Gauge/Discharge point and plant location are shown in **Figure 10**.

Table-7. Monthly observed discharge at Pondugala G& D site

year	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Annual
Units: Mm ³													
1976-1977	572.92	7714.05	17252.25	4854.76	1519.40	417.70	232.11	386.19	380.62	466.88	268.57	64.52	34129.98
1977-1978	809.81	3373.94	9172.26	6548.44	4483.09	362.42	300.63	363.99	378.58	579.10	416.76	397.50	27186.51
1978-1979	441.78	7018.81	21516.32	13817.61	8113.75	1969.85	2609.60	1643.40	503.21	405.22	368.59	276.60	58684.75
1979-1980	803.39	1841.39	11659.50	9809.43	6532.60	940.04	967.14	496.46	451.69	461.76	552.91	598.97	35115.28
1980-1981	883.83	9030.76	20081.35	5947.40	2825.72	936.00	646.42	442.88	441.08	449.16	332.72	0.00	42017.31
1981-1982	821.29	1541.70	13686.92	14741.05	5906.07	1203.66	1053.41	809.46	709.30	889.16	853.31	600.04	42815.36
1982-1983	648.97	1283.09	6829.29	3109.38	1542.53	1129.99	832.14	754.05	726.45	789.96	811.97	783.67	19241.47
1983-1984	622.17	1162.79	15353.64	11555.02	5474.27	716.96	533.56	618.61	568.49	568.44	588.31	546.97	38309.22
1984-1985	937.53	1427.28	5482.75	1546.44	1149.92	901.67	914.50	534.06	745.68	1010.75	824.77	729.76	16205.12
1985-1986	590.41	1210.51	1264.02	1354.33	832.30	546.54	352.61	339.15	341.12	484.24	694.77	621.78	8631.78
1986-1987	676.38	984.70	1042.42	963.34	951.77	568.20	550.89	522.50	517.50	647.55	190.46	88.97	7704.69
1987-1988	422.37	940.80	764.24	646.33	492.51	641.95	385.68	530.83	491.05	1148.59	800.19	819.03	8083.58
1988-1989	627.96	614.26	6443.72	16477.72	4713.37	587.38	461.61	522.82	584.80	1091.85	1095.93	566.84	33788.03
1989-1990	702.16	1199.52	1565.06	4296.98	5227.68	606.93	506.17	591.17	698.47	759.59	679.10	830.78	17663.59
1990-1991	619.64	1241.80	13358.68	4071.25	3440.01	1208.82	636.87	708.13	1306.33	1699.70	1188.64	536.81	30016.67
1991-1992	977.05	6033.25	17336.67	3284.48	1577.86	705.89	727.17	541.00	922.32	1225.99	1214.36	718.59	35264.64
1992-1993	434.13	830.23	1500.24	3686.52	1302.52	874.96	893.93	1020.76	1154.85	1152.11	1106.43	778.19	14734.86
1993-1994	596.61	1466.30	1962.64	2310.86	9477.54	1416.11	905.29	1222.00	1834.29	2509.48	1146.51	678.89	25526.52
1994-1995	447.53	11412.79	7089.60	12504.99	2384.53	1238.25	834.96	647.94	1280.33	1412.76	457.41	266.85	39977.95
1995-1996	344.90	624.89	1153.15	815.26	1186.94	709.53	909.26	519.68	420.86	481.57	615.35	459.21	8240.60
1996-1997	517.38	609.24	1045.84	1934.37	10564.45	1057.35	632.77	608.10	884.40	1590.27	1048.21	508.85	21001.22
1997-1998	494.25	1167.85	9392.74	5348.73	1443.41	623.46	383.18	633.71	669.12	1150.11	1121.27	608.44	23036.27
1998-1999	587.18	1062.28	1205.88	6810.16	24103.38	1058.52	560.23	641.34	701.78	1167.27	1080.36	399.53	39377.93
1999-2000	604.86	1324.11	5160.51	2036.54	1074.14	982.39	668.17	674.13	639.46	1688.67	1829.35	575.32	17237.64

Figure-10. The location of plant site and Pondugala G&D station



The average minimum daily flow in each month at Pondugala G/D station is given in **Table-8** and the daily required water for plant (2.71 cumec) . The maximum percentage is observed at Pondugala in the month of May (13.5%). It was observed that the withdrawal percentage is less than 20% in lean season. However to draw water from Krishna river, a suitable location should be identified after proper investigation.

Table-8. Average minimum discharges at Pondugala (1976 to 2000)

Month	Minimum Cumec	% Withdrawn
Jun	167.49	2.01
Jul	235.05	1.43
Aug	294.85	1.14
Sep	249.36	1.35
Oct	190.01	1.77
Nov	139.82	2.40
Dec	86.08	3.90
Jan	130.84	2.57
Feb	131.60	2.55
Mar	156.33	2.15
Apr	103.61	3.24
May	24.89	13.50

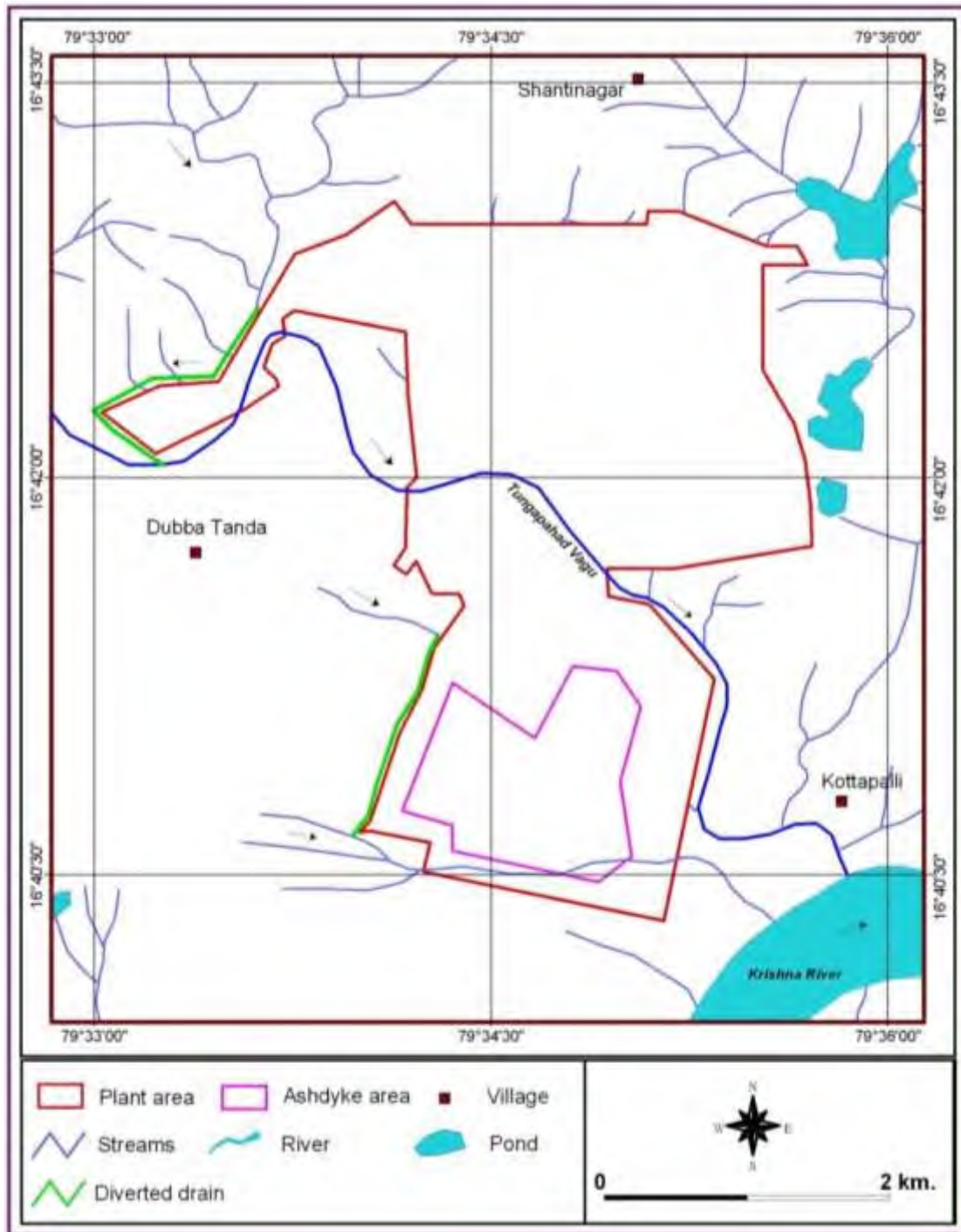
12.0 IMPACT OF THE PLANT ON NATURAL DRAINAGE SYSTEM AND ANY DIVERSION REQUIRED

A review of the drainage system of the area (**Figure-3**) before setting the plant shows that that Tungapahad Vagu (stream), an ephemeral stream, passes through the centre of the plant area taking south-easterly course. This is a big stream having significant catchment area outside the plant in north western side.

There are some streamlets flowing through the plant area which meet Tungapahad Vagu. These streamlets which originate due to rainfall within the plant area will stop flowing as Storm water drainage system will be designed before constructing the plant and it will be allowed to meet the Tungapahad Vagu as and where feasible. There is a stream with limited catchment area entering in the ash pond area which has to be diverted to join another stream flowing in the south. Another streamlet just passes through the southern part of the ash pond and will be allowed to flow undisturbed and the ash pond will be formed away from this streamlet.

The drainage system shows that a major stream enters the plant area from north western side and meets Tungapahad Vagu which passes through the plant area. Although Tungapahad Vagu will be allowed to flow undisturbed, the four streams of 1st order and major stream meet Tungapahad Vagu. These streams need diversion and will ultimately join Tungapahad Vagu in the western-central part. With the proposed two diversions, the surface drainage will not be affected and all the surface drainage will join the natural drainage without affecting the surface water regime due to plant as shown in **Figure-11**.

Figure-11. Diversion program proposed for the streams entering in the plant area



12.1 Diversion program for streams meeting Tungapahad Vagu from the western side

The total catchment area of four 1st order stream and major stream originating on the north and western side of the plant is 18.72 km². The catchment yield this river, before it joins Tungapahad Vagu from the western side has been estimated as 3.83 Mm³, taking 30% as runoff coefficient for hard rock topography and hilly terrain and average annual rainfall of 683 mm. However, the maximum runoff, taking maximum rainfall of 250 mm /day and runoff coefficient of 30 % and hydraulic gradient of 10 m/km, the flow will be 16.25 cumecs.

12.2 Diversion program for stream entering ash pond area

There is one 1st order streamlet with limited catchment area of 74 hectares which enters ash pond area and needs to be diverted to join another stream which is just flowing in the southern part of the ash pond. This being a 1st order stream and having limited catchment yield estimated as 0.15 Mm³, taking 30 % as runoff coefficient for hard rock topography and hilly terrain. However, the maximum runoff, taking maximum rainfall of 250 mm /day and runoff coefficient of 30 % and hydraulic gradient of 11/km, the flow will be 0.62 cumec.

13.0 POTABLE WATER SUPPLY FOR VILLAGES LOCATED IN DAMARCHERLA MANDAL

Damarcherla Mandal, as per the Mandal's Revenue office of Nalgonda District, has 17 villages out of which 13 villages have piped water supply schemes while all the villages have bore wells and 4 villages have 17 open dug wells providing drinking water. So, every village has an assured water supply scheme. Few villages, where some clusters of houses, may not be getting piped water supply, may be getting water supply from hand pumps. If some such cluster of houses does not have access to water supply, hand pumps may be the most convenient and nearest source of water. Damarcherla Mandal is composed of hard, well bedded and jointed limestone having shallow water levels, within 10 metres below the

ground level. Limestone is most suitable for construction of hand pumps which can be constructed by deploying a light duty DTH drilling rig. One hand pump can be constructed in one day and in a village where there are cluster of houses. One hand pump, if constructed up to depth of 40 m to 50 metres with dia of 150 mm can provide assured potable water supply of 1000 to 2000 litres/hour. Any house holder can get the potable water from a hand pump as and when needed by operating it manually and filling the pot or bucket within 5 minutes. By the time, next user comes, the hand pump recovers the drawdown and can again provide water even during the summer months.

Fortunately, the quality of ground water is potable in all the villages of Damarcherla Mandal and all other constituents like Total dissolved salts, Chloride, Nitrate, Fluoride, Sulphate, Iron, Total Hardness etc are all within the permissible limit as per Indian Drinking Water standards 10,500 -2012.

13.1 Cost and design hand pumps

As the area is most suitable for construction of hand pumps due to consolidated sedimentary rocks and having shallow water levels and a most convenient method of getting drinking water even for a cluster of few households in a village, it is proposed that as and when a water supply source is required, hand pumps may be constructed. One hand pump can be constructed in one day by deploying a light DTH rig, about 40 m to 50 metres in depth with a dia of 150 mm. It may be necessary to install a Mild steel or PVC pipe of 3 m to 6 metres against the alluvium or weathered limestone so that it may not collapse. This well may be fitted with India Mark-II hand pumps or any locally made hand pump and each hand pump may be provided a cemented plate form of 1 m dia with a drain of 10 m to collect the surplus water in a tank of 3m x 3m and depth of 3 metres. This may be filled with gravel or coarse sand so that this surplus overflow of water during manual operation of hand pump gets filtered and recharges the ground water storage around it.

The normal rate of drilling of 150 mm dia bore well by DTH rig is around Rs.200/ to Rs.250/m. So a hand pump of 40 metres depth will cost Rs.8,000 to Rs.10,000/ India Mark-II hand pump will cost another Rs. 5,000/ and with cemented platform and a drain and filtration tank would cost another Rs. 3000/. So, the average cost of a hand pump will be around Rs.16,000/ to Rs.18,000/ and will meet the water requirement of about 50 house holders. As and when there is any breakdown of hand pump, this can be repaired by local village mechanic or by the pump supplier on annual maintenance contract basis and the payment can be made by village Panchayat or village council.

A Photoplate of a hand pump showing the location of filtration tank to be filled with filter media like gravel and coarse sand is shown as under.



14.0 SURFACE AND GROUND WATER QUALITY OF BUFFER ZONE

With a view to find out the suitability of surface water for irrigation and general use and ground water for drinking use, one water sample was collected from Krishna river flowing near the plant while 13 water samples were collected from the bore wells as shown in **Figure-12** and in **Table-9**. All the 14 water samples were analyzed in the Chemical Laboratory of Vimta Labs. Ltd, an accredited Lab by NABL. All the water samples were analyzed for 35 constituents and parameters including bacteriological tests like Total Coliform and Fecal Coliform. The chemical analysis results were compared with the Indian Drinking Water Standards (IS-10,500-2012) (**Annexure-II**).

While reviewing the results of ground water analysis, it is found that entire buffer zone has ground water within the acceptable limits. The quality of surface water of Krishna river is better than the bore wells.

Table-9. Details of location, type of source, and villages from where the water samples were collected and analyzed

S. No.	Water Sample Code	Source	Location/village
1.	SW-1	River	Krishna River
2.	GW-1	Bore well	Kallepalli
3.	GW-2	Bore well	Telukuttla
4.	GW-3	Bore well	Gottimukala
5.	GW-4	Bore well	Adividevulapalli
6.	GW-5	Bore well	Ragadappa
7.	GW-6	Bore well	Damacherla
8.	GW-7	Bore well	Virapalem
9.	GW-8	Bore well	Virappagudem
10.	GW-9	Bore well	Plant Site (BW-1 Vimta)
11.	GW-10	Bore well	Ash pond area (BW-5 Vimta)
12.	GW-11	Bore well	Ash pond area (BW-6 Vimta)
13.	GW-12	Bore well	Virapalem village
14.	GW-13	Bore well	Tallaveerapagudem village

Figure-12. Map of buffer zone showing the locations from where water samples were collected and TDS concentration contour



14.1 Discussions on the results of chemical analysis

14.2 Constituents affecting human health if more than acceptable/ permissible limits

There are two constituents, Fluoride and Nitrate which affect the human health if these are present in drinking water more than the permissible limits.

14.2.1 Fluoride

The acceptable and permissible limits of Fluoride are 1.00 mg/l and 1.5 mg/l respectively. All the 13 ground water samples, collected from the buffer zone have Fluoride content ranging from 0.1 mg/l to 1.1 mg/l. All the samples have Fluoride less than 1.00 mg/l, the acceptable limit except one sample (GW-12) which has Fluoride as 1.1 mg/l, but it is within the permissible limit of 1.5 mg/l. Higher concentration of Fluoride in water in the range of 3 to 10 mg/l can cause Fluorosis, causing deformation of bones which is not curable. Fortunately, such situation is not in all the wells being used for drinking. So, it is clear that ground water of the buffer zone has no problem with respects to Fluoride.

14.2.2 Nitrate

The acceptable limit of Nitrate is 45 mg/l while there is no relaxation for it. So, the drinking water must not have nitrate more than 45 mg/l. High Nitrate concentration in ground water is mostly due to contamination from decaying organic matter, sewerage waste and nitrate fertilizers. The ground water gets high concentration of Nitrate if the water levels are shallow. High concentration more than 45 mg/l can create methamoglobinemia (conversion of hemoglobin to methamoglobin due to nitrate thereby restricting oxygen to brain) in infants. However, all the 13 water samples, collected from the buffer zone have Nitrate content ranging from 0.2 mg/l to 56.8 mg/l indicating that only one water sample (GW-11) has

Nitrate content of 56.8 mg/l . All other samples have Nitrate around 1 mg/l. It is very likely that water sample from GW-11 may be due to local contamination from decaying organic matter.

14.3 Other parameters/ constituents

14.3.1 Odor & taste

Odor is recognized as a quality factor affecting acceptability of drinking water and food prepared from it. Most organic and some inorganic chemicals contribute to taste or odor. The odor and taste is agreeable for all the samples analyzed.

14.3.2 pH value

pH value is the logarithm of reciprocal of hydrogen ion activity in moles per litre. In water solution, variations in pH value from 7 are mainly due to hydrolysis of salts of strong bases and weak acids or vice versa. Dissolved gases such as carbon-dioxide, hydrogen sulphide and ammonia also affect the pH of water. The overall pH range of natural water is generally between 6 and 8. Higher values of pH more than 8.5 and lower than 6.5 indicates industrial pollution.

The pH limit fixed for drinking water as per IS: 10500-2012 standards is 6.5 to 8.5. Beyond this range, the water will affect the mucus membrane system. Within and around the well fields, the pH of the groundwater was found varying between 6.95 to 8.35. The pH values for all the samples collected from the buffer zone are within the acceptable limits.

14.3.3 Total Hardness

Hardness of water is caused by the multivalent metallic cations and is largely due to the presence of calcium, Ca^{++} , and magnesium, Mg^{++} ions. Hardness is reported in terms of CaCO_3 . Hardness is the measure of capacity of water to react with soap. It is not caused by single substance but by a variety of dissolved polyvalent metallic ions, predominantly calcium and magnesium cations.

The acceptable and permissible limits of Total Hardness as Calcium Carbonate are 200 mg/l and 600 mg/l respectively. All the 13 water samples, collected from the buffer zone have Total Hardness ranging from 70 mg/l to 480 mg/l. 9 water samples have Total Hardness more than 200 mg/l as Calcium Carbonate indicating that they are within permissible limit of 600 mg/l.

14.3.4 Chloride

Chloride is one of the major inorganic anion in water. In potable water, the salty taste is produced by the chloride concentration. There is no known evidence that chloride constitute any human health hazard. For this reason, chloride has been kept as 250 mg/l under acceptable limit while it is 1000 mg/l under permissible limit.

Chloride levels in sampled water varied between 28.4 /l to 182 mg/l. It means that drinking water has very good palatability and quenches the thirst as it has Chloride less than 250 mg/l, the acceptable limit.

14.3.5 Color

Color in water may be due to the inorganic ions, such as iron and manganese, humus and peat materials, plankton, weeds and industrial wastes. Ground water is mostly colorless as it

gets filtered before reaching the zone of saturation. The color is expressed in Hazen units and means the true color of water from which turbidity has been removed. Color of all the water sample were found almost colorless and with less than 5 hazen units, the acceptable limit for drinking water. However there are two samples (GW-10 & GW-13) having Hazen limit of 7 and 6 units. This may be due to local contamination from organic waste.

14.3.6 Total Dissolved Solids

Total dissolved solids (TDS) is the term applied to the residue remaining in a weighed dish after the sample has been passed through a standard fiber glass filter and dried to constant mass at 103 – 105 °C or 179 – 181°C. Many dissolved substances are undesirable in water. Dissolved minerals, gases and organic constituents may produce aesthetically displeasing color, taste and odor. Some dissolved organic chemicals may deplete the dissolved oxygen in the receiving waters and some may be inert to biological oxidation, yet others have been identified as carcinogens.

The acceptable limit for total dissolved solids as per IS:10500-2012 is 500 milligrams per litre (mg/l) in groundwater, where as the permissible limits, in absence of alternate source is 2000 mg/l, beyond this palatability decreases and may cause gastro-intestinal irritation. In all 13 groundwater samples collected from the buffer zone , the TDS were found to be varying between 305 mg/l and 968 mg/l. only 3 water samples have TDS within acceptable limit while 10 water samples having TDS more than 500 mg/l . However, all the ground water samples are within the permissible limit and have less than 1000 mg/l against the permissible limit of 2000 mg/l.

14.3.7 Sulphate

The major physiological effects resulting from the ingestion of large quantities of sulphate are catharsis, dehydration, and gastrointestinal irritation. Sulphate levels in the water samples

were found to be in the range of 29.6 mg/l to 227 mg/l against the acceptable limit of 200 mg/l. It is higher than 200 mg/l only in one sample (GW-8) where it 227 mg/l but is within the permissible limit of 400 mg/.

14.3.8 Coliforms

Coliforms are normally present in surface water as the surface runoff collects the Coliform from organic waste, fecal source, cattle waste etc. Ground water mostly does not have any coliform as it is removed while filtration through alluvial formation before it joins the zone of saturation. So, in majority of water supply from bore wells is directly supplied to consumers without any water treatment.

All the 13 water samples collected from bore wells was found not to have any Fecal Coliform and Total coliform in MPN/100 ml. So, the water pumped from wells in the buffer zone does not appear to have been bacteriologically polluted.

So, it is concluded that ground water quality of the buffer zone is perfecting suitable for drinking use where all the constituents are within the acceptable limit and permissible limits of IS-10500-2012.

Regarding heavy and toxic metals, all these are within acceptable limits except Lead, Iron and Chromium which are within permissible limits. Of course, these are not expected in ground water where there are no polluting industries and mineral deposits for these ores.

As one surface water was collected from Krishna river and it shows that all the constituents are within acceptable limit except that being a surface water, it might be having more suspended solids, Total Coliform and Fecal Coliform more than ground water but all the constituents and parameters are within acceptable limits.

15.0 ROOF TOP RAIN WATER UTILIZATION POTENTIAL IN PLANT AREA

15.1 Proposed Power house, Admin building, Service building, CW pump house and Clarified water pump house

There are proposed Power house, Admin building, Service building, CW pump house and Clarified water pump house having total roof top area of 23600 m². All the roof top rain water will be collected through drain pipes and brought to a recharge trench which will be constructed in front and back of the building and filled with filter media as shown in **Figure-13**. The excess water will be collected in proposed Recharge Dug well (**Figure-15**).

Figure-13. Recharge system for proposed buildings
(Power house, Admin building, Service building, CW pump house and Clarified water pump house)



The availability of roof top water and the peak runoff from the roof top of the different buildings i.e. Power house, Admin building, Service building, CW pump house and Clarified water pump house having total roof top area of 23600 m² has been estimated as under, taking annual average rainfall as 624.2 mm, 0.85 as runoff coefficient for cemented roof and rainfall intensity which is about 60 mm/ hour day as peak rainfall for Nalgonda area.

Availability of roof top rain water	$23600 \times 0.85 \times 0.624 = 12517 \text{ m}^3$

Peak availability of water during 60 minutes	$23600 \times 0.85 \times 0.06 = 1204 \text{ m}^3$

It is proposed that roof top rain water from the Power house, Admin building, Service building, CW pump house and Clarified water pump house building (having total roof top area of around 23600 m²) may be collected through 50 mm PVC drain pipes and brought to the recharge trench which will be constructed in front and back of the building and will have minimum length of 5100 metres in front and back of the building.

The capacity of the recharge trench is sufficient to accommodate the peak rainfall of 60 minutes taking 50% as void ratio.

$$0.5 \times 1 \times 5100 \times 0.5 = 1275 \text{ m}^3$$

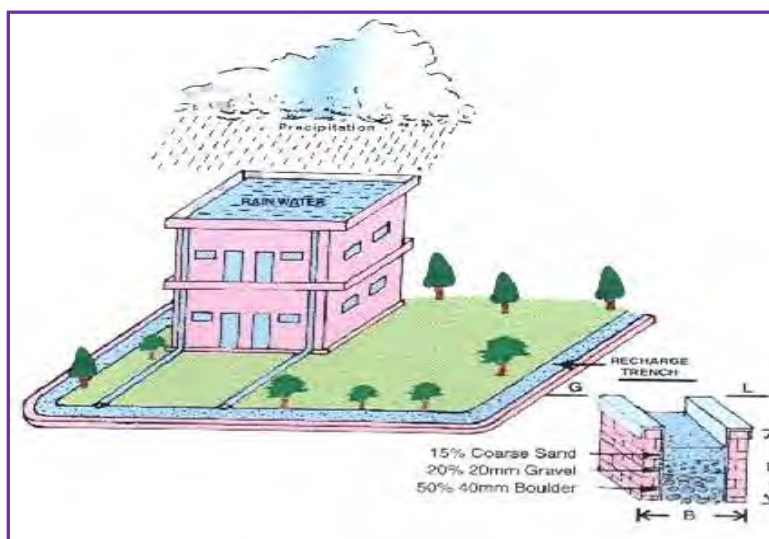
$$W \times D \times L \times \text{void ratio} = \text{capacity}$$

Any surplus water (during any cloud burst or slow infiltration rate of the trench) may be taken as overflow to proposed Recharge Dug well constructed in the plant area. The water in the trench will gradually percolate and join the water table in due course of time.

15.2 Fire water pump house

There are proposed Fire water pump house having total roof top area of 300 m². All the roof top rain water will be collected through drain pipes and brought to a recharge trench which will be constructed in front and back of the building and filled with filter media as shown in **Figure-14**. The excess water will be collected in proposed Recharge Dug well (**Figure-15**).

Figure-14. Recharge system for proposed fire water pump house



The availability of roof top water and the peak runoff from the roof top of the Fire water pump house having total roof top area of 300 m² has been estimated as under, taking annual average rainfall as 624.2 mm, 0.85 as runoff coefficient for cemented roof and rainfall intensity which is about 60 mm/ hour day as peak rainfall for Nalgonda area.

Availability of roof top rain water $300 \times 0.85 \times 0.624 = 159 \text{ m}^3$

Peak availability of water during 60 minutes $300 \times 0.85 \times 0.06 = 15 \text{ m}^3$

It is proposed that roof top rain water from the Fire water pump house building (having total roof top area of around 300 m²) may be collected through 50 mm PVC drain pipes and brought to the recharge trench which will be constructed in front and back of the building and will have minimum length of 75 metres in front and back of the building.

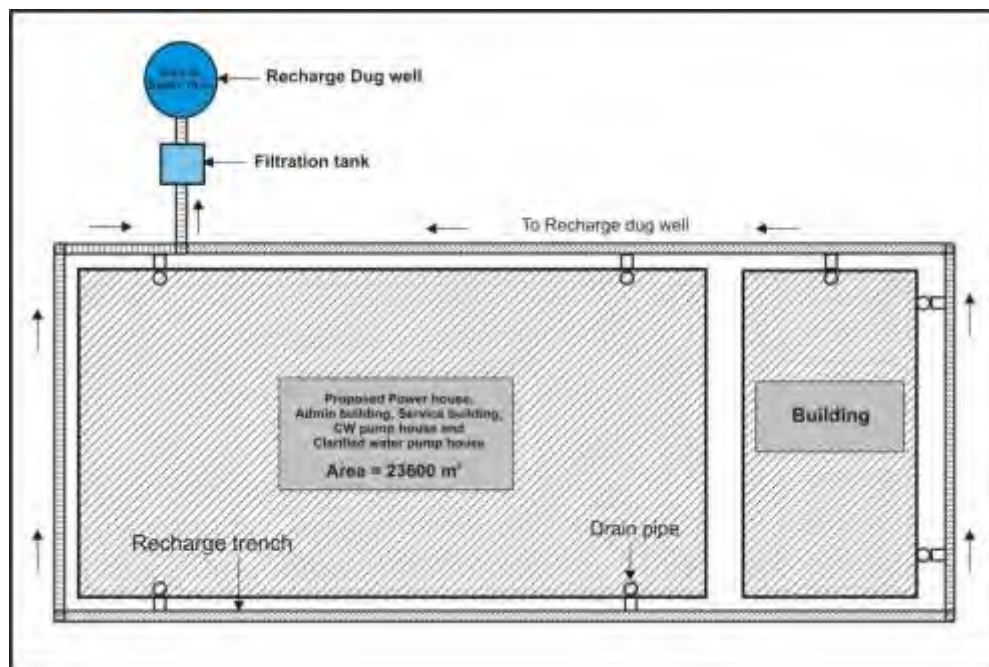
The capacity of the recharge trench is sufficient to accommodate the peak rainfall of 60 minutes taking 50% as void ratio.

$$0.5 \times 1 \times 75 \times 0.5 = 19 \text{ m}^3$$

$$W \times D \times L \times \text{void ratio} = \text{capacity}$$

Any surplus water (during any cloud burst or slow infiltration rate of the trench) may be taken as overflow to proposed Recharge Dug well constructed in the plant area. The water in the trench will gradually percolate and join the water table in due course of time.

Figure-15. Illustration of recharge system for different buildings and proposed recharge dug well



15.3 Road/paved areas and green belt

Table-10. Illustration of Water Harvesting Potential for different land uses

S. No.	Description	Quantity
1.	Average Annual rainfall	624 mm (0.624m)
2.	Rainwater endowment of one hactare area (10,000 sq. m) per year	10,000 X 0.624= 6240 m ³ per year
3.	Water harvesting potential of -Paved areas and road side drains -Green belt and other areas left out	75% of sl. no. 2 i.e. 4680 m ³ per year 25% of sl. no. 2 i.e. 1560 m ³ per year

Table-11. Water Harvesting Potential in the Proposed Plant Area

Land Use	Area in hactares	Water Harvesting Potential (m ³ /yr)
Paved areas and road side drains	4	24960
Green belt	400	624000
Total Area	404	648960

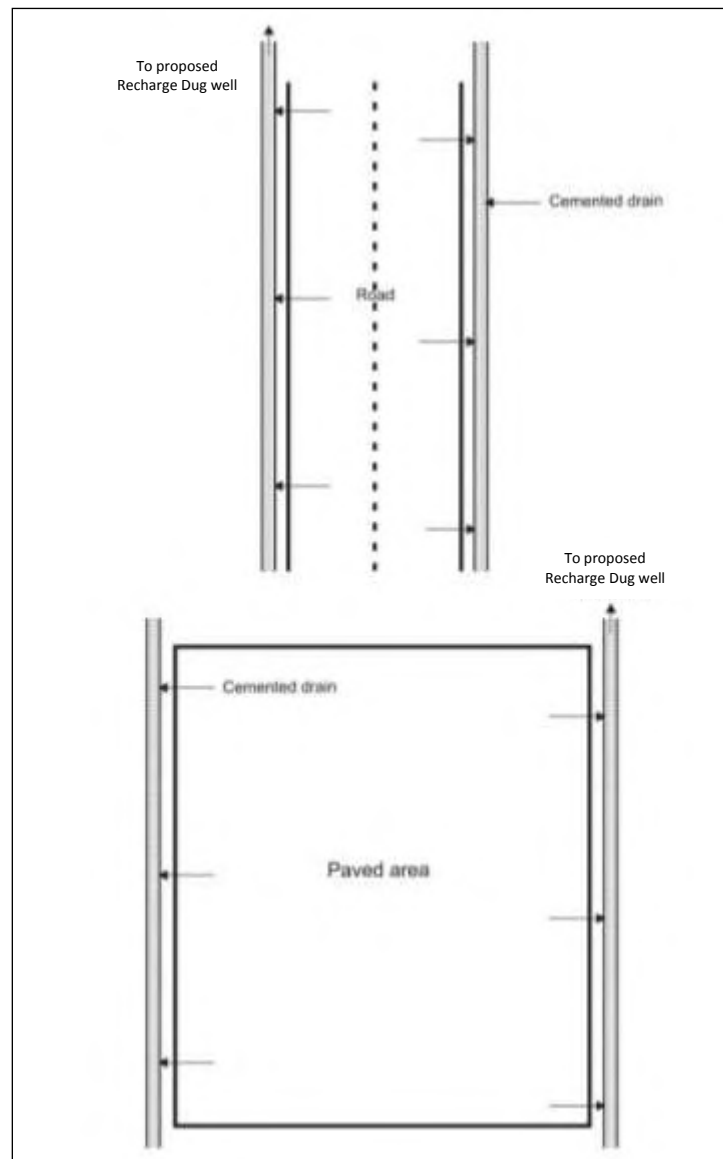
From the above harvested area it is expected that 648960 m³ of rainwater is the potential for a normal year. This harvested water (fresh) should be stored in a separate tank for in plant water requirement. If the available water from paved areas can not be stored and is recharged it is proposed that the runoff from the paved areas may be collected in the cemented drains having required slopes and taken the proposed recharge dug well.

The availability of water and the peak runoff from the road and paved area 4000 m² has been estimated as under, taking annual average rainfall 624 mm, 0.5 as runoff coefficient for cemented floor and average rainfall intensity of 60 mm /day as peak rainfall for the area.

Availability of water from paved areas $4000 \times 0.50 \times 0.624 = 1248 \text{ m}^3$

Peak availability of water during 24 hour $4000 \times 0.50 \times 0.06 = 120 \text{ m}^3$

Figure-16. Recharge system for paved area and road



15.4 Total Ground water recharge

The total ground water from the roof top of buildings has been estimated as 12,676 m³/year while from paved area, it is 1248 m³/year. All this quantity is based on the initial buildings which will be constructed under Phase-I. With construction of more buildings, this will increase according to roof top area and area of the paved roads.

S. No.	Structures	Total rain water harvested in m ³ /yr	Ground water recharge in m ³ /yr
1.	Proposed Power house, Admin building, Service building, CW pump house and Clarified water pump house	12517	6258.5
2.	Fire water pump house	159	79.5
3.	Road and paved area	1248	624
4.	Green belt (30% as surface runoff)	194688	97344
Grand Total		208612	104306

16 CONCLUSIONS & RECOMMENDATIONS

16.1 Conclusion

After conducting the comprehensive hydrogeological assessment studies of the plant area and its buffer zone, it is concluded that area has adequate ground water resources of which hardly 30 % is being exploited for irrigation and there is surplus which could be exploited in future.

Krishna river is perennial in nature and even during the summer, just before the first monsoon rain, the minimum flow (May, 1976) has been measured as 24.89 cumec or 2.15 Mm³/day against the power plant requirement of 2.71 cumec. Thus the withdrawal percentage is less than 15% in lean season.

An ambitious rain water recharging has been proposed which can be executed for harvesting the rain water within the plant area from the roof top of different buildings. Similarly, the surface runoff can be utilized for augmenting the groundwater storage of the buffer zone which has unsaturated horizon during post monsoon period which could be recharged.

16.2 Recommendations

16.2.1 Time bound action plan for specific mitigation measures (During the construction stage)

16.2.2 Laying of clay or HDPE lining below the ash pond

As it has been found, after conducting geotechnical studies, that the horizon below the proposed ash pond does not have the required permeability to arrest the seepage of water from the ash pond, it is necessary that an impervious lining may be laid below the ash pond so that contaminated ash pond water does not join the zone of saturation. Accordingly, it is proposed that while the thermal power plant is being constructed, either a 300 mm thick natural clay line may be laid or HDPE lining may be placed at the bottom after the compaction of the soil. The lining must have permeability in the range of 10^{-7} cm/second to 10^{-9} cm/second.

16.2.3 Construction of piezometers around ash pond.

With a view to know any contamination from ash pond by seepage to join the ground water and the consequent rise of water table in the surrounding area of ash pond, covering an area of 180 hectares, it is proposed that 12 piezometers (small dia shallow bore wells meant only

for measuring the water levels) may be constructed around the ash pond. The piezometers will be 100 mm dia and 40 metres deep, 3 on each side with PVC casing and casing cap. The piezometers may be about 10 metres away from the ash pond boundary and are to be monitored quarterly for water levels and water quality.

16.2.4 Diversion of stream entering the plant area from outside

Drainage pattern of the plant area (Figure-3) shows that there are two first order streams entering the plant area from northern and the ash pond area from the western side. The water of these the northern side stream will be diverted via drains to the Tungapahad Vagu whereas the western side stream will rejoin its normal course as shown in Figure-11. This diversion channel may be constructed while the thermal plant is under construction.

16.2.5 Rain water harvesting and storm drainage works in the plant

The roof top rain water from different buildings will be recharged through trenches and any excess water will be recharged through openwells. The surface rain water runoff from paved area will be handled in the same manner. While designing the storm drainage system of the plant, the runoff generated after construction of plant may also be considered.

16.2.6 Mitigation measures to be taken up during the operation of plant

It is very likely that the thermal power plant will commence power generation after one to two years of the initiation of construction work. Once it is in operation, the following action plan may be undertaken.

16.2.7 Disposal of fly ash

With the generation of 5 x 800 MW of power and with the annual consumption of coal :

- A. 13.81 MTPA (1854.42TPH) -50% domestic coal + 50% imported coal of GCV 4550 Kcal/kg and heat rate 2109.40 kcal/kwh
- B. 11.02 MTPA (1480.28 TPH) -100% imported coal of GCV 5700 Kcal/kg and heat rate 2109.40 kcal/kwh

The total ash generated from the proposed plant will be about 3.94 MTPA. Out of this fly ash will be about 3.1 MTPA and balance 0.8 MTPA will be bottom ash.

It has been envisaged that entire fly ash will be lifted by the nearby cement plants and brick manufacturers .Efforts must be made to see the entire quantity of fly ash is lifted and only bottom ash remains in the ash pond.

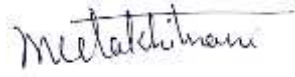
16.2.8 Monitoring the piezometers for water levels and water quality

As soon as the ash pond start getting the fly ash/bottom ash, all the piezometers must be monitored quarterly (pre-monsoon, mid – monsoon, post – monsoon and) winters and water samples may be collected and analyzed for important constituents to see that ground water is not getting contaminated from ash pond. Based on the fluctuation of water levels and variation in ground water quality, an annual report may be prepared showing any impact and submitted to CGWA & State Pollution Control Board. If any impact is noticed, immediate mitigation measures must be taken up to control the contamination.

Hydrology and hydrogeology of core
buffer zones of Yadadri Thermal Power
plant and its impact on water regime

Telangana State Power Generation Corp. Ltd.

for HYDROGEO SOLUTIONS

A handwritten signature in dark ink, appearing to read 'Meeta Khilnani', with a horizontal line drawn through the middle of the signature.

Dr Meeta Khilnani

**Appendix I Hydrological data of key wells of core and buffer zone of Ash Pond,Yadadri Thermal power plant,Nalagonda monitored
During pre and post monsoon period, 2016**

S.N.	VILLAGE	LATITUDE	LONGITUDE	DEPTH OF WELL (M)	POST MONSOON WATER LEVEL (M)	PRE MONSOON WATER LEVEL (M)	AQUIFER	YIELD m ³ /hr	PUMP CAPACITY (HP)	PURPOSE
1	Damaracherla	16°43'10.9"	79°37'37.1"	7.21	8.85	12.50	Limestone	6 to 10	5.00	Irrigation
2	Virappagodem	16°42'35.5"	79°37'10.6"	65.00	10.54	14.74	Limestone	6 to 10	5.00	Irrigation
3	Virappagodem	16°41'44.0"	79°35'09.2"	40.00	15.81	17.35	Limestone	4 to 8	3.00	Irrigation
4	Dubbatanda	16°41'33.9"	79°33'40.8"	80.00	8.68	12.68	Limestone	6 to 10	5.00	Irrigation
5	Dubbatanda	16°41'47.5"	79°33'19.8"	14.25	9.24	13.15	Limestone	-	-	Drinking
6	Virlapalem	16°41'32.4"	79°32'08.8"	75.00	7.87	12.66	Limestone	6 to 10	5.00	Irrigation
7	Kalwakutta	16°42'17.4"	79°31'08.3"	85.00	12.78	18.64	Sandstone/ limestone	6 to 10	5.00	Irrigation
8	Uljhapalam	16°42'43.9"	79°30'55.1"	7.30	23.36	27.70	Sandstone/ limestone	-	1.00	Drinking
9	Pedatanda	16°44'08.1"	79°30'36.8"	40.00	1.58	3.44	Granite	4 to 8	3.00	Irrigation
10	Matur	16°45'07.7"	79°30'13.3"	80.00	7.65	10.85	Granite	6 to 10	5.00	Irrigation
11	Palugutanda	16°45'10.3"	79°29'55.9"	9.10	4.15	6.56	Granite	4 to 8	3.00	Drinking
12	Matur	16°45'41.7"	79°30'22.9"	8.10	1.20	4.50	Granite	5 to 9	4.00	Drinking
13	Dilawarpur	16°47'00.8"	79°34'35.9"	9.10	1.10	4.08	Granite	6 to 10	5.00	Drinking
14	Bandrotanda	16°46'21.0"	79°35'21.5"		2.20	5.28	Granite	-	-	Drinking
15	Bothalpalem	16°45'35.9"	79°36'54.9"	70.00	2.34	5.68	Granite	6 to 10	5.00	Irrigation
16	Srinagar	16°39'40.2"	79°41'02.1"	75.00	32.26	36.61	Limestone	-	-	Monitoring
17	India cement mines	16°41'20.5"	79°38'33.3"	40.00	13.54	18.26	Limestone	-	-	Monitoring
18	Tallaveerapagudam	16°41'40.8"	79°36'20.6"	85.00	12.76	17.25	Limestone	4 to 8	3.00	Irrigation
19	Tallaveerapagudam	16°42'25.7"	79°35'05.0"	80.00	10.55	15.80	Limestone	6 to 10	5.00	Irrigation
20	Mojulakunta	16°42'41.9"	79°34'57.3"	105.00	26.74	30.78	Limestone	6 to 10	5.00	Irrigation
21	Shantinagar	16°43'28.8"	79°35'06.4"	105.00	12.36	16.78	Sandstone/ limestone	6 to 10	5.00	Irrigation
22	Virlapalem	16°41'20.5"	79°31'42.0"	90.00	12.80	16.46	Limestone	8 to 12	7.50	Irrigation
23	Adividevulapalli	16°41'02.7"	79°31'27.3"	135.00	15.29	19.28	Limestone	8 to 12	7.50	Irrigation
24	Jktanda	16°40'15.9"	79°30'03.3"	105.00	14.95	19.56	Limestone	8 to 12	7.50	Irrigation
25	Badampalli	16°40'01.6"	79°28'13.8"	94.00	13.66	18.84	Limestone	8 to 12	7.50	Irrigation
26	Damaracherla	16°42'24.4"	79°37'47.1"	60.00	8.95	13.20	Limestone	4 to 8	3.00	Irrigation
27	Samdhanapeta	16°37'18.9"	79°32'33.9"	74.00	12.55	16.50	Limestone	6 to 10	5.00	Irrigation
28	Telukutla	16°37'57.6"	79°35'50.1"	75.00	14.26	18.40	Limestone	6 to 10	5.00	Irrigation
29	Cherla Tand	16°40'25.7"	79°31'36.4"	90.00	13.67	18.54	Limestone	6 to 10	5.00	Irrigation
30	Kotur	16°40'31.4"	79°29'05.8"	92.00	14.76	19.56	Limestone	8 to 12	7.50	Irrigation

Annexure 13
Copy of Fly ash utilization letters

PARASAKTI CEMENT INDUSTRIES LIMITED



Date: 26th April, 2016

To,
The Chief Engineer /Civil/Thermal,
TS Genco, Vidyut Soudha,
Hyderabad – 500 082.

Sir,

Subject: Lifting of Flyash from proposed Yadadri Thermal Power Station (5x800MW),
Near Veerlapalem Village, Dameracheria Mandal, Nalgonda district, Telangana.

We are one of the leading cement manufacturing companies in South India with a production capacity of 1.2 Million tones out of which 25% of PPC to cater various clients in the states of South India.

We are willing to lift the dry fly ash about 6000 MTs per month from your upcoming Yadadri Thermal Power Station (5x800MW), Near Veerlapalem Village, Dameracheria Mandal, Nalgonda District, to be commissioned in the year 2017 at free of cost by entering the long term agreement for period of not less than 10 years.

We assure you of our best services at all times and would like to foresee mutually beneficial long standing association with you.

Thanking you,

Yours faithfully,

For Parasakti Cement Industries Ltd,

Authorised Signatory.



Regd.Off:
8-3-214/21, Srinivasa Nagar Colony (West),
Hyderabad-38. Phone: +91 40 44119100 / 200,
Fax: +91 40 23747562

Factory:
Jettipalem Village, Post - 522 421,
Rantachintala Mdl, Guntur Dist., A.P.
Phone: 0863 2344600, 98667 00014

Internet:
www.parasakticement.com
info@parasakticement.com
CIN: U26942TG1993PLC015764



Annexure 13
Copy of Fly ash utilization letters

- igopinath@indiacements.co.in
-
- Today at 11:46 AM

To

- [cecthermal2](#)

Message body

**Chief Engineer
Civil / Thermal
TSGENCO
Vidyut Soudha
Hyderabad**

Dear Sir,

We understand that TSGENCO is coming up with a 5 X 800 MW coal based thermal power project (Yadadri TPP) at Damarcheria Mandal in Nalgonda District of Telangana and that Phase-1 of the project is expected to be commissioned in FY 2019-20.

We are operating a large cement plant at Vishnupuram, which is located close by and would be interested in taking about 500 MT/Day of Dry Flyash from Yadadri TPP, subject to mutually acceptable terms & conditions, for manufacture of Portland Pozzolana Cement at our plant.

Yours faithfully,
For The India Cements Ltd

I.Gopinath
Sr. Vice President
Corporate Affairs

Annexure 13
Copy of Fly ash utilization letters



Annexure 13
Copy of Fly ash utilization letters

PARASAKTI CEMENT INDUSTRIES LIMITED


Parasakti
CEMENT

Date: 26th April, 2016

To,
The Chief Engineer /Civil/Thermal,
TS Genco, Vidyut Soudha,
Hyderabad – 500 082.

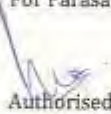
Sir,

Subject: Lifting of Flyash from proposed Yadadri Thermal Power Station (5x800MW),
Near Veerlapalem Village, Dameracherla Mandal, Nalgonda district, Telangana.

We are one of the leading cement manufacturing companies in South India with a production capacity of 1.2 Million tones out of which 25% of PPC to cater various clients in the states of South India.

We are willing to lift the dry fly ash about 6000 MTs per month from your upcoming Yadadri Thermal Power Station (5x800MW), Near Veerlapalem Village, Dameracherla Mandal, Nalgonda District, to be commissioned in the year 2017 at free of cost by entering the long term agreement for period of not less than 10 years.

We assure you of our best services at all times and would like to foresee mutually beneficial long standing association with you.

Thanking you,
Yours faithfully,
For Parasakti Cement Industries Ltd,

Authorised Signatory.



Regd. Off: B-3-214/21, Srinivasa Nagar Colony (West), Hyderabad-38. Phone: +91 40 44119100 / 200, Fax: +91 40 23747562	Factory: Jettipalem Village, Post - 522 421, Rantachintala Mdl, Guntur Dist., A.P. Phone: 0863 2344600, 98667 00014	Internet: www.parasakticement.com info@parasakticement.com CIN: U26942TG1993PLC015764

Annexure 13
Copy of Fly ash utilization letters

(2)



To,

Date: 25/04/2016
Hyderabad.

The Chief Engineer/Civil/Thermal,
TSGENCO, Vidyut Soudha,
Hyderabad – 500082

Sir,

Sub: Lifting of dry fly ash from proposed Yadadri Thermal Power Station
(5x800 MW), Veetalapalem(V), Dameracherla (M), Nalgonda Dist.

*sefcsd
my
25/4
cc*

We are one of the leading cement manufacturing Companies in South India with a production capacity of 2 Million Ton out of which almost 45 % is PPC grade and is catered to various clients in South India.

We are willing to lift the dry fly ash of about 3000 MT per month as per our factory requirement specification from your upcoming Yadadri Thermal Power Station (5x800 MW), Veerlapalem(V), Dameracherla(M), Nalgonda District to be commissioned in the year 2019 at free of cost by entering the long term agreement for a period of not less than 10 years.

We assure you best of our support at all times and would like to foresee long standing association with you.

Yours Faithfully,
For M/s. NCL Industries Limited,

Utkal Goradia – DGM Purchase
(M) 09390801010 (P) 040-30120000



*EE-1
25/4/2016*

*Asst
by
TSGENCO*



NCL INDUSTRIES LIMITED - 10/10/1001, 2000 Gokulap
8th Floor, Madhava's Cyberpark, New Chaitanyam Phase, Gachibowli, Hyderabad-500 033, India.
Tel: 41-40-10120000, 39807948 / 49 Fax: 91-40-296019871
E-mail: marketing@ncl-ind.com / www.nclind.com CIN : L31130TG1939PLC002821



Annexure 13
Copy of Fly ash utilization letters

THE INDIA CEMENTS LIMITED

Regional Office: "White House", Block III B, 3rd Floor, 6-3-1192/1/1, Kundanbagh, Begumpet, Hyderabad - 500 016.
Phones : 040-23417317, 23417319 to 321 Fax: 040-23417324

26th April 2016

Chief Engineer
Civil / Thermal
TSGENCO
Vidyut Soudha
Hyderabad

Dear Sir,

Sub: Dry Flyash from Yadadri TPP in Damarcherla, Nalgonda Dist.

We understand that TSGENCO is coming up with a 5 X 800 MW coal based thermal power project (Yadadri TPP) at Damarcherla Mandal in Nalgonda District of Telangana and that Phase-1 of the project is expected to be commissioned in FY 2019-20.

We are operating a large cement plant at Vishnupuram, which is located close by and would be interested in taking about 500 MT/Day of Dry Flyash from Yadadri TPP, subject to mutually acceptable terms & conditions, for manufacture of Portland Pozzolana Cement at our plant.

Yours faithfully,
For The India Cements Ltd


I. Gopinath
Sr. Vice President
Corporate Affairs

Registered Office: "Dhun Building", 827 Anna Salai, Chennai - 600 002.
Corporate Office : "Coromandel Towers", 93 Santhome High Road, Karpagam Avenue, RA Puram, Chennai - 600 028.
Corporate Identity No: L26942TN1946PLC000931 Website : www.indiacements.co.in



Annexure 13
Copy of Fly ash utilization letters



Penna Cement Industries Limited.

PCIL : YPS : 2016-17/22

April 26, 2016

The Project Director,
M/s. Yadadri Power Station,
TSGENCO,
Hyderabad.

Kind Attn : **Sri Radhakrishnan, Project Director**

Dear Sir,

Sub : **Allotment of fly ash from Yadadri Thermal Power Station to our cement plant situated at Ganeshpahad Village, Damarcherla Mandal, Nalgonda District - Reg.**

This has reference to the setting up of 4000 MW Thermal Power Plant under the name of Yadadri Power Station near Damarcherla Mandal, Nalgonda District by TSGENCO.

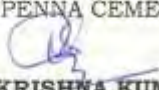
We have 1.0 MTPA cement plant in Ganeshpahad Village, Damarcherla Mandal, Nalgonda District operating since 2000. For the production of PPC cement at this plant, we need about 300 tons per day of fly ash regularly.

We will be interested to procure the same from your plant once the power plant comes into operation.

This is for your information and necessary action.

Thanking you,

Yours faithfully,
For PENNA CEMENT INDUSTRIES LIMITED,


(S. KRISHNA KUMAR)
DGM (PURCHASE)

Lakshmi Nivas 705, Road # 3, Banjara Hills, Hyderabad, Telangana, India. Pin code : 500034
Phone : 040 - 44565100 / 400, Fax : 040 - 44565145 / 44565222 / 44565310. www.pennacement.com
CIN : U26942AP1991PLC013359



Annexure 13
Copy of Fly ash utilization letters

ACL/JAL/2016/FA/2366
26th April, 2016

ANDHRA CEMENTS LIMITED
DURGA CEMENT WORKS

The Chief Engineer (Thermal)
Telangana State GENCO
Vidyut Soudha, Khairatabad
HYDERABAD

Sub: Lifting of Flyash from proposed Yadadri Thermal Power Station – Reg.

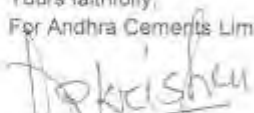
Dear Sir,

With reference to the subject cited above and discussions with your Good selves, we submit as follows:

1. Andhra cements Limited (ACL) is manufacturing cement from the production facilities located at Dachepalli Village of Guntur District.
2. Jaypee group has taken over the management control of ACL in February 2012.
3. Proposal to enhance the production capacity of Cement to 5.31 MTPA from existing 2.31 MTPA is at an advance stage, tentatively schedules of operation to commence end of 2019.
4. ACL proposes to lift 10000 to 15000 MT per annum of Dry Flyash from upcoming YTPS (Yadadri Thermal Power Station).
5. Above mentioned quantity shall be supplied to us on Free of Cost Basis.
6. Once YTPS is operational, we shall enter into a long term agreement for a period of 10 years above.
7. Proposal mentioned herein is subject to our production facility being operational as scheduled. ACL shall not be penalised for non-lifting / delay in lifting of flyash as detailed in this proposal owing to delay in project Implementation of ACL.

Thanking You,

Yours faithfully,
For Andhra Cements Limited


(R K DOODA)
Sr. Vice President


JAYPEE
GROUP

Regd. Office &
Factory

ANDHRA CEMENTS LIMITED
Durga Cement Works, Durgapuram, Srisagar (P.O),
Dechepalli - 522 414, Guntur Dt. Andhra Pradesh
Ph : +91-8649-257428-29, Fax : +91-8649-257449

Annexure 13
Copy of Fly ash utilization letters

Date: 26.04.2016

To,
The Chief Engineer-Civil/Thermal,
TSGENCO, Vidyut Soudha,
Hyderabad – 500082



**SRI CHAKRA
CEMENT LIMITED**

Admin. Office: "CONCRETE HOUSE"
6/3-66/14/88, Durgam Nagar Colony,
Hyderabad-500 083
Tel: (0) 040-66612374, 66674833
Fax: 040-23404657
E-mail: srichakracement@gmail.com
CIN No: U28240KA1981PLC002932

Sir,

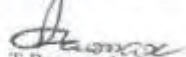
Sub: Lifting of fly Ash from proposed Yadadri Thermal Power Station (5 x 800 MW),
Damercherla (M), Nalgonda Dist.

We are one of the leading cement manufacturing Companies in South India with a production capacity of 2000 TPD Out of which 50.% of PPC to cater various clients in the states South India.

We are willing to lift the dry fly ash about 100 MT per day from your upcoming Yadadri Thermal Power Station (5x800 MW), Damercherla (M), Nalgonda District to be commissioned in the year 2019 at free of cost by entering the long term agreement for period of not less than 10 years.

We assure you of our best services at all times and would like to foresee mutually beneficial long standing association with you.

Yours Faithfully,
For M/s. Sri Chakra Cement Ltd.


T. Ramasuri
GM (Commercial)

Unit - I : Sri Narasimhapuri, Karimnagar, Guntur Dt. A.P.
Unit - II : Annamcharupeta (V), Janti Mandal, Vizianagaram Dt. A.P.

Annexure 13
Copy of Fly ash utilization letters

ISO 9001 : 2008, ISO 14001 : 2004 and
BS OHSAS 18001 : 2007 Company
Award of Excellence in CSR by FAPCCI
CIN : L26942MH1983PLC265166



Anjani Portland Cement Ltd
(A Subsidiary of Chettinad Cement Corporation Limited)

Ref : APCL/TSGENCO/Fly-Ash/2016-17.

28.04.2016.

To,

The Chief Engineer (Civil / Thermal)
T S GENCO,
Vidyut Soudha
HYDERABAD – 500 082.

Dear Sir,

Sub : To lift Fly-Ash from proposed Yadadri Thermal Power Plant, Damarcherla,
Nalgonda-Dist., Telangana-Reg.

This is bring to your kind information that we are one of the leading Cement manufacturing company in South India with a production capacity of 01 million Tons, out of which 20 to 30% PPC to cater various clients in the states of South India.

Hence, we are willing to lift the Dry Fly-Ash about 200-250 MTs per day (provided the quality of Fly-Ash as per our requirement) from your upcoming Yadadri Thermal Power Plant, Damarcherla, Nalgonda-Dist., at free-of-cost by entering the long term agreement.

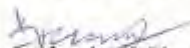
As per Ministry of Environment and Forest (NoEF), New Delhi, State Pollution Control Board directions and also to encourage waste minimization by producing more PPC and encourage CO₂ (Carbon-Di-Oxide) reduction for Environmental Protection,

We assure you of our best services at all times and would like to foresee mutually beneficial long standing association with your Organization.

Thanking you,

Yours faithfully,

for **ANJANI PORTLAND CEMENT LIMITED**


Authorized Signatory

	Corporate Office : # 6-3-553, The Hub, E3 & E4, 4th Floor, Queen Square, Off Taj Deccan Road, Emmannel, Hyderabad - 500 082, Telangana T : +91 40 2335 3096 / 3106, F : +91 40 2335 3093 e : info@anjanicement.com	Works : Chinnalapalem Village, Mallampet Mandal, Nalgonda Dist. - 508 236, Telangana T : +91 08683 230 158, 230 166, 230 168 F : +91 08683 230 024 www.anjanicement.com
	Regd. Office : 306A, The Capital, 3rd Floor, Park No. C-70, G-Block, Bandra Kurla Complex, Bandra (East), Mumbai - 400 051, Maharashtra, India. T : +91 22 47039909	

Annexure 13
Copy of Fly ash utilization letters

DECCAN CEMENTS LIMITED



CIN : L28942TG1979PLC002500
REGD OFFICE : 6-3-868/8,
"DECCAN CHAMBERS", SOMAJIGUDA,
HYDERABAD - 500 082.
PHONE : +91 (40) 23310168, 23310552,
+91 (40) 23310561, 23310599
FAX : +91 (40) 23318366
E-MAIL : info@deccancements.com
WEBSITE : www.deccancements.com

Date: 30.04.2016

TO
CHIEF ENGINEER / CIVIL / THERMAL
TELANGANA STATE POWER GENERATION CORPORATION LTD.
A-BLOCK,
VIDYUTH SOUDHA,
KHAIRATABAD,
HYDERABAD,
TELANGANA STATE.

Dear Sir,

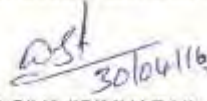
Sub: To lift dry Fly Ash from Yadadri Thermal Power Station (5 x 800 MW), Veerlapalem (V),
Damarcherla (M), Nalgonda Dist, Telangana - Reg.

We are one of the leading Cement Manufacturers in South India. We are willing to lift Dry
Fly Ash 150 MT/ Day as per our factory requirement / specification from your proposed
Yadadri Thermal Power Station at Veerlapalem (V), Damarcherla (M), Nalgonda Dist,
Telangana State at free of cost by entering the long term agreement for a period of Ten
Years.

Thanking you,

Yours Faithfully,

For Deccan Cements Ltd


(D.SIVAJISIMHARAI)



Manager (Purchase)

Mobile No: 9490729384

Mail I.D: sivaji.d@deccancements.com

Works : Bhavanipuram, Janpahad P.O., Pin : 508 218. Nalgonda Dist. (T.G.)
Phones : (08683) 229503, 229504, 229505, 229507, Fax : (08683) 229502

PROCEEDINGS OF THE ENVIRONMENTAL PUBLIC HEARING FOR THE PROPOSED 5 X800 MW COAL BASED YADADRI THERMAL POWER STATION BY TSGENCO AT VEERLAPALEM VILLAGE, DAMARCHERLA MANDAL, NALGONDA DISTRICT ON 31.05.2016 AT 10.00 AM AT PYLON AREA IN THE PREMISES OF PROPOSED SITE OF 5X800 MW COAL BASED YADADRI THERMAL POWER STATION, VEERLAPALEM (V), DAMARCHERLA (M), NALGONDA DISTRICT.

The following members have attended the meeting:

Sl. No.	Name of the Panel Member	Designation
1.	Sri P. Sathyanarayana Reddy, IAS, Collector & District Magistrate, Nalgonda	Chairman
2.	Sri G. Hanumantha Reddy, Environmental Engineer (FAC) T.S. Pollution Control Board, Regional Office, Nalgonda.	Member

The following Government officials were present at the venue

Sl. No.	Name & Designation
1.	Dr. N. Satyanarayana, IAS, Joint Collector & Additional District Magistrate, Nalgonda.
2.	Sri B. Kishan Rao, Revenue Divisional Officer, Miryalaguda, Nalgonda District.
3.	Sri G. Ganesh, Tahsildar, Damarcherla (M), Nalgonda District.
4.	Sri P. Suresh Babu, AEE, TSPCB, RO, Nalgonda.
5.	Sri T.Ravindar, Analyst Gr-1, TSPCB, RO, Nalgonda.

The following representatives of TSGENCO were present at the venue

Sl. No.	Name & Designation
1.	Sri C. Radhakrishna Director/Projects & Chairman & Managing Director (i/c) M/s. Telangana State Power Generation Corporation Limited.
2.	Sri S. Ashok Kumar, Director/HR, Telangana State GENCO.
3.	Sri A. Ajay, Chief Engineer /Civil/Thermal, Telangana State GENCO.

About **3000** public from the surrounding villages attended the public hearing meeting and Hon'ble Member of Parliament- Nalgonda and Hon'ble MLA of Miryalaguda constituency and other local body representatives took part in the meeting.

At the outset the Environmental Engineer, T.S. Pollution Control Board, Regional Office, Nalgonda welcomed the gathering and invited the Collector & District Magistrate, Nalgonda to preside over the meeting. Further, he welcomed the TSGENCO officials, public representatives, the public gathered at the venue and press. He explained the salient features of the notification S.O. 1533(E), dated 14-09-2006 issued by the Ministry of Environment and Forest, Govt. of India under the Environment (Protection) Act, 1986. He stated that the public consultation process has been made mandatory for the projects listed in Schedule -A & B1 of EIA Notification, 2006 for obtaining Environmental Clearance from the Ministry of Environment of Forest & Climate Change, Govt. of India. He further explained that as per the provisions of EIA Notification, public opinion regarding the proposed project was invited in writing from the public by giving an advance notification in Namaste Telangana (Telugu daily) and The Hindu (English daily) newspapers on 30.04.2016. The public were given 30 days time to submit their opinions, objections, suggestions

etc. in writing. The Executive summaries both in Telugu & English and the EIA reports were displayed for access to the public as mentioned in the press notification.

He further stated that as a part of the programme the project authorities would explain the environmental aspects of the proposed project and then the people would be given an opportunity to elicit their opinion. The project authorities would give replies to the issues raised during the hearing before concluding the hearing process. He further explained that all the proceedings of the public hearing would be recorded and forwarded to the Ministry of Environment, Forests & Climate Change (MoEF&CC), Govt. of India for further course of action. He then requested the Collector & District Magistrate, Nalgonda to preside over the public hearing.

The Collector & District Magistrate, Nalgonda while welcoming Hon'ble MP & MLA, and other officials, media and the public gathered at the venue, requested the representatives of TSGENCO to explain the salient features of the proposed project.

Sri C. Radha Krishna, Chairman and Managing Director (I/C) - TSGENCO welcomed the dignitaries on the dais and the public and expressed the following.

He stated that he has been deputed on behalf of the CMD of TSGENCO and gave a brief account on the development status of the power sector in the State. The brief details are as follows:

- Power sector is the core sector of growth in the economy and more so in the newly formed State of Telangana. There is a power deficit of 2700 MW after formation of Telangana State w.e.from 02.06.2014. To tide over this power crisis to some extent, the government has been purchasing power from other states at higher cost.
- Hon'ble Chief Minister has envisioned a power –surplus Telangana State by the end of 2018. In pursuance to his orders, the State generation utility TSGENCO is working to realise the ambitious goal of building a 'Golden Telangana' and to meet power requirement for water grid schemes, lift irrigation, 24 hours power supply to the entire state, 9 hours power supply to agricultural sector, uninterrupted supply to industries and other sectors .
- In this regard, TSGENCO has proposed to establish power plants viz, 800 MW Kothagudem Thermal Power station (Stage-VII) at Paloncha, 1080MW (4 x270 MW) Bhadadri Thermal Power Station at Manuguru in Khammam district and 4000 MW Yadadri Thermal Power station at Damaracherla in Nalgonda district with total investment of Rs. 39000 crores approximately. For this ,they obtained financial closure from REC and PFC which are Central Government agencies.
- The proposed Yadadri Thermal Power Station (5x800 MW) is being developed by TSGENCO with the financial assistance from Rural Electrification Corporation and Power Finance Corporation at an investment of Rs.25,099.42 crores.
- The Expert Appraisal Committee of MoEF&CC, GoI, New Delhi has issued the terms of reference to the project on **16-02-2016** for conducting EIA studies. Accordingly, the draft Environmental Impact Assessment study has been conducted by the accredited consultant as per the Standard terms of reference issued on 02.11.2015.

- The project is designed by adopting latest and most efficient technology in thermal power projects. An amount of Rs. 2410 crore is envisaged towards the implementation of pollution control measures.
- The proposed (5 x 800 MW) 4000 MW Supercritical Plant will be the First in terms of capacity at one place in the country, undertaken by Government Sector Utility.
- The Project is based on the Super Critical Technology which has been made mandatory by the Ministry of Power, Government of India for all the Projects establishing after 01.04.2017.
- The Units will not have a Boiler Drum, but only Tubes which circulates water and the water heated by the fire in the furnace, duly converting into RH steam, SH steam and is finally let into Turbine for running the Machines duly producing electricity from the Generator.
- The temperature of main stream will be 565 Degrees Celsius and re-heater steam will be 593 Degrees Celsius. The steam capacity of the Unit will be 2420 Tonnes per hour and the pressure will be 247 Kgs per Centimeter Square.
- The requirement of water will be 9755 Cubic Meters per hour. The Boiler is designed for pulverized coal either 100% imported Coal or 50% imported + 50% indigenous coal. The chimney will be 275 meters high, 2 nos with twin flue arrangements for four Units and one for fifth unit.
- The coal requirement will be 138 Lakh Tonnes Per Annum with 50% imported coal + 50% indigenous and 110 Lakh Tonnes if it is 100% imported.
- The station heat rate will be 2109.4 Kcal per Kwhr.
- The natural draft cooling tower (NDCT) of height 170 meters with a COC of 5.
- As per the latest Paris Summit held in December, 2015 the latest environmental norms will be implemented in this project. The SPM levels will be 30 mg/Nm³ and NOx will be 100 mg/Nm³. To achieve these parameters additional ESPs will be provided. Modification of Boiler Mills and Flue Gas Ducts will be added to achieve the NOx levels. For achieving SOx levels of 100mg/Nm³ FGD Plants will be installed. All these will be incorporated in this Project.
- Also 39 Lakh Tonnes of fly ash will be generated per annum and this will be utilized 100% within a period of 3 years and this has been committed to MOEF. There are 22 cement factories around plant and they have assured for lifting of fly Ash from above plant.
- Setting up of latest electro static precipitators with 99% efficiency to control dust emissions and an additional ESP field is also proposed to bring the dust emission as per the latest norms adopted at Paris convention, 2015 i.e. to bring down the dust emission below 30 mg/m³.
- To control NOx, Ammonia will be used, through SCR(Selective Catalytic Reduction) mechanism which will bring down the NOx concentration below the standard levels as stipulated in the norms.
- Flue gas desulphurisation(FGD) plant is proposed to bring down the sulphur concentration levels as stipulated in the ToR.

- The estimated quantum of coal requirement is 13.81 mtpa, which includes 50 per cent of indigenous coal and 50 per cent imported coal with the average GCV of coal as 455 k.Cal/kg.
- The make-up and consumptive water requirement is assessed as 9755 cum/hr which will be sourced from the river Krishna.
- Five natural draft cooling towers are envisaged to recycle the water with COC 5.
- It is also contemplated to establish Effluent Treatment Plant, Ash water recovery system and Sewage Treatment Plant with recycling system to utilise the treated water for development of green belt and floor washings, dust suppression in coal plant areas and ashing requirements.
- The TSGENCO has allocated Rs. 100 crores towards the implementation of development works such as water supply, repairs to the school buildings, construction of roads, toilets in the surrounding villages under corporate social responsibility of TSGENCO.
- An amount of Rs. 285.81 crores towards land compensation, R&R package and other charges was deposited with the District Collector, Nalgonda in the month of January 2016 for acquiring Ac. 854.32 Gts of patta lands and Ac. 920.25 Gts of ROFR land.
- In addition to the above, about Rs. 198 crores was deposited with the Forest Department towards NPV of forest land which includes raising and maintenance under compensatory afforestation over an extent of 4676 acres.
- Establishment of this project has certain beneficial impacts in terms of bridging the power demand-supply gap and providing employment opportunities that will be created during the course of construction and operation phase as well.

He then sought support to the proposed thermal power station as it will give required boost to the power generation capacity and also to make the State to attain self-sufficiency in respect of power.

The District Collector has requested the public gathered at the venue of public hearing to offer their views, comments, suggestions and objections, if any, on the proposed thermal power project. He also requested Hon'ble Member of Parliament, Nalgonda constituency to offer his views on the proposed thermal power plant.

1. Sri Gutta Sukhendar Reddy, Hon'ble Member of Parliament, Nalgonda after customary address he has stated that this is the biggest project after the formation of the State and any development will have some adverse impact. Electricity is a quintessential requirement like water. This project will help to enhance the supply of power from 6-hrs to 9 hrs for agriculture. After commissioning of the project, there will be no power cuts in the State. At present the State is purchasing power from Chattisgarh State at an average cost of Rs. 6/- per unit which will come down drastically to Rs. 4-5/- per unit. Government of India banned the setting up of new units based on sub-critical technology and this project utilises the latest super-critical technology. Moreover, the compensation is paid as per the Land Acquisition Act, 2013.

Necessary infrastructure will be promoted in surrounding villages with the advent of the proposed thermal power project. There is an extent of 650-acres of land without pattas but under cultivation in Thallaveerappagudem panchayat, for which compensation has to be paid on par with patta lands. He has requested the District Administration and CMD, TSGENCO to take necessary action in that direction. He further requested CMD to engage the local labourers for construction purposes and provide employment to the local people in the project by giving priority for the land oustees. He added that Hon'ble CM was kind enough to release compensation liberally to all classes of lands lost under the project. He expressed profound gratitude to all scheduled tribe people and other land losers for parting their lands to facilitate the setting up of this project. Finally, he thanked the district administration for their excellent effort and cooperation in ensuring the timely acquisition of land for the project.

2. Sri N. Bhaskar Rao, Hon'ble Member of Legislative Assembly, Miryalaguda, after customary address, he specifically thanked the Hon'ble CM for choosing this location for setting up this mega power project. There were several apprehensions over the implementation of this project initially. In fact, few villagers have lost their lands. On behalf of the people of his constituency, he assured full cooperation to the implementation of this project. There are no pattas for 740-acres of land, however, he assured them that the compensation will be worked out to render justice to them. He expressed his gratitude to the Hon'ble Minister for Power in expediting the process of compensation payment. He requested the management of TSGENCO to reciprocate on the same lines by timely completion of the works on the project. He has further stated that there are no political differences in respect of this project and assured the officials of cooperation from the leaders cutting across the party lines and from the people as well. He expects that Damarchela area will be transformed economically and socially as the land rates are increasing with the setting up of this project from 50-lakhs to 1.0 crores. He has assured that work will be provided to all eligible local people without their political affiliations. He expressed his gratitude to the people for extending the unequivocal support for setting of this important mega project which enabled him to keep up his word given to the Hon'ble CM.

3. Sri Shankar Naik, ZPTC Member- Damarcherla, after customary address he welcomed the project. He has stated that Kapoor thanda and Veerlapalem people are affected by this project and employment is not provided to the B. Tech graduates as was done in the case of ITI trained people. Compensation has not been paid so far to the crops damaged by the recent hail storm and urged the authorities to expedite the process of compensation.

4. Smt. Mangamma, President - Mandal Praja Parishad, Damarcherla welcomed the setting up of the project. She has requested for payment of compensation to the land holders as there are no pattas vested with them, who are mainly from backward classes. She demanded the payment of compensation within a month time on par with the patta lands and provision of employment to the people of the mandal.

5. Sri Kotya Naik, Sarpanch- Veerlapalem, after the customary address to the chair, he has stated that the land acquisition process has been completed in his village, which includes forest land also. He has brought out the problem of losing the grazing area of the cattle and the dung-storing grounds and sought alternate land to compensate the loss. People would be happier if

employment is provided on priority to the project displaced persons. He has requested for expediting the process of compensation to the remaining land. He appealed to TSGENCO not to engage the labourers from outside area and only local labourers should be engaged during the construction and operation phase.

6. Smt. Aruna Balu, MPTC member, Veerlapalem welcomed the project.

7. Sri Balu Naik, Husband of MPTC member-Veerlapalem has stated that farmers of the village have lost their agricultural lands due to the proposed thermal project and have been paid Rs. 7.0 lakhs per acre. Endowment lands are not paid so far. He demanded the authorities for payment of Rs. 6 lakhs to the non-right holders. He sought employment to the local people and demanded that no outsider should be engaged. The village lost its grazing ground to cattle and suitable place should be identified in the adjacent forest areas. He sought the establishment of corporate hospital with health card worth of Rs. 5.0 lakhs to be provided to each villager.

8. Sri G. Kotaiah, MPTC member, Thallaveerppagudem supported the setting up of the power project as it would boost the rural economy.

9. Smt. J. Rajyalakshmi, Sarpanch, Thallaveerppagudem urged the authorities to make adequate payment of compensation to the lands lost under the proposed project and employment to the people of her village as per eligibility.

10. Sri D. Narayana Reddy, PACS Chairman- Veerlapalem, after customary address, he has stated that about 174 families have lost their lands and has requested the government to allot double-bed room houses to all of them. He sought facilities to the land losers on par with BCs and SCs. He demanded for the setting up of an ITI to train adequate number of local youth in skills required by the project, as the existing private ITI is having a limited intake capacity of 30-40 members only. He demanded employment to all eligible people of the area.

11. Sri B. Hanuma Naik, R/o Modugulkuntathanda welcomed the setting up of the project.

12. Sri Eeshwar, R/o Kapoorthanda raised the issue of losing his complete land under this project and sought justice by way of providing employment to all such people.

13. Sri G. Surya Naik, R/o Modugulakuntathanda sought enhancement of compensation to the lands lost by them as the existing compensation is not adequate enough.

14. Sri Vasha Naik, R/o Modugulakulathanda has stated that the compensation is not commensurate with the market rate and sought payment as per the value determined locally. He wanted that resettlement colony could be located near Shanthi Nagar. He also requested for payment of compensation to the lands under enjoyment of local people (assignee land).

15. Sri Chandrasekhar Yadav, CPI(M) Leader has stated that water is available, land is available and people have sacrificed their lands for setting up of this project. Keeping this in view, compensation should be paid to the farmers of surrounding thandas. He demanded employment to all eligible people irrespective of their party affiliations. Earlier, the managements

of cement factories located in the mandal discriminated the local people by not providing employment to the local people. Instead, they brought the people from outside, leaving dust pollution to the locals. He cited the examples of M/s Deccan Chromates, M/s India Cements Limited to prove his case. He warned of agitation in case the local land losers and other affected people are not provided employment in the proposed project.

16. Sri A. Balu Naik, R/o Veerlapalem demanded employment to one member from each family and free supply of electricity and water. He requested for the establishment of a hospital to cater to the needs of the people.

17. Sri Mohd. Yousuf, TDP Leader, R/o Wadapally (V), Damarcherla (M) stated clearly that all political parties irrespective of their party affiliations welcomed the setting up of the proposed project. He wanted to know about the actual number of people to be provided direct employment in this project. About 180 families were displaced on account of acquisition of their properties and they should be provided employment on priority basis. He hoped that adequate steps would be taken to prevent the contamination of Krishna river water from dust pollution, which used to serve as drinking water source for thousand people living in these areas. There is no information on this aspect in the draft EIA report. There were instances of non-payment of compensation even after acquisition of lands and the people had bitter experiences on this count earlier. He sought compensation to the loss of agriculture crops in case of any such instances of pollution. He demanded for the allotment of double-bed room houses as part of compensation.

18. Sri A. Parsha Naik, ex-Sarpanch - Veerlapalem demanded adequate compensation to the project affected people belonging to Veerlapalem and Thallaveerappagudem. He thanked profoundly for payment of compensation to about 80% of land losers and requested for the expeditious payment of compensation for the remaining people of TV Gudem.

19. Sri D. Balaji Naik, Mandal President, TRS party-Damarcherla assured cooperation of local people to the proposed project and sought employment on priority basis to the people of Damarcherla mandal only. He hoped that Damarcherla would become a mega city in near future and the electricity generated from this project would provide uninterrupted supply of power to the entire state of Telangana.

20. Sri M. Kishan Naik, TRS Leader, R/o Narsapuram thanda spoke bilingually. He stated that Scheduled Tribe dependent on agriculture for their livelihood and there should be adequate place to store the natural organic fertiliser like cow dung etc. Pollution has troubled them frequently. He pointed out that STs being un-educated were not provided with pattas to the lands cultivated by them and demanded payment of compensation to all such lands. He also dwelt about the people who left these areas in search for suitable employment and all such people should be provided compensation.

21. Sri K. Saidulu, TRS activist, R/o Wadapally thanked the Hon'ble CM for selecting the location to set up this mega project. He requested for the payment of compensation to the lands lost under the project. He also requested for coverage of entire mandal under CSR. He further

requested for setting up of institutions to cater to the needs of people under KG-PG free education scheme.

22. Sri Veera Koti Reddy, Ex-PACS Chairman, Damarcherla while welcoming the project requested the payment of compensation to the residents of TV Gudem and sought an assurance in respect of provision of employment. An ITI should be established in this mandal for attaining the technical skills required for the project by the local people and preference on provision of employment. Most of the people in the thandas (Veerlapalem, Veerappagudem & Modugulathanda) surrounding this project have lost their lands and needed rehabilitation and requested for provision of 500-Sq. yards of homestead land to accommodate their cattle. Since the area up to 10-km radius will be impacted by pollution, there will be corresponding increase in temperature and requested to take suitable measures. In all such cases, employment should be provided as measure of compensation.

23. Sri Kokala Venkateshwarlu, Congress Party SC cell Coordinator & Chairman - Lift Irrigation Scheme stated that the project site covers the route of existing pipeline and requested the realignment of pipeline and the construction of pump house. He expressed happiness that the new state was formed and new power station would come up. He cited the case of M/s India Cements Limited that fertile lands of black cotton soil were acquired and resulted in the loss of agriculture income. He sought the name of TV Gudem to be incorporated in the title of the project along with name of Veerlapalem village. Several forest cases were filed against the people of TV Gudem for taking up illegal cultivation earlier, for all such lands he demanded payment of compensation at the rate of Rs. 6 lakhs per acre. The actual occupants of such lands should be identified and compensation should be paid to them only. In survey number 26, an extent of 78 acres of land is being cultivated by 30 families, only assignment pattas were issued in their favour and some of them disposed their lands. However, the land remained in the name of original assignee. He sought in all such cases the present occupant should be ascertained before effecting payment of compensation.

24. Sri Suddha Saidaiah, R/o TV Gudem stated that only 100-acres of land are covered under pattas and the remaining 700-acres of land are classified as forest land under cultivation. He sought provision of employment to all the land oustees. He demanded the development of infrastructure like roads, which needs to be converted as CC roads and construction of Ramalayam temple. He sought adequate compensation to 700-acres of land located in TV Gudem. He also sought the name of TV Gudem to be incorporated in the title of the project along with name of Veerlapalem village.

25. Sri R. Saidulu, R/o TV Gudem thanked the people of TV Gudem for supporting the setting up of the project. He demanded payment of compensation at the rate of Rs. 6 lakhs per acre and provision of employment for one member. In case of lands under enjoyment, Rs. 5 lakhs per acre and provision of employment for one member.

26. Sri A. Karunakar Reddy, Mandal President - YSRCP, Damarcherla welcomed the setting up of the project. He stated that about 80% of the land oustees received compensation

and about 20% yet to be compensated. He sought construction of a corporate type hospital for providing free health care and institutions for imparting free education.

27. Sri Venkateshwarlu, R/o Ganeshpahad alleged that not even a single person was provided employment in the cement industries including the post graduates of that local area. He sought job opportunities for the local people.

28. Sri K. Sathyanarayana, R/o TV Gudem stated that the village lost entire forest land of 650 acres to the project. He demanded employment for all local people and also to the engineering and post-graduates from the village without following the process of eligibility. He expressed apprehensions on the viability of agriculture in view of the impending increase in temperatures on account of this mega project. Action shall be taken to control dust pollution.

29. Sri Konakanti Narsaiah, R/o TV Gudem has stated that there is a dispute of ownership in respect of 150-acres of patta land and compensation has been withheld which may be expedited. He sought employment protection card as a guarantee. Compensation should be paid to the oustess of the enclosed lands.

30. Sri R. Suresh, R/o TV Gudem stated that the lands were sold and claim for compensation is made by previous land holders, which should be curbed.

31. Sri Pokala Kiran Madiga, TMRPS, R/o TV Gudem cited the past experiences of inadequate compensation paid to the lands acquired for setting up M/s India Cements Limited. Compensation for cultivating the forest land was paid at the rate of Rs. 2 lakhs per acre. He demanded the enhancement of compensation for all such lands where bore wells were dug up and power was also supplied. He requested for issuance of ID cars for all land oustees and dependent labourers should be provided with employment in the project. He sought construction of the temple in his village.

32. Sri S. Saidi Reddy, TDP activist, Damarcherla welcomed the setting up of the proposed thermal power project.

33. Sri Skylab Naik, R/o Kondrapolu village welcomed the setting up of the project as it would enhance the employment opportunities. He complained that the industries in Damarcherla mandal were using the resources of their area without providing any gainful employment to the local people and engaging people from outside.

34. Sri R. Saidulu, R/o TV Gudem supported the project proposal in their area. He demanded the compensation for all lands.

35. Sri R. Kotaiah, R/o TV Gudem sought the name of TV Gudem to be incorporated in the title of the project along with name of Veerlapalem village. He requested to take up the construction of temple in his village and up-gradation of local school to full-fledged level so that pupil could continue their studies beyond 8th standard up to 10th standard without any sort of difficulty of going outside the village.

36. Sri Parshya Balu Naik, Banjara Seva Samithi leader, R/o Kalepally requested for restoration of lift irrigation scheme. He welcomed the setting up of the project.

37. Sri L. Hanimi Reddy, R/o Veerlapalem supported the project proposal in their area.

38. Sri Ravinder, TRS district Secretary, R/o Dilawarpurthanda supported the project proposal.

39. Smt. T. Nagalakshmi Bhargav, Chairperson- Miryalaguda Municipality unequivocally supported the establishment of proposed mega power project as this step would enhance the economic activity in this region.

40. Sri N. Balu Naik, Akhila Bharata Banjara Seva Samithi, R/o Veerlapalem stated that the village lost its grazing ground to the project and sought alternate land in the adjacent forest area.

41. Sri G. Hathiram, R/o Thimmapuram welcomed the proposed project. He requested the project proponent to clarify the status of land acquisition at Survey No. 190.

42. Sri G. Hanimi Reddy, R/o Veerlapalem sought clarification as to whether the lands in survey number 190 were included in the project area. He demanded acquisition of lands in survey number 190 and payment of compensation.

43. Sri K. Sreenu, Sarpanch - Mogilicherla supported the setting up of the proposed project.

44. Sri Gunda Lakshmi Kanth Gupta, R/o Wadapally wanted a pollution-free power plant in their area. He hoped that the proposed project would benefit the area. Since this area is tail-end of Nagarjuna Sagar canal, water supply is irregular. Hence, he requested to implement lift irrigation scheme to increase the greenery as a measure of abatement of pollution. He requested that the latest and most efficient technology for control of pollution should be adopted in the proposed thermal power plant. He sought employment to the local people and adequate compensation to all land oustees.

45. Sri D. Venkateshwarlu, R/o Damarcherla while welcoming the setting up of the project requested for construction of a Hospital & College.

46. Sri A. Anjaneyulu, Ex-MPTC, Wadapally thanked the Hon'ble CM for selecting this area for construction of mega power project. He appealed to the project authorities to establish high power ESPs using advanced technologies to control dust pollution.

47. Sri N. Harinder, National Alliance for People's Movement, R/o Miryalaguda objected the setting up of thermal power project by TSGENCO and presence of TSGENCO officials on the dais. He quoted the recent international convention, wherein the Hon'ble Prime Minister of India also agreed to the suggestions to desist from construction of new thermal power projects in view of impending increase of 2 degree Celsius in global temperatures, which will make the earth inhospitable for living beings. He cited the popular saying "earth can support the needs of human beings but not to the greed." He alleged that EIA report was not studied by anybody here except

one person though the report was exhibited for the access of the public. As per the report, the power project would generate 30 lakh tonnes of ash annually. That means the project generates ash at the rate of 2 tonnes/minute. As per the report, 7% of the total ash produced would be supplied to the cement industries in this area and 93% of ash would be left in the ash pond. The TSGENCO had no concrete plans of disposing the ash without causing any harm to environment. He questioned the rationale behind setting up of this type of mega power plant, which is detrimental to environment and people. At present the TSPCB is staffed with three members to cater the needs of 2000 industries located in the district. He stated that the cost of the power from this project would be around Rs. 5/- per unit, whereas the solar power project developed with site specific locations would cater to the needs of the people without causing pollution. He added that solar power could be harnessed and supplied to the consumers by way of putting up at decentralised locations at cheaper prices without any adverse impacts. The mega projects like the present one require rehabilitation & resettlement of people. The experience of the people, who are displaced due to the construction of Pulichintala Project, is fresh in the minds of people even after lapse of seven years. There is water course adjacent to the M/s India Cements Limited, which cater to the needs of thousands of acres in the vicinity, which may be affected by the dust pollution. The EIA report failed to evaluate the adverse impact on the water course.

48. Sri K. Thirupathaiah Goud, R/o Wadapally supported the setting up of the project and sought implementation of the lift irrigation scheme.

49. Sri P. Rampal Reddy, Telangana Trade Union welcomed the project and requested that no person from Andhra should be allowed to take up any sort of employment in the project and only local people should be given opportunity to do the same work.

50. Sri G. Mahesh Goud, Vidhyardhi Sangham, BC Welfare Association sought employment and wanted to know the details of job opportunities available in the proposed project.

51. Sri S. Nagasena Reddy, Environmentalist, R/o Veerlapalem while welcoming the project he dwelt the elaborate process followed by Expert Appraisal Committee of MoEF&CC. The EAC headed by one Dr. C.R. Babu (from Kakinada) and assisted by one Deputy Director from MoEF inspected the site and deferred the location of the thermal power plant. With great effort, the government convinced the authorities and obtained terms of reference for the present location. He cited the latest guidelines regarding brick kilns wherein the use of fertile top soil useful for agriculture is prohibited. Construction is going at a brisk pace in Hyderabad city and fly ash in large quantities can be used for manufacturing of bricks apart from meeting the requirement of cement units. He sought free power supply to the lift irrigation schemes under CSR to provide irrigation needs of the area. He assured that he would volunteer to support TSGENCO legally in case of any impending cases filed against the proposed project.

52. Sri G. Ramaiah, R/o Veerlapalem questioned the decision of setting up of the thermal power plant at Veerlapalem instead of coal mining areas like Manuguru and Kothagudem. He raised the issue of compensation for occupied lands. He sought raising plantation on large-scale in advance.

53. Sri Surkanti Venkat Reddy, NGO, Choutuppal welcomed the setting up of the proposed power plant. He cited that the progressive people of Telangana State supported the project like this in contrast to the opposition of setting up of similar type of projects at Kakarapally and Sompeta by the people from Andhra region. He sought to take up advance operations for developing plantations.

54. Sri Jeethiram, R/o Thimmapuram requested for the survey of lands in survey number 188 in Veerlapalem area.

The District Collector, Nalgonda requested the project proponent i.e. CMD, TSGENCO to offer his clarifications on various issues raised during the course of public hearing.

Sri C. Radha Krishna, Chairman and Managing Director (i/c) - TSGENCO gave a detailed explanation to the technical issues raised as follows:

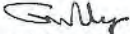
- The plant is proposed to install additional ESP's to meet the emission standards of 30 mg/Nm³ and also proposed to install FGD plant to control SO₂ emissions.
- The Plant is designed for Zero discharge concept. No effluent will be discharged into the natural stream. Effluent treatment plant will be constructed with re-cycling system and treated water will be utilized for cooling water make up, dust suppression system in coal plant, wetting of coal in coal stock yard and for plantations. Also Ash Water Recovery System will be provided to collect decanted water from the Ash Pond and the same collected water will be reused in ashing purpose.
- The Tungapadu Vagu which is flowing through the Plant site will not be disturbed. The Sub-Committee of Expert Review Committee (special Team) from MOEF has visited the Project site on 05.12.2015 and after a thorough visit recommended for deepening the stream and also recommended provide embankments on either side of the stream so that it cannot be disturbed. To this effect TSGENCO has already committed to the MOEF.
- Arrangements for 100% Fly Ash Utilisation are made available so that there will not be any Air Pollution.
- With respect to the query about temperature of 140 Degrees at the Plant it is clarified that the Chimney's height is designed for 275 meters so that the exhaust temperatures of Flue Gas is let out at that height and there will not be any thermal pollution.
- Regarding employment, as per the norms available there would be a provision for 2000 employees in the Project which comprises all cadres in the plant. For the land losers jobs will be provided as per the existing norms of the Government and also as per eligibility criteria.

The EE, TSPCB while summing up of the proceedings stated that there are 15 written representations received by him and about 54 persons spoke during the course of public hearing. He has stated that entire proceedings are videographed and will be sent along with the written representations to the MoEF&CC for further course of action.

The District Collector stated that the public hearing was conducted in accordance with the provisions of the notification. There are 15 written representations received on this project and about 54 speakers have offered their comments at this venue. Many people supported the setting up of this project. People from surrounding villages overwhelmingly supported this project proposal. Regarding payment of compensation, 80% of work has been completed and the remaining 20% relating to the category of encroachments will be completed at the earliest after verification of the details of the occupants. The district administration has submitted proposal for enhancement of compensation in case of certain categories, whose lands are covered under acquisition process. The entire proceedings are videographed and the minutes will be sent to the MoEF&CC for further course of action. He then concluded the hearing on positive note as the public in general, who have gathered at the venue of public hearing supported the project proposal.

List of the public participated in the public hearing is appended.

Representations received before and on the day of hearing in connection with the subject are herewith for consideration.


Environmental Engineer (FAC)
T.S. Pollution Control Board
Regional Office, Nalgonda.


Collector & District Magistrate,
Nalgonda.



Statement of representations received w.r.to Environmental Public Hearing (EPH) held on 31.05.2016 for proposed to set up 5x800 MW Super Critical Coal Based Yadadri Thermal Power Station (YTPS) of M/s. Telangana State Power Generation Corporation Ltd., (TSGENCO) at Veerlapalem (V), Damarcherla (M), Nalgonda District.

Sl. No	Representation given by	Date of receipt	Content of the representation
1	Sri N. Bhaskara Rao, Hon'ble MLA, Miryalguda Constituency, Nalgonda District.	31.05.2016	He supported the proposed power project.
2	Sri D. Narayana Reddy, S/o. Chintha Reddy, Veerlapalem (V), Damarcherla (M), Nalgonda District.	31.05.2016	He supported the proposed power project as per CPCB norms. And requested the management to provide & take all pollution control measures & he requested the management to develop the green belt in surrounding villages. He requested the management to give employment to land losers and local villagers & spent CSR funds to roads, schools & health camps.
3	Sri P. Venkateshwarlu, Chairman, Sri Kantamaheshwara Ettipothala Pathakam, Thallaveerappa Gudem (V), Damarcherla (M), Nalgonda District.	31.05.2016	He supported the proposed power project. And requested the management to give employment to land losers and local villagers & sanction the new lift irrigation scheme for Thallaveerappagudem (V) instead of Sri Kantamaheshwara Ettipothala Pathakam which is lost in acquisition for YTPS project.
4	Sri N. Kotya Naik, Sarpanch, Veerlapalem (V), Damarcherla (M), Nalgonda District.	31.05.2016	He supported the proposed power project. He requested that the management to do all basic needs in his village.
5	Sri P. Kiran Madiga, Founder President, TMRPS, 2-2-87/24/1/d/1, Amberpet, Mallikarjuna Nagar, Hyderabad.	31.05.2016	He supported the proposed power project. And requested the management to give employment to land losers and local villagers & sanction the new lift irrigation scheme for Thallaveerappagudem (V) instead of Sri Kantamaheshwara Ettipothala Pathakam which is lost in acquisition for YTPS project.
6	Smt. J. Rajya Lakshmi, Sarpanch, Thallaveerappa Gudem (V), Damarcherla (M), Nalgonda District.	31.05.2016	He supported the proposed power project and take-up developmental activities in our village as top priority. And requested the management to give employment first priority in our village as our village is very closed to proposed project.
7	Sri R. Saïdulu, CPI Mandal Secretary, Damarcherla (V&M), Nalgonda District.	31.05.2016	He supported the proposed power project and he requested to provide jobs for the local villagers. The management to give free Power, Education, Medical treatment, Drinking water & Double bed room houses and he also requested to control pollution & temperature by advanced technology. He requested the Government to sanction Government Technical College and he requested the management to give 100% local employment.
8	Samachara Hakku Sadhana Samithi, Nalgonda District Committee, Nalgonda.	31.05.2016	They supported the proposed power project. They requested the management to develop the forest in other area. The management to take-up developmental activities in villages.

9	Sri V. Abraham, General Secretary, Manava Vanarulu & Paryavarana Parirakshana Prachara Samstha. Amanagallu (V), Vemulapally (M), Nalgonda District.	31.05.2016	He supported the proposed power project as the proponent proposed all necessary pollution control measures in the EIA report.
10	Sri Surkanti Venkata Reddy, Social Worker, Nalgonda District.	31.05.2016	He supported the proposed power project and requested for good compensation and jobs to local.
11	Sri G. Mohan, State Secretary, Human Rights Forum.	31.05.2016	Submitted detailed questionnaire on TOR's, Coal, Water, Forest, Socio Economic Impact Assessment, Ash pond, Health, Cumulative Impact Assessment, and Alternatives. He expressed that the EIA report is not complete.
12	Sri N. Harinder, Human Rights Forum.	31.05.2016	Submitted detailed queries on draft EIA.
13	Sri Ch. Sailu, NGO, Choutuppal (V&M), Nalgonda District.	28.01.2016	He supported the proposed power project and requested for employment and development in the area.
14	Sri J. Ravinder, President, Haritha Kala Morcha, Nalgonda.	31.05.2016	He supported the proposed power project.
15	Modugula Thanda & Kapoor Thanda Hamlets of Veerla Palem Villagers, Damarcherla (M), Nalgonda District.	31.05.2016	They requested the authorities for compensation to the lands and employment to each family.
16	Sri P. Nagaiah, President, Parja Chaitanya Vedika, Hyderabad.	31.05.2016	He supported the power project and requested the authorities for necessary action for environmental protection and massive plantation in the area.

Annexure 15: Action Plan and Proponent for representation received

S.No	Issue	Proponent Response																																	
II	'Falsification of data and plagiarism in EIA report of YTPS', by Dr.BabuRaoKalapala vide email dt 27-05-2016																																		
1	Land requirement for the project is given as "The total extent of land for establishment of proposed power project is 2800 Acres (Forest land is Ac. 2095.28 Gts, Patta Land, Government Land, Udfapatta Land and D-Patta Land etc is Ac. 704.12 Gts)." (Page 2-27) "A thick greenbelt will be developed around the project boundary in an extent of 1225 acres of land." (Page 1-16) "The total area of extent for establishment of power station is 2800 acres, including 100 acres for colony and 1300 acres for greenbelt development." (Page 2-25) <table border="1"> <thead> <tr> <th>Sno</th><th>Details</th><th>Area (acres)</th></tr> </thead> <tbody> <tr> <td>1</td><td>Main plant area</td><td>250.00</td></tr> <tr> <td>2</td><td>BOP area</td><td>350.00</td></tr> <tr> <td>3</td><td>Raw water Reservoir</td><td>100.00</td></tr> <tr> <td>4</td><td>Coal handling plant</td><td>250.00</td></tr> <tr> <td>5</td><td>Ash dyke area</td><td>400.00</td></tr> <tr> <td>6</td><td>Green belt area</td><td>1225.00</td></tr> <tr> <td>7</td><td>Housing colony</td><td>100.00</td></tr> <tr> <td>8</td><td>Raw water pipeline and Railway corridor</td><td>50.00</td></tr> <tr> <td>9</td><td>Roads</td><td>75.00</td></tr> <tr> <td></td><td>Total</td><td>2800.00</td></tr> </tbody> </table> What is the logic in converting Ac2095.28 Gts of reserve forest land for industrial use and developing a green belt in 1225 acres of the same forest land? Greenbelt requirement is 30% of the total project land. According to the above table 1575 acres is the actual project area that constitutes 70% of the total area. So the land requirement including greenbelt comes to $1575/0.7 = 2250$ acres. So land requirement for greenbelt is 675 acres only. Excess land is 550 acres. Why is 704 acres of poor people's land taken away beyond requirement?	Sno	Details	Area (acres)	1	Main plant area	250.00	2	BOP area	350.00	3	Raw water Reservoir	100.00	4	Coal handling plant	250.00	5	Ash dyke area	400.00	6	Green belt area	1225.00	7	Housing colony	100.00	8	Raw water pipeline and Railway corridor	50.00	9	Roads	75.00		Total	2800.00	As per the norms of MoEF&CC,GOI, NEW Delhi minimum 33% of the project area is to be developed with green belt. As such it is proposed to develop the green belt in 1225 acres in the total extent land of 2800 acres proposed for the project. The Government land, UDAFA land, D-Form patta lands etc., are sandwiched in the forest land. Accordingly the patta lands were acquired. Sufficeint land compensation and R&R package was paid to the land losers of the above patta lands. During the public hearing also some of the land owners who are abutting to the project site are also requesting to take their lands. As such no loss was made to the any of the land losers. Also for construction of township, there is no permission for construction in forest land. Hence, patta lands were acquired.
Sno	Details	Area (acres)																																	
1	Main plant area	250.00																																	
2	BOP area	350.00																																	
3	Raw water Reservoir	100.00																																	
4	Coal handling plant	250.00																																	
5	Ash dyke area	400.00																																	
6	Green belt area	1225.00																																	
7	Housing colony	100.00																																	
8	Raw water pipeline and Railway corridor	50.00																																	
9	Roads	75.00																																	
	Total	2800.00																																	
2	Fresh water is presently a very limited resource. Several thermal power plants in various states were forced to close due to shortage of water this summer.Telangana state is undergoing severe	The water requirement is optimized as per the latest norms of MoEF&CC issued on dated 7 Dec																																	



Annexure 15: Action Plan and Proponent for representation received

S.No	Issue			Proponent Response																																
	drought. According to the new directive of MoEFCC dated 7 Dec 2015 all new plants coming up after Jan 2017 have to use not more than 2.5 m3/MW hr of water. “New plants to be installed after 1st January, 2017 shall have to meet specific water consumption upto maximum of 2.5 m3/MWh and achieve zero waste water discharge.” As per this norm the water requirement for the 4000 MW plant comes to 2.5 X 4000 = 10000 m3/hr at full capacity and at a PLF of 85% the water requirement is 8500 m3/hr on average with peak value at 10000 m3/hr. But the total water requirement is given as 9755 m3/hr = 2.87 m3/MW hr at 0.85 PLF violating the standard. What is the basis for obtaining 9755 m3/hr? This requirement does not include water needed for FGD units as Table 2.11 reproduced below indicates. <table><tr><th>Sno</th><th>Water Usage Description</th><th>Water requirement Qty(m³/hr)</th><th>Remarks</th></tr><tr><td>1</td><td>Make-up water for cooling tower</td><td>8250</td><td>(1540) to ash water pond/CHP,(100) to CMB</td></tr><tr><td>2</td><td>DMF feed pump</td><td>290</td><td>(15) Silting chamber of PTP(20)CMB(205) Make up to boiler CST</td></tr><tr><td>3</td><td>Service water</td><td>215</td><td>To CMB</td></tr><tr><td>4</td><td>HVAC Makeup</td><td>275</td><td></td></tr><tr><td>5</td><td>Portable water</td><td>25</td><td>Treated in STP</td></tr><tr><td>6</td><td>AHS compressor cooling, makeup for wastage from clarifier,AHP water sump coal handling plant,Miscellaneous</td><td>700</td><td>Sludge handing system, CMB</td></tr><tr><td></td><td></td><td>9755</td><td></td></tr></table> Water required for the growing paddy per acre is about 1300 m3 for the crop season. An hour’s use of water in the plant (9755/1300 = 7.5) is sufficient for 7.5 acres of paddy crop. Per day 7.5 X 24 = 180 acres irrigation for a season is deprived. About 56000 acres will be deprived of irrigation every year.			Sno	Water Usage Description	Water requirement Qty(m ³ /hr)	Remarks	1	Make-up water for cooling tower	8250	(1540) to ash water pond/CHP,(100) to CMB	2	DMF feed pump	290	(15) Silting chamber of PTP(20)CMB(205) Make up to boiler CST	3	Service water	215	To CMB	4	HVAC Makeup	275		5	Portable water	25	Treated in STP	6	AHS compressor cooling, makeup for wastage from clarifier,AHP water sump coal handling plant,Miscellaneous	700	Sludge handing system, CMB			9755		2015. The water requirement of 9755 m³/hr is calculated at 100% PLF with Zero discharge concept. The requirement of water for FGD will be finalized at the time of engineering and design of the project and the total water requirement for the project will be limited to 9755 m³/hr. Electricity is essential commodity for the development of state and the agricultural sector in the Telangana state utilizing 40% of the power generated in the Telangana state. As such establishing of the new power plant is essential to meet the present and future demand in the state.
Sno	Water Usage Description	Water requirement Qty(m ³ /hr)	Remarks																																	
1	Make-up water for cooling tower	8250	(1540) to ash water pond/CHP,(100) to CMB																																	
2	DMF feed pump	290	(15) Silting chamber of PTP(20)CMB(205) Make up to boiler CST																																	
3	Service water	215	To CMB																																	
4	HVAC Makeup	275																																		
5	Portable water	25	Treated in STP																																	
6	AHS compressor cooling, makeup for wastage from clarifier,AHP water sump coal handling plant,Miscellaneous	700	Sludge handing system, CMB																																	
		9755																																		



Annexure 15: Action Plan and Proponent for representation received

S.No	Issue						Proponent Response
3	Draft EIA does not unambiguously commit to setting up FGD unit to reduce SO₂ Emissions to meet the new emission standard of 100 mg/Nm³ of stack gas. True extract of the minutes of 16th board meeting of the company held on 14.03.2016 discussed the new standards but did not take any firm decision to implement them. Board decide to follow in principle the steps to be taken by NTPC, New Delhi in this regard”(Annexure 8) but while computing the incremental GLCs new standard value is taken to calculate the rate of SO₂ stack. How is SO₂ reduced to that level without FGD needs limestone and produces solid waste that should disposed and liquid waste water that requires treatment? There is no mention about these in the draft EIA. Amount of SO₂ generated based on coal rate and composition = $13.81 \times 106 \times 0.65 / 100 \times 64/32 = 179,530$ TPA. (Sulphur content from table 2.14). In the table 4.56 reproduced SO₂ emission rate from the stack is calculated based on fictitious stack gas flow rate based on stoichiometric combustion calculations. Numbers given do not match. How does the proponent / consultant justify it?						FGD system will be installed to comply with new Thermal Power Plant Emission Standards in respect of Sulphur dioxide. The design and layout of steam generator and its auxiliaries will be such that a wet/dry flue gas desulphurisation system can be installed, taking suction from duct after ID fan and feeding the desulphurised flue gases back to the chimney. The emission rates have been considered based on the latest norms of MoEF&CC by TSGENCO. The same has been computed and provided in EIA report. TSGENCO is committed to follow the new emission standards prescribed for Thermal Power Plants. In this regard the EPC contractor will be asked to provide the facilities for the installation of FGD as per the norms. In the proposed project cost, FGD project cost is not included. However, the cost of the project will be enhanced suitably to meet the cost of FGD.
	Sno	Parameters	Units	2x800MW (Unit 1&2)	2x800MW W (Unit 3&4)	2x800MW (Unit 5)	
	1	Stack height	m	275	275	275	
	2	No.of flue	No	2	2	2	
	3	Top diameter of flue	m	7.6	7.6	7.6	
	4	Flue gas velocity in each flue	m/s	22	22	22	
	5	Flue gas tempararture	°K	413	413	413	
	6	Flow rate of gas in each flue	Nm ³ /S	998.02	998.02	998.02	
	8	Emission rates					
	A	Sulphur dioxide(SO ₂)	g/s/flue	61.06	61.06	61.06	



Annexure 15: Action Plan and Proponent for representation received

S.No	Issue						Proponent Response												
		(emission rate based on 100 mg/Nm³ emission standard)																	
	B	Particulate matter (PM)(emission rate based on 30 mg/Nm³ emission standard)	g/s/flue	18.32	18.32	18.32													
	C	Oxides of Nitrogen(NOx)(emission rate based on 100 mg/Nm³ emission standard)	g/s/flue	61.96	61.96	61.96													
	D	Mercury(emission rate based on 0.03 mg/Nm³ emission standard)	g/s/flue	0.02	0.02	0.02													
4	Emission rates of pollutants presented in Table 4.66 are erroneous. For example, both SO2 and Nox emission rates are based on the standard 100mg/Nm3. So the emission rate per flue should be same. But the values given are 61.06 and 61.96 respectively. But based on the flow rate of gas per flue of 998.02 Nm3/s the emission rate should be 998.02x100/1000 = 99.8 g/s/flue for both SO2 and Nox. Emission rate taken is nearly 39% off. This error is in addition to calculation of a fictitious stack gas velocity that has no real basis. Similarly the emission rate of PM10 given in the table cannot be reproduced. Proponent consultant to explain how the NOx concentration is reduced to 100 mg/Nm³. <table><tr><td>Project</td><td>Nox Emission Standard used</td><td>Year</td><td>Source Respective EIA</td></tr><tr><td>KTPS Expansion 800MW</td><td>200g/GJ =500mg/Nm³</td><td>2014</td><td>EIA,page63</td></tr><tr><td>SDTPSII</td><td>350mg/Nm³</td><td>2014</td><td>Table 4.5</td></tr></table>						Project	Nox Emission Standard used	Year	Source Respective EIA	KTPS Expansion 800MW	200g/GJ =500mg/Nm³	2014	EIA,page63	SDTPSII	350mg/Nm³	2014	Table 4.5	Typographical error, rectified in final report. The NOx emission from the boilers will be controlled by controlling combustion measures, which will be approached by way of low NOx burners. And addition of By Pass Over Fire Air in furnace and dynamic classifiers in the mills in the place of static classifiers. Further, NOX control will be effected duly incorporating SCR(Selective Catalytic Reduction).Further ammonia gas induction in to the flue gas duct will bring down NOX levels to the prescribed levels. Mercury emissions are far less than the prescribed emission norms.
Project	Nox Emission Standard used	Year	Source Respective EIA																
KTPS Expansion 800MW	200g/GJ =500mg/Nm³	2014	EIA,page63																
SDTPSII	350mg/Nm³	2014	Table 4.5																



Annexure 15: Action Plan and Proponent for representation received

S.No	Issue					Proponent Response	
		,Krishnapatnam				Stack diameter has been considered based on the stack designed for ongoing 1 X 800 KTPS Project.	
		NTPC,Ramagundam	260g/GJ =742.85mg/Nm³	2015	Table 4.4		
		NTPC,Pudimadka	510mg/Nm³	2015	Table 4.4		
		YTPS,Veerlapalem	Assumed Nox in stack gas at 100mg/Nm³	2016	No data		
	There is no proposal for any treatment of gas to reduce Nox. Use of low NOx burners can at best lower the Nox generated to 400 mg/Nm³. Selective catalytic reduction is required to bring it down to 110 mg/Nm3. International Energy Agency compiltion of “Fossil Fuel fired Power Generation: Case studies of recentky constructed Coal – and gas – Fired power plants” published in 2007 on several best performing plants in OECD countries show that Nox cannot be brought down to below 100 mg/Nm³ without use of selective catalytic Reduction process. What is the actual Nox generated? How the company will achieve the standard og 100 mg/Nm3 of Nox in effluent gas? Same is the case for mercury.What is the total mercury released in coal combustion and how it is made to meet the emission standard needs explanation. The flue gas flow rate given at serial no 6 is not Nm3/s but m3/s. Conversion to STP conditions gives about 659 Nm3/s. With FGD installed the stake gas temperatures will be lower at about 383 K and not 43 K as given here. Emission rates for pollutants given in the table do not match with calculated values based on this flue gas flow rate also. Consultant falsified the information. How this consuilant got accreditation from NABET is rather surprising. It indicates the quality of our accreditation agencies. With false emission rates what is the sanctity of computed GLCs?						
5	Stack diameter per flue is given as 7.6 m for this project. Given below is a comparative table for several 800 MW supercritical plants.					The average velocity of 22m/s has been considered as per standard design in line with ongoing 1 X 800 MW KTPS 7 th Stage project.	
	S n o	Plant	Stack Diameter, m	Velocitym/s	GCV Kcal/kg		SHR(Des) Kcal/kWh
	1	KTPS Expansion	7.0	22	3700		2317
	2	APGENCO,Krishnapatnam	7.5	22	6340		2317



Annexure 15: Action Plan and Proponent for representation received

S.No	Issue						Proponent Response
	3	APGENCO,Ibrahimpatnam	7.0	22	3700	2317	
	4	NTPC, Ramagundam	8.15	22	NA	NA	
	5	UMPP,Krishnapatnam	7.7	25	6500-7000	NA	
	6	NTPC,Kudgi	7.7	26	3400	2447	
	From the above data it is clear that calculating emission rates of pollutants based on an assumed stack gas velocity could be off substantially.						
6	Regarding the linkage for domestic coal compliance for ToR 36 is: “ The quantity of coal required for the proposed project is 13.81 mtpa (50% domestic + 50% imported) Source: 50% quantity of Domestic coal will be sourced from M/s SCCL and the balance 50% of coal will be from foreign origin. Accordingly an MOU is entered with M/s SCCL for supply of 50% domestic coal of G9 grade which is GCV of 4600 Kcal/Kg. The Coal analysis results are given in Table- 2.6 of Chapter-2.” Table 2.14 given the GCV of domestic coal as 3400 KCal/Kg and the blended coal GCV as 4550KCal/Kg. There is discrepancy in the quality of domestic coal considered in the preparation of draft EIA and the domestic coal for which anMoU with M/s SCCL is claimed. Copy of the MoU is not provided with the draft EIA. Is entering anMoU for supply of coal synonymous to firm linkage? Linkage letter can only be issued by Ministry of coal. Will the coal allotted have the same GCV and quality parameters used in the preparation of EIA? Is this project eligible to apply for EC without firm linkage of fuel?						Keeping in view the non-availability of 100% domestic coal for the proposed project, it is proposed to meet the requirement of the project from domestic sources and foreign origin. Accordingly, it is proposed to source 50% of the requirement from domestic and 50% from imports. The average GCV of blended coal would be in the order of 4550 Kcal/Kg by considering the GCV of ‘F’ grade coal (G13) of SCCL 3400 Kcal/Kg and 5700 Kcal/Kg for imported coal. M/s. SCCL has accepted to supply higher grade coal (G9) having GCV of 4600 Kcal/Kg and accordingly MoU has been entered with SCCL. The quality of coal offered to supply by SCCL is similar to the quality of blended coal 4550 Kcal/kg considered for preparation of draft EIA. It is also to mention that by utilizing higher quality of coal will reduce the coal consumption and also reduction in generation of ash. With regard to entering of MoU with SCCL it is to mention that the MoU has been entered with SCCL as per the guidelines issued by Ministry of Coal, Govt. of India vide letter dated 07.10.2008



Annexure 15: Action Plan and Proponent for representation received

S.No	Issue	Proponent Response
		and with the provisions of National Coal Distribution Policy (NCDP) 2007 for supply of coal to future Projects on cost plus basis.
7	Entire report has no reference to the material taken from other works. Most of Chapter six is lifted from Annexure document of EIA/EMP of Raosahebada PawarGhodgangaSahakariSakharKarkhana Ltd for captive power plant expansion to 20.5 MW prepared by SGM Corporate Consultants pvt Ltd and MKW Biosystems, Pune available on MoEFCC website. Table 6.70 and 6.71 are reproduced from this document verbatim. http://environmentclearance.nic.in/writereaddata/FromB/EC/EIA/EMP/15032016SL0QCU4LAnnexyre-documentofEIA-EMP.pdf There is extensive copy paste in section 7.8 from "Risk Assessment and Disaster Management Plan & Hazard Control w.r to Ferro Alloys Division of M/s Misrilal Mines Pvt.Ltd., Pankapal, Jajpur, Odisha." This report is available at http://environmentclearance.nic.in/writereaddata/online/RiskAssessment/18022015COKJ5207RiskAssessmentandDisasterManagementPlan.pdf Section 7.8.2 is fully lifted from the above reference. This EIA and EMP report prepared by Environmental Research and Services (India) Pvt.Ltd., Bhubaneswar was submitted to MoEFCC in July 2012. Fourth and fifth paragraphs of section 7.8 are a verbatim copy from a website in Australia. The Second sentence of the copied paragraph "These regulations and codes, adopted under state and territory OH & S Acts, explain the duties of particular groups of people in controlling the risks associated with specific hazards." In India we do not have any state territory OH & S Acts. This is an indication of the quality of the EIA report and the competency of the consultant.- indicates that it is thoughtlessly lifted from an Internet source. "As a small business owner one has certain rights and responsibilities regarding health and safety in the workplace. Even without any employees, one must ensure that the business doesn't create health and safety problems for the customers and the general public."	Risk Assessment and Disaster Management Plan has been prepared based on standard reference material. The same is referred by various consultants in various reports. References have been incorporated in the EIA report.



Annexure 15: Action Plan and Proponent for representation received

S.No	Issue	Proponent Response
	The principal source for all these plagiarized parts is “Safety among Health in the Iron and Steel Industry, ILO Code of Practice, Second Edition 2005” available at https://books.google.co.in/books?isbn=9221175359 Section 7.6.2.3 Safety Policy and Regulations is a verbatim reproduction from NTPC Safety Manual 2004 available at www.rgppl.com/tender/Safety.pdf Section 7.6.2.1, 7.6.2.2, and 7.6.2.3 are extensively copy pasted from the publication of Ruchi Srivastava and Pravin Patel, International Journal of Engineering Research & Technology (IJERT), Vol. 3 Issue 4, April – 2014. Table 7.79 Risk Classification Screening and Table 7.80 Risk Classification pertain to a Hazard Identification and Risk Assessment Study (HIRA) done by the authors for the CSEB thermal power plant at Kobra in Chhattisgarh. The same is presented as HIRA for the proposed 4000 Mw YTPS. This is most unethical practice and attracts disqualification as per OM dated 5 October 2011 on the ownership of EIA Report. MoEF Notification 2006 in section 8 (vi) clearly states “Deliberate concealment and/or submission of false or misleading information or data which is material to screening or scoping or appraisal or decision on the application shall make the application liable for rejection, and cancellation of prior environmental clearance granted on that basis.” Second para of section 6.2 and some bullet points under 6.2.1 are copied from “Environmental Management in Oil and Gas Exploration and Production” available at http://books.google.co.in/books?isbn=9280716395 Few examples of the section and page on which it begins in the source copied is given below to confirm the fact of plagiarism for anyone to verify. Entire section 7.7 dealing with Disaster Management Plan and Sections 7.8.2.4 are all copied from a document on Risk Assessment available at http://environmentclearance.nic.in/.../01042015G0QGT1PXRiskassessmentfortheProject.pdf. Author of the report is Unknown. [Source: https://books.google.co.in/books?id=2mNlt-TUASAC&pg=PA127&lpg=PA127&dq=Respirators+should+be+cleaned+and+sanitized+periodic	



Annexure 15: Action Plan and Proponent for representation received

S.No	Issue	Proponent Response
	ally&source=bl%ots=DCVir6s8vi&sig=_w5f0eXoe3XsoJ8ZoupU8PGwTgg&hl=en&sa=X&ved=0CBwQ6AewAGoVChMI7NzNn- 2vyAIVjRmOCh1lbw1z#v=onepage&q=Respirators%20should%20be%20cleaned%20and%20sanitized%20periodically&f=false] “Handling of Heavy Bags Handling of heavy bags of the final products may lead to occupational Injuries like strains, sprains and cramps. This can be avoided by going for mechanical handling of the product or minimising the weight for manual handling.” (Page 7-216) This has no relevance to this project but is a relic of copy paste from other reports. One such is available on MoEF website http://environmentclearance.nic.in/.../online/.../08082014QUGPYT2311Ch6-ICPL-final.pdf Also the Entry Medical Examination Form and the Periodic Medical Examination Form are taken from literature but not acknowledged. Respective sources for these forms are given below. [www.unv.org/fileadmin/docs/...of.../Entry Medical Exam Form.doc http://sas.undp.org/.../Periodic Medical Examination FormMS6.doc There is enough evidence in this chapter to conclude that this chapter is copy pasted from the EIA report for a fertilizers and chemicals plant for VBC Fertilizers and Chemicals Ltd, Jayantipuram, AP done by this consultant in 2015. For Example More incidence of plagiarism can be identified with patient search at consirable expense of time. But it is not worth the effort. It os a clear case of plagiarism that is very common in the EIA report preparation as the scrutiny is weak. A Rs25,000crore company beginning its venture on false premises is disturbing. It is violative of professional ethics. Explain the reasons for passing others work as the contribution of	



Annexure 15: Action Plan and Proponent for representation received

S.No	Issue	Proponent Response
	the Consultant. Thungapaduvaguang its feeding channels pass through the site chosen for the power plant. A subcommittee visited the site on 5 December 2015 and made a visit report based on which ToR was issued on 16 February 2016. "The Vgu has a catchment area of 267 sq. Miles (696 sq.KMs) including the NSLC command area and yields 1,234 mcf. (1.234 TMC) including 328.98 Mc ft. As regenerated flow the ayacut." Hydrogeological character map taken from the hydrogeological studies report annexed to draft EIA is presented below showing the contours of drain channels on the proposed site connecting to Thungapaduvagu. Once the site is developed for construction all these natural channels will be leveled and eliminated. That is an ecological damage not considered in the EIA or the subcommittee visit report. Ash pond also is located over drain channels and disrupts natural drainage. What are the health impacts of pollution generated from the plant? What is the fate of all the toxic elements released into the environment? Where will they disappear? Provide material balance for mercury and other heavy metals in the coal. ToR are not adequately complied with. For example, ToR 24 on "source of water and sustainability even in lean season" compliance report states "As the Krishna river is perennial river sufficient water will be available even during the lean season also." But the reality is different. RTPS located close to Krishna River in Karnataka was forced to close down 3 units this summer due to shortage of water. "The drought situation has affected the operations at the Raichur Thermal Power Station (RTPS), which accounts for over 30 per cent of the State's power generation. Three of its generating units (2, 6, and 7) with an installed capacity of 210 MW each have stopped operations due to shortage of water for their cooling towers." http://www.thehindu.com/news/national/karnataka/drought-hits-power-generation-in-rtps/article8358513.ece	



Annexure 15: Action Plan and Proponent for representation received

S.No	Issue	Proponent Response
	Again ToR 42 on “Radioactivity and Heavy metal content” compliance stated in Annexure 7 is misleading. The analysis reports are for some coal and not for the actual coal to be used in the plant as there is no firm fuel linkage as yet. Among the additional terms of reference issued to YTPS the following were not answered. “(d) What is the carbon intensity from your electricity generation projected? (i.e. CO2 Tons/MWh or Kg/kWh) (e) Amount of CO2 in Tons/Yr expected to be reduced from the baseline data available on CEA’s website (www.cea.nic.in)” On “Cumulative impact assessment” prescribed, the compliance stated is: “Accepted. TSGENCO will undertake the cumulative impact assessment of air, water and socio economics covering the industries located within 15 km radius of the present project site and present the same in the Draft EIA report.” But no such assessment within 15 km area is presented in the draft EIA. How could the consultant make such a false statement and get away with it? [Source:http://www.canberrabusinesspoint.com.au/resourcestools/business-topics/?id=253] Another sentence in the fifth paragraph of section 7.8 indicates that it is thoughtlessly lifted from an Internet source. “As a small business owner one has certain rights and responsibilities regarding health and safety in the workplace. Even without any employees, one must ensure that the business doesn’t create health and safety problems for the customers and the general public.” The principal source for all these plagiarized parts is “Safety among Health in the Iron and Steel Industry, ILO Code of Practice, Second Edition 2005” available at https://books.google.co.in/books?isbn=9221175359 Section 7.6.2.3 Safety Policy and Regulations is a verbatim reproduction from NTPC Safety Manual 2004 available at www.rgppl.com/tender/Safety.pdf Section 7.6.2.1, 7.6.2.2, and 7.6.2.3 are extensively copy pasted from the publication of RuchiSrivastava and Pravin Patel, International Journal of Engineering Research & Technology	



Annexure 15: Action Plan and Proponent for representation received

S.No	Issue	Proponent Response
	(IJERT), Vol. 3 Issue 4, April – 2014. Table 7.79 Risk Classification Screening and Table 7.80 Risk Classification pertain to a Hazard Identification and Risk Assessment Study (HIRA) done by the authors for the CSEB thermal power plant at Kobra in chhattisgarh. The same is presented as HIRA for the proposed 4000 Mw YTPS. This is most unethical practice and attracts disqualification as per OM dated 5 October 2011 on the ownership of EIA Report. MoEF Notification 2006 in section 8 (vi) clearly states “Deliberate cocealment and/or submission of false or misleading information or data which is material to screening or scoping or appraisal or decision on the application shall make the application liable for rejection, and cancellation of prior environmental clearance granted on that basis.” Second para of section 6.2 and some bullet points under 6.2.1 are copied from “Environmental Management in Oil and Gas Exploration and Production” available at http://books.google.co.in/books?isbn=9280716395 Few examples of the section and page on which it begins in the source copied is given below to confirm the fact of plagiarism for anyone to verify. Entire section 7.7 dealing with Disaster Management Plan and Sections 7.8.2.4 are all copied from a document on Risk Assessment available at http://environmentclearance.nic.in/.../01042015G0QGT1PXRiskassessmentfortheProject.pdf. Author of the report is Unknown. [Source:https://books.google.co.in/books?id=2mNlt-TUASAC&pg=PA127&lpg=PA127&dq=Respirators+should+be+cleaned+and+sanitized+periodically&source=bl%ots=DCVir6s8vi&sig=_w5f0eXoe3XsoJ8ZoupU8PGwTgg&hl=en&sa=X&ved=0CBwQ6AewAGoVChMI7NzNn-2vyAIVjRmOCh1lbw1z#v=onepage&q=Respirators%20should%20be%20cleaned%20and%20sanitized%20periodically&f=false] “Handling of Heavy Bags Handling of heavy bags of the final products may lead to occupational Injuries like strains,	



Annexure 15: Action Plan and Proponent for representation received

S.No	Issue	Proponent Response
	sprains and cramps. This can be avoided by going for mechanical handling of the product or minimising the weight for manual handling.” (Page 7-216) This has no relevance to this project but is a relic of copy paste from other reports. One such is available on MoEF website http://environmentclearance.nic.in/.../online/.../08082014QUGPYT2311Ch6-ICPL-final.pdf Also the Entry Medical Examination Form and the Periodic Medical Examination Form are taken from literature but not acknowledged. Respective sources for these forms are given below. [www.unv.org/fileadmin/docs/...of.../Entry Medical Exam Form.doc http://sas.undp.org/.../Periodic Medical Examination FormMS6.doc There is enough evidence in this chapter to conclude that this chapter is copy pasted from the EIA report for a fertilizers and chemicals plant for VBC Fertilizers and Chemicals Ltd, Jayantipuram, AP done by this consultant in 2015. For Example More incidence of plagiarism can be identified with patient search at considerable expense of time. But it is not worth the effort. It is a clear case of plagiarism that is very common in the EIA report preparation as the scrutiny is weak. A Rs25,000crore company beginning its venture on false premises is disturbing. It is violative of professional ethics. Explain the reasons for passing others work as the contribution of the Consultant.	
8	Thungapaduvagu and its feeding channels pass through the site chosen for the power plant. A subcommittee visited the site on 5 December 2015 and made a visit report based on which ToR	Tungapaduvagu will not be diverted and its original drainage pattern will be maintained. The vagu will be strengthened by providing suitable



Annexure 15: Action Plan and Proponent for representation received

S.No	Issue	Proponent Response
	was issued on 16 February 2016. "The Vagu has a catchment area of 267 sq. Miles (696 sq.KMs) including the NSLC command area and yields 1,234 mcft. (1.234 TMC) including 328.98 Mc ft. As regenerated flow the ayacut." Hydrogeological character map taken from the hydrogeological studies report annexed to draft EIA is presented below showing the contours of drain channels on the proposed site connecting to Thungapaduvagu. Once the site is developed for construction all these natural channels will be leveled and eliminated. That is an ecological damage not considered in the EIA or the subcommittee visit report. Ash pond also is located over drain channels and disrupts natural drainage.	size and section of earthen bunds on either side of the banks. Also its natural flow will be maintained by removing silt and any other blockages etc. from the vagu within the plant premises. This will be done in consultation with the Irrigation dept., Govt. of Telangana.
9	What are the health impacts of pollution generated from the plant? What is the fate of all the toxic elements released into the environment? Where will they disappear? Provide material balance for mercury and other heavy metals in the coal.	No pollutant will be discharge outside the plant premises. The plant is based on Zero Discharge concept. The ground level concentration of air pollutants are with in the permissible limits. Hence, no adverse impact on health. The occupation health impacts have been addressed in detail in the Chapter 7 of the EIA report. The presence of Heavy metals has been analysed in the coal to be used and the same is presented as Annexure 7.
10	ToRare not adequately complied with. For example, ToR 24 on "source of water and sustainability even in lean season" compliance report states "As the Krishna river is perennial river sufficient water will be available even during the lean season also." But the reality is different. RTPS located close to Krishna River in Karnataka was forced to close down 3 units this summer due to shortage of water."The drought situation has affected the operations at the Raichur Thermal Power Station (RTPS), which accounts for over 30 per cent of the State's power generation. There of its generating units (2, 6, and 7) with an installed capacity of 210 MW each have stopped operations due to shortage of water for their cooling towers."http://www.thehindu.com/news/national/karnataka/drought-hits-power-generation-in-rtps/article8358513.ece.	The water requirement for the proposed thermal power plant of 5 x 800 MW will be about 9,755 m3/hr shall be sourced from the Krishna river. The intake water structure is proposed on Krishna river, tentatively at a distance of about 10. km away from the site. About 3.03 TMC/annum of water is required for the proposed thermal power plant. Whereas, the I&CAD Department, Telangana state government



Annexure 15: Action Plan and Proponent for representation received

S.No	Issue	Proponent Response
	Again ToR 42 on “Radioactivity and Heavy metal content” compliance stated in Annexure 7 is misleading. The analysis reports are for some coal and not for the actual coal to be used in the plant as there is no firm fuel linkage as yet. Among the additional terms of reference issued to YTPS the following were not answered. “(d) What is the carbon intensity from your electricity generation projected? (i.e. CO₂ Tons/MWh or Kg/kWh). (e) Amount of CO₂ in Tons/Yr expected to be reduced from the baseline data available on CEA’s website (www.cea.nic.in)” On “Cumulative impact assessment” prescribed, the compliance stated is: “Accepted. TSGENCO will undertake the cumulative impact assessment of air, water and socio economics covering the industries located within 15 km radius of the present project site and present the same in the Draft EIA report.” But no such assessment within 15 km area is presented in the	has allocated 6.6 TMC/annum of water from the Krishna river. As the Krishna river is a perennial river, the water will be available in lean season also and the Govt of Telangana has allocated 6.6 TMC of water per annum for the above project after taking all inter states shares into consideration. As the Krishna river is perennial river sufficient water will be available even during the lean season also M/s. SCCL is supplying coal for the existing Power Projects of TSGENCO from their group of mines in Godavari Valley Field Area. SCCL is offered to supply coal under MoU to Yadadri Thermal Power Project from the same group of mines. The coal samples actually collected from SCCL mines for testing of Heavy Metal content and reports are placed. With regard to Radioactivity analysis the imported coal sample of similar specification proposed to be utilized in the project was obtained from NTPC Simhadri Power Station. The analysis reports are placed. The EIA report has been revised based on the public hearing comments and action plan.



Annexure 15: Action Plan and Proponent for representation received

S.No	Issue	Proponent Response
	draft EIA. How could the consultant make such a false statement and get away with it?	Cumulative impacts of the proposed power plant operation as well as vehicular movement has been studied in detail using USEPA approved software. However, impacts of the existing industries in the 15 km radius are already covered in baseline AAQ levels.



Annexure 15: Action Plan and Proponent for representation received

S. No	Issue	Proponent Response
II	Comments, Questions and Suggestions for the Public Hearing to be held on 31 May 2016 for “5x800 MW Supercritical Coal Based Thermal Power Plant at Veerlapalem Village, Damarcherla Mandal, District Nalgonda, Telangana”, Prasad Khale, Conservation Officer, Conservation Action Trust vide email from prasad@cat.org.in on 28/05/16 06:11 PM	
1.	Given the huge size of the proposed project, site monitoring should have been carried out for all four seasons viz. Pre-monsoon, Monsoon, Post-monsoon and Winter Season. It is also important to know the worst case scenario during the dry season.	One complete season baseline data collected during winter season 2015-16, i.e., from 6 th Dec.2015 to 5 th March 2016 and incorporated in the EIA report in line with the condition No 38 of standard ToR issued on 2 nd Nov 2015 by MoEF&CC for the proposed project. Impacts due to worst case scenario have been incorporated in Chapter-4 of the EIA report. However the base line data for other seasons are also being collected for monitoring the pollution levels after commissioning the project. The work is entrusted to M/s Bhagavathi Ana labs Ltd,Hyderabad who are accredited consultants certified by NABET.
2.	As the proposed thermal power plant unit is based on coal, please provide full details about the expected deterioration of ambient air quality due to emissions from the plant and its related activities, as well as storage and transport of coal and disposal of fly ash.	Impacts due to the proposed power plant operation during operation stage and its related activities, as well as storage and transport of coal and disposal of fly ash are covered in Section-4.3 of Chapter-4 of the EIA report.
3.	Also provide the details of expected plume behaviour as per the wind speed and wind direction data collected from IMD as well as onsite monitoring using 3D models validated with ground monitoring.	The generated site data and the available secondary meteorological data generated by the nearest Indian Meteorological Department (IMD) station located at Nalgonda have been provided in the Section 3.3 of Chapter 3 of the EIA report.
4.	EIA mentions about the data obtained from Indian Meteorological Department, but there is no comparison of the data obtained by onsite monitoring and data obtained from IMD. Please provide proper Tables and Charts comparing the differences using both sets of data.	The generated site data and the available secondary meteorological data generated by the nearest Indian Meteorological Department (IMD) station located at Nalgonda are provided in Section-3.3 of Chapter-3 of the EIA report. The onsite and IMD data are provided in separate tables.
5.	Surface water quality monitoring mentions only about the existing quality of water. Please provide the details on the expected deterioration of existing surface water quality due to proposed Thermal Power project.	The proposed project is based on “ Zero Discharge Concept” and Hence no impact on surface water quality.
6.	Similarly provide details about the expected deterioration of existing ground water quality parameters due to the proposed project.	The project will not extract groundwater and hence there will be no impact on ground water. Also HDPE film will be provided over the impermeable clay lining in the ash pond and there would not be any leaching effect on the ground water quality.



Annexure 15: Action Plan and Proponent for representation received

7.	What will be the expected deterioration of existing water quality of Krishna River due to the proposed project?	The wastewater generated in the plant area will be treated in the effluent treatment plant and treated water will be utilized in various activities such as cooling water make up, dust suppression system in coal conveyor and coal storage yard, ashing purpose, floor washing and greenbelt development. Ash water recovery system will be provided with recycling arrangement to reuse the decanted water for ashing purpose. No discharge is envisaged into any surface river water bodies; hence, no impact is envisaged on surface river water quality.
8.	Please provide the data for analysis of meteorological parameters like wind speed, wind direction, thermal inversion, atmospheric pressure, rainfall and cloud cover etc. Please provide the data for the period of last 10 years.	The latest available secondary meteorological data from Climatological Tables, 1975-2000, India Meteorological Department (IMD), Nalgonda which is the nearest Indian IMD station is provided in Section-3.3 of Chapter-3 of the EIA report.
9.	What will be the impact on the existing soil quality due to deposition of pollutants from proposed coal thermal power plant?	The fugitive emissions will be controlled to a great extent through proposed control measures like highly efficient ESPs and installation of bag filters in each and every transfer points in coal handling plant and water sprinkling system shall be installed at coal yard. High concentration slurry disposal system for ash disposal will be implemented. Details provided in Section-4.3. of Chapter-4 of the EIA report.
10.	What will be the impact on the farmlands and crops due to deposition of pollutants from proposed plant? How will the farmers be compensated for decrease in productivity?	The plant will be designed with high efficient ESPs, FGD, ETP with recycling system, 275 m high chimneys for dispersion of flue gases, etc., to maintain the environmental parameters as prescribed by MoEF&CC, GOI, New Delhi.
11.	Please provide mitigation measures for the same.	Greenbelt with suitable species will be developed in the periphery of the plant area to mitigate air pollution levels. Hence, there would not be any effect on near by agricultural fields.
12.	Please provide the complete list of flora and fauna with IUCN status of the species whether it is endemic, endangered or vulnerable etc.	Incorporated in EIA report
13.	What is the distance of the project site from the boundary of Nagarjuna Sagar Wildlife Sanctuary?	Beyond 10 km radius
14.	Are there any wildlife corridors passing through the proposed project area? Have any studies being carried out for the same? If yes, kindly provide mitigation measures for the same.	No, not applicable
15.	What will be the impact of this project on existing Flora and Fauna?	Discussed in Section-4.3.8 of Chapter-4 of EIA report
16.	What steps have been taken to minimize the entrapment of small aquatic flora and fauna? Have state of the art low aperture intake screens proposed to be installed, along with fishnets around the intake? Please provide the details of the	The intake structure will be designed suitably.



Annexure 15: Action Plan and Proponent for representation received

	system proposed to be installed in order to minimize entrapment.	
17.	Please provide IUCN status of all the aquatic flora and fauna species found in the study area.	Incorporated in EIA report
18.	There are Schedule-I species present in the study area. What are the mitigation measures to protect the same?	If, any Schedule-I species are observed in the plant premises, the wild life department will be informed to shift them to appropriate location. Domestic Coal from SCCL mines at a distance of 300 kms and Imported Coal form Indonesia from Kakinada port at a distance of 328 kms shall be sourced. The coal will be transported to power Station from coal mines through Indian Railways Network. Details provided in Chapter-2. The coal analysis reports, including Heavy Metal Analysis and Radioactivity Test Report of typical coal samples are enclosed in Annexure 7 of EIA report. No losess.
19.	Please specify details of the mines, the means of transport, the composition, the radioactivity, the mercury content, other heavy metals, the Sulphur content of the coal for the proposed thermal power plant.	
20.	What will be losses of coal during transportation?	
21.	What measures will be taken to prevent coal dust getting into the atmosphere?	
22.	What will be the environmental impact due to coal transportation for this project? Kindly furnish full details of same.	Water sprinkler systems will be provided in coal conveyors, coal storage yard to control coal dust emissions. Bag filters will be provided at every junction tower and in coal bunker building to control the fugitive emissions. Coal is transported only through rail. So no impact on environment.
23.	How will the coal be transported to power plant? Where would it be stored? Kindly provide co-ordinates and details of the coal storage yard, and the green belt along its periphery.	
24.	Please mention the source of imported and / or the indigenous coal and its detailed composition.	The coal will be transported to power Station from coal mines through Indian Railways Network. Storage location and greenbelt details and plant layout map are provided in Chapter-2 of EIA report. Domestic Coal from SCCL mines at a distance of 300 kms and Imported Coal form Indonesia from Kakinada port at a distance of 328 kms shall be sourced. Details provided in Chapter-2. The coal analysis reports, including Heavy Metal Analysis and Radioactivity Test Report of typical coal samples are enclosed in Annexure 7 of EIA report.
25.	Please furnish full details of radioactivity and heavy metal content analysis of the coal proposed to be used. Report for the same should be submitted.	
26.	What will be the dispersion of fly ash due to wind, and in what direction, and at what speed? What is the amount of fly ash expected to be dispersed due to wind? Please provide full details of the same for each season.	The fly ash will be conveyed by pipeline to remote silos for issue to cement industries and other users. The fly ash will be transported from remote silos in closed tankers to cement industries, brick manufacturing untis, etc., hence no dispersion of fly ash.
27.	What are the co-ordinates of the proposed Effluent Treatment Plant? What is the area required for the same?	The design and engineering of the proposed project will be taken up only after obtaining the EC.



Annexure 15: Action Plan and Proponent for representation received

28.	What are the co-ordinates of the proposed Sewage Treatment Plant? What is the area required for the same?	The design and engineering of the proposed project will be taken up only after obtaining the EC.
29.	What is the expected increase in traffic in the area? What will be the approximate increase in SO _x and NO _x emissions as well as SPM and noise pollution due to increased traffic because of the plant? Please furnish with the mitigation measures of same, if any.	About 200 to 250 ash tankers will be moving for lifting of fly ash. Mitigation measures include Transportation of ash by closed tankers; cement concrete roads within the plant area; and development of greenbelt around the plant to arrest the fugitive emissions. Mitigation measures provided in Section-4.3 of Chapter-4 of the EIA report.
30.	Which are the industries where the fly ash will be supplied? Please provide full details. Please also mention the distance of such industries from the proposed project area and mode of transportation for fly ash.	Fly ash will be supplied to cement plants and brick manufacturing units within 200 km of the proposed plant site. Willingness letters furnished by certain cement industries for lifting of Fly ash are provided in Annexure 11 of EIA report.
31.	Please furnish full details of the field visits conducted to undertake the ecological study including copies of field notes. Please mention full details of the team members, their qualifications, and the number of man-days spent on the ecological data collection.	Details of the experts involved in EIA studies are already provided in the Declaration of experts page submitted for public hearing. All records are available at BALPL office.
32.	What are the proposed facilities for the parking, washing, repairs and maintenance of trucks and other heavy equipment?	Designated facilities for the parking, washing, repairs and maintenance of trucks and other heavy equipment shall be provided as per the plant requirement.
33.	Is the EIA report in line with the EIA guidelines and TOR as specified by the MoEF & CC?	Yes
34.	The EIA report does not deal with the impact of coal dust, Fly ash and other emissions on crops and other agricultural produces. Please provide expected impacts of such emissions on agriculture of the area.	. Details provided in Section-4.3.8 of Chapter-4 of the EIA report.
35.	What will be the impact of the air pollution and the fly ash on the people living in the vicinity of the project area? What are the health impacts? Kindly furnish with details of same.	The air dispersion modelling results were provided in Section 4.3 of Chapter 4. The ground level concentration are with in the plant premises. Hence, no impact on the health of surrounding people.
36.	Please provide the number of people expected to lose livelihoods or be displaced due to this project. Please provide detailed rehabilitation and resettlement plan for these people.	R&R plan as approved by District Collector is provided in EIA report as Annexure An amount of Rs. 285.81 crores towards land compensation, R&R package and other charges was deposited with the District Collector, Nalgonda in the month of January 2016 for acquiring Ac. 854.32 Gts of patta lands and Ac. 920.25 Gts of ROFR land.
37.	Please furnish copies of compliance reports and monitoring reports.	Monitoring results provided in EIA report
38.	How will this proposed project impact the bird life?	No impact on bird life.



Annexure 15: Action Plan and Proponent for representation received

39.	How will this proposed project impact the livelihoods of local community?	Need based studies have been carried out in surrounding villages to study socio economic profiles, infrastructure availability and infrastructure requirement Accordingly EIA report is prepared for implementation of CSR activities, necessary provision has been made towards drinking water, sanitation, education, health care, infrastructure development, with a provision of Rs 100.40crores @ 0.40% of the project cost towards CSR plan. Impacts discussed in EIA report. The project will improve the living standards of the people living around the project site, as it will provide direct and indirect employment.
40.	Please provide details on how much area is going to be reclaimed for various activities for the proposed project.	No reclamation.
41.	Please furnish details of the length of the intake and outfall channel.	The suitable location for the intake structure is yet to be finalized. No outfall, as zero discharge envisaged.
42.	Please furnish the details on the aquatic ecology of Krishna River from which the water for the project is going to be withdraw and discharged.	Details provided in Chapter-3 of EIA report.
43.	Kindly furnish the list of industries in the study area as well as other activities such as quarries, mining, etc.	Around 12 cement industries are located in the 50 km radius boundary. The details of mines and quarries may be obtained from concerned Departments.
44.	Have cumulative assessment studies for the project being carried out? Please furnish details of same as well as copies of these Reports.	Cumulative impact of all sources of emission data are given in Section-4.3.4 of Chapter-4
45.	Please explain the mitigation measures for the noise generated from the plant machineries.	Details provided in Section-4.8.3 of Chapter-4 of EIA report.
46.	Seismic map of the area is not provided in Disaster Management Plan. Please provide the same.	Incorporated in Chapter 7.
47.	The project site is located in an area lying in seismic zone 3. What possible measures will be undertaken in event of earthquake? Is the power plant and all the structures designed for Category 3?	Structural design of the plant units shall be done in consideration to the seismic zonation.
48.	Please furnish study on the impact on the ecology of the area during the site clearance, construction activities and operation activities of the proposed project.	Details provided in Chapter-4 of EIA report
49.	Kindly furnish details of all the clearances granted to the proposed project – forest clearance, environment clearance.	Stage II Forest Clearance is obtained vide Lr. No. F.No. 8-07/2015-FC, dated 7 July 2015. The Forest Clearance letter from MoEF&CC dated 7 July, 2015 is provided in Annexure 3 . EC is yet to be obtained.
50.	Does the any area of intake & outfall channel for the plant coming under fishing zone?	No
51.	Please furnish full details of the type of material being used for the landfill/reclamation and its source(s).	No reclamation from the outside of the plant area.



Annexure 15: Action Plan and Proponent for representation received

52.	What is the life of this proposed project? And what is the lease period of the land given for this project?	Life of plant-25 years; The land is not taken on lease. It is completely acquired by –TSGENCO and it is now the property of TSGENCO.
53.	Has the work of the proposed project commenced? Please furnish full details of work carried out so far.	No
54.	What will be the configuration of the thermal power plants? What will be the height of each stack of each unit?	5 x 800 MW Two chimneys of double flue of height 275 mts and one chimney of single flue of height 275 mts.
55.	What will be configuration of stacks?	Same as above.
56.	Please furnish details on impact of the increase in water temperature on the aquatic life.	Zero discharge envisaged.
57.	Is there provision of FGD installation? What type of FGD units will be installed?	Yes. Type of FGD will be decided at the time of engineering.
58.	Please furnish the Cumulative impact assessment of all sources of emissions (including transportation) on the AAQ of the area. Please also furnish full details of the model used and the input data used for modelling shall also be provided.	Details provided in Chapter-4 of EIA report.
59.	Please furnish full details of green belt, along with map, gps coordintes and area details.	The layout map showing the green belt is provided in EIA report.
60.	What will be the quantity of fly ash generated from the proposed project?	The total ash generation from the proposed power plant will be about 3.9 MTPA. Out of this, the bottom ash will be about 0.8 MTPA and balance 3.1 MTPA will be fly ash. Details provided in EIA report.
61.	Please furnish details of proposed fly ash utilization as per the notification.	Details provided in Section-4.8.4, Chapter-4 of EIA report.
62.	Please list the details on the area of green belt around the fly ash dumping pond, width of this green belt, density of plants in this green belt and composition of plants of the green belt.	Details provided in EIA report.
63.	Has any carrying capacity study been conducted for the area? Please furnish copies the Reports.	Such study is not conducted in present EIA studies as it is not necessary.
64.	Considering the ecological importance of the area please justify the feasibility of the project. Please mention the impacts of project on the crops and river. Please also give the mitigation measures. Please furnish with details of compensation for the same to the project affect people.	Details provided in EIA report.
65.	What will be the capacity of the STP & ETP? How much water will be generated from STP & how much of it will be reused. Kindly furnish with full details.	Capacity will be finalized at the time of engineering of the plant.



Annexure 15: Action Plan and Proponent for representation received

66.	Were any alternate studied for intake or outfall channel? Please mention in details about same.	Suitable location of intake structure is yet to be finalized.
67.	How much water shall be drawn from the Krishna River & how much will be discharged back?	3.03 TMC of water per annum will be drawn from Krishna River. No plant effluent will be discharged in to the Krishna river.
68.	Has the Project proponent carried out detailed Social impact assessment (SIA) study? If yes, please furnish with same. If no, kindly explain.	Yes, incorporated in EIA report.
69.	How many villagers from villages has given permission for the project? How many are objecting the proposal? Kindly give information for each village.	All the villagers have welcomed the project.
70.	What will be the impact of the additional transport of raw materials and the finished products on the road, rail?	No impact.
71.	Please furnish details of the transportation studies conducted.	No impact on the road and traffic.
72.	What will be the impact of the utility corridor, roads, etc. required for this project?	No impact
73.	Please furnish No Objection Certificates, Consents, from the State Pollution Control Board for the projects involving discharge of effluents, solid wastes, and sewage waste under Environmental Protection Act 1986.	Consent for Establishment of the project under Air and Water Act will be obtained from TSPCB only after issue of EC by MoEF&CC, GOI, New Delhi.
74.	How much percentage of the project cost shall be utilized for environment management? Please explain the execution plan for the same.	Details provided in EIA report.
75.	Is this project designed to comply with the latest norms issued by the MoEF&CC?	Yes, as per the Gazette Notification dated 07 th December 2015 issued by MoEF & CC.



Annexure 15: Action Plan and Proponent for representation received

S.No	Issue	Proponent Response
I	Written questionnaire for Yadadri Public Hearing, G Mohan, Human Rights Forum, State Secretary and N. Harinder, General Secretary Human Rights Forum.	
1.	How can it be that TOR can be automatically get generated by the MoEF&CC when the same has been rejected by the EAC?	As per the para (4) of Gazette Notification dated 10th April 2015 of MoEF& CC the standard TOR shall enable the project proponent to commence preparation of an EIA report after successful on line submission and registration of application. The online application for issue of ToR was filed on 19th Septebmer 2015. The standard TOR was received on 2nd November 2015 from MoEF &CC. The TOR was not rejected by MoEF&CC during its 45th EAC (Thermal) meeting held on 29th – 30th October, 2015. But the proposal was deferred with a intention to consider TOR after site visit by sub-committee of EAC. The sub-committee visited the site on 5th December 2015 and recommended for grant of ToR.
2.	How can it further be that when the TOR itself has been given in the month February, 2015, the baseline data has been collected from December, 2015 to February, 2016?	The above answer gives the reply.
3.	The EIA should be strictly in accordance to ToR which has been granted. However, the EIA study is far way from compliance of many of the TOR. Therefore, the EIA Study is not in compliance of the TOR. (Detailed queries on non-compliance of TOR are made in question no. 37)	EIA has been prepared in compliance to the approved ToR issued by MoEF&CC.
4.	There are many cement industries and their a captive mining operations and also other industries within 15 Kms of the project area. In order to effectively study the Environmental Impact of the proposed project, he Comprehensive Environmental Impact Assessment study (CEIA) should be conducted covering 3 seasons baseline data. However, in contrast, only the Rapid EIA (REIA) with only one season data has been conducted. Please give us a "Detailed Explanation" of what is the hurry for such REIA studies? Please also explain us if such REM Studies will actually give effective, comprehensive and complete view of the impact of the proposed project?	As per the condition no 38 of Standard TOR, one complete season site specific meterological and AAQ data (Except Monsoon Season) as per latest MoEF notificaiton shall be collected. Accordingly the baseline data for the period from 6th December 2015 to 5th March 2016 was collected and EIA report was prepared. Cumulative impact assessment studies duly considering the Industries with in 15 km radius of the project area was carried out and incorporated in the EIA report.
5.	There is no Confirmed Fuel linkage for the proposed project either for the	The quantity of coal required for the proposed project is 13.81



Annexure 15: Action Plan and Proponent for representation received

	Indigenous Coal or for the Imported Coal. In the absence of the same, how can be it that Coal analysis can be done without any labo atonal reports and the EIA Study can be conducted accordingly?	MTPA (50% domestic +50% imported) Source: 50% quantity of Domestic coal will be sourced from M/s SCCL and the balance 50% of coal will be from foreign origin. Accordingly an MOU is entered with M/s SCCL for supply of 50% domestic coal of G9 grade which has GCV of 4600 Kcal/Kg. With regard to imported coal M/s MSTC, a Government of India under taking has given a consent for supply of required quantity and quality of imported coal. TSGENCO is in the process of entering long term MoU with M/s MSTC for supply of imported coal.
6.	The Source from which the Coal will be sourced, the transportation route, is impact on the Ambient Air Quality have not been examined. In the absence of the same, how can it be said that the EIA study is complete.	Coal will be sourced from SCCL mines and imported coal from foreign origin will be transported by rail only. No impact on AAQ as coal will be transported by rail network.
7.	The Proposed Project site is ecologically a very sensitive area by virtue of the fact there are hills, forests and water bodies within the project area. There will be irreversible and inevitable damage on all these ecologically sensitive areas by the proposed project. What is the justification for setting up the proposed project on such ecologically sensitive areas?	"The proposed project site has been selected after careful examination of ecologically sensitivities and the proposed plant site was found to be have least impact on the environment." The forest land is a degraded forest where no forest is observed. The project site doesn't fall under the ecologically sensitive areas declared by MoEF&CC.
8.	It is quite certain that proposed will cause irriversable damage, fill up and pollute all the tributaries of Thungapadu Stream / Bandham(aka AnnameruVaagu) within the Project site. Give us " Detailed explanation" as to how the each and every tributary of Thungapadu stream will not be affected in a way by the propose Project	There are some streamlets flowing towards Tungapahad Vagu. These streamlets which originate due to rainfall in the plant area will be not be disturbed and drainage system will be designed to allow rain water into Tungapadu Vagu.
		The action plan for strengthening the Tungapadu vagu is given in the EIA report.
9.	As per the Terms of Reference, the project site should be away from High Flood Line plus 500 meters of any stream/ creek/tanks/Rivers, etc. Please give us the " Detailed Explanation" as to why the proposed project site is located on teh significant number of tributaries of Thungapadu Stream" and also the Thungapadu Stream, all of which are flowing to the Krishna River from with the project site.	The main plant boundary is kept at a distance of 2.40 km and the ash pond boundary is kept a distance of 1 km from HFL of Krishna River. As such, the project site is beyond 500m distance from Krishna river. Also the ash pond is kept a distance 500 m away from the Tungapadu vagu.
10.	The Sub-committee of EAC which visted the project site did not have any understanding of common TOR for all Thermal Power Plants which	As per the recommendation of sub committee it is proposed to



Annexure 15: Action Plan and Proponent for representation received

	makes it mandatory that Project site should be High Flood Line Plus 500 mtrs away from any stream/ creek/ tanks / Rivers, etc. While recommending that the proposed project can be allowed for TOR consideration, provided 100 meter buffer zone is maintained from Thungapadu Stream. How can it be that Sub-Committee can violate TOR given by MoEF@CC itself and recommend the project on the basis of 100 meter buffer area?	construct earthen embankments on either side of Tungapadu vagu. Further on either side of the banks of the vagu, a minimum of 100 m buffer will be left and the same will be developed into native forest with in the plant premises in coordination and guidance from the state forest department
11.	Isn't it true that the present site selection has been monotonously decided during the Aerial Survey conducted along with the Chief Minister of Telangana, without any due precautions on ecological and environmental sensitivity of the project area ?	It is not correct that the site is selected by Hon'ble Chief Minister of Telangana State by conducting aerial survey. Three sites have been evaluated based on environmental sensitivity, R&R issues, road and rail connectivity, proximity to source of water. Finally the proposed location at Veerlapalem village is selected after due deliberations on alternate sites. The details are given in EIA report.
12.	Why have you obtained permission for withdrawal of 6.6 TMC Water from Krishna River when the plant requirement for water is only 3.3 TMC ?	Originally it is proposed to establish 6800 MW coal based TPP at Veerlapalem, Dameracherla, Nalgonda Dist. Accordingly 6.6 TMC of water is allocated for the project from Krishna river by Telangana State Government. But it is decided to establish 4000 MW TPP in the above area in first phase and take up the balance 2800 MW in second phase. The water requirement for the 4000 MW at 3.03 TMC per annum will only be drawn from Krishna River out of the allocated 6.6 TMC per annum.
13.	Is such huge quantum of water available at the point where Krishna River is going to be drawn from ?	The necessary survey for finding suitable location for construction of intake structure to draw water from Krishna river is yet to be taken up.
14.	Give us the Statistical details of Water availability in the last 5 years at the point from the Water is going to be drawn for the proposed project ? No details of water availability have been presented in the EIA report	
15.	The Project's EIA report does not give any details whatsoever of the downstream impacts of water withdrawal for the proposed project. Please give us a "Detailed Explanation" of downstream impacts of 6.6 TMC water usage for the proposed project	There is adequate water flowing during the lean period in Krishna river. No adverse impact of downstream consumers is anticipated.
16.	What is the total amount of Krishna River which is drawn per year by the 22 cement industries within 15 kms radius of the proposed project site ?	Information may be obtained from Irrigation & CAD Dept or respective cement industries.
17.	The EIA report does not also say anything about ecological and environmental impacts of already existing industries within 15 kms radius of the Krishna River. Please give us "Detailed Explanation" of the ecological and environmental impact of the industries within 15 kms radius of the proposed project.	The baseline study was conducted within the 10 km radius of the project area. The cumulative impact assessment study duly considering the existing industries was carried out and incorporated in the EIA report.
18.		



Annexure 15: Action Plan and Proponent for representation received

19.	The TOR requires the assesement of the plant's impact on ground and surface water. Yet the report does not properly establish a baseline of ground water and surface water quality. The baseline data collection described in the EIA is grossly inadequate both for ground water and surface water. Proponents sampled ten existing bore wells outside the project area and only three groundwater wells within the proposed footprint of the ash pond. In addition, only one surface water was taken from the Krishna River, and no sample were taken from Thungapaduvagu, the stream that actually flows through the project area. All Sampling locations were only sampled once. Both the number of locations and the frequency of sampling are wholly insufficient for determining the baseline ground water and surface water quality in the study area. Standard baseline monitoring occurs over an entire year, in order to determine the water quality in all seasons. There is absolutely no justification for the proponents to provide so few sampling points and to sample only once. Sampling of wells and surface waters provides essential data. Post-Operation impacts cannot be determined if baseline data is not collected and assesed. Neglecting to sample the stream that flow through the project area is certainly a critical oversight. Similarly the EIA claims there will be no impact on the aquatic ecology because there will be no discharges. There is a false assumption. At the very least, the EIA should have examined the plant's proximity to the Krishna River and Thungapadu stream and explained how the underlying fractured geology may quickly route contaminates to the nearby surface waters. ("The ground water movement in the Limestone and Granite is mainly through the joint and fractures." Hydro-Geological Studies report at 14.) In addition, the deposition of pollutants, like mercury from the stacks, or fugitive dust from the ash ponds, may severely impact aquatic environments. Failure to evaluate these factors is a violation of the requirements of the ToR.	During baseline study 8 ground water samples were collected and analysed. During detailed hydrogeology study 5 ground water and 1 surface water samples were collected and analysed. The proposed plant will be operated on Zero Discharge Concept. No waste water will be discharged into any water bodies nor on to the soil. To know the impacts of ash pond, one ground water location within the plant site has chosen. TungapaduVagusample was also collected and analysed and the results are present in Chapter 3 of EIA report. Sample collection and analysis frequency was followed as per approved ToR. Fly Ash will be collected in dry form and bottom ash will be disposed to ash pond through HCSD system. Ash pond will be provided with impervious HDPE lining above clay lining to completely avoid the seepage of water in to the ground surface. Minimum amount of moisture in the ash pond will be maintained to control the fugitive emissions. Hence, there will not be any scope for seepage from ash pond.
20.	What is the total quantam of Waste Water generated which will be generated by the proposed project per day ? It has not been mentioned in the EIA Report. Therefore, I specifically request you to please give me the figure.	About 1940 m3/hr waste water will be generated and will be treated in effluent treatment plant, and the treated wastewater will be reused for cooling tower make up, dust suppression system in coal conveyors and coal storage yard, ash handling, green belt development and floor wash etc.,
21.	What are all the components for which Waste Water will be reutilized	



Annexure 15: Action Plan and Proponent for representation received

	within the project under the concept of Zero Liquid Discharge ?. Please give us detailed engineering as well as scientific explanation to substantiate how the proposed project will meet the Zero Liquid Discharge, as the same has been not been in detailed in the EIA report.	
22.	Why have you obtained Forest Clearance to the extent of about 4,800 acres when the land requirement for the project is only about 2,800 Acres ? What is the purpose of acquiring such huge amount of land ?	Forest clearance obtained with a view to establish 6800 MW plant. Now it is proposed to establish 4000 MW in first phase and 2800 MW in second phase as a expansion project.
23.	Has the Forest Rights Act been implemented in the Forest Area which is proposed for Diversion ?	All the conditions stipulated in the Stage II FC accorded for diversion of 4676 acres are complied with.
24.	What are the Tribal Communities which are residing within the project area and what are their present sources of Livelihood ?	Details are incorporated in CSR report furnished by M/s CMSR, Hyderabad and the same is incorporated in the EIA report.
25.	Will the Project not have any adverse impact on the list of Flore and Fauna within the project area as well as in the Study area ? There details have not been provided in the EIA Report	Impacts on Ecology & biodiversity has been discussed in Sec 4.3.8 in EIA report.
26.	What has been done as a part of Socio - Economic Impact Assessement study is only a CSR report, identifying what activities will need to be taken up under CSR. You are kindly reminded that " Socio- Economic Impact Assessement" does not mean mere presentation of "Charitable Acitivities" which will be undertaken. It means to study and assess the impacts of the proposed project on various socio-economic rights of the people, which include the following. Impact of the Project on the People's Land rights Impact of the Project on Agriculture Impact of the Project on Social Relations of the people Impact of the project on Livelihoods and Economic dependency and Interdependency of the people. Impact of the Project on People'scommon property resources such as common lands, grazing lands, water resources, forest resources etc. Impact of the Project on People's right to health etc. The entireEIA Report does not in any way reflect on the project's impact on the above components,"Socio-Economic Impact". In fact it is quite striking to see that you have not conducted any such thing called "Socio Economic Impact Assessment" for the proposed project.	Development of project of such magnitude will have positive impacts in terms of economic upliftment of the surroundings, raising the living standards, providing hundreds of direct & indirect employment and more over the major land taken over for construction of the above project is degraded forest land.
27.	The EIA states that the Yadadri Plant will generate 3.1 Million tons of Fly ash and 0.8 Million tons of Bottom ash (EIA page 160). In contrast the " Hydro-Geological Studies" report states that the plant will generate 5,685,255 tons per year of fly ash and bottom ash(Annexure 10 page 28 "a 4000 MW thermal power plant burning 44,505 TPD of coal will generate 11,682(75%) TPD of fly ash and 3894 TPD(25%) of bottom	Total Ash generation – 3.9 MTPA Fly Ash generation – 3.1 MTPA Will collected in dry form and 100% utilized as per Fly Ash Notification. Bottom Ash generation – 0.8 MTPA Will be disposed through HCSD system into HDPE film lined



Annexure 15: Action Plan and Proponent for representation received

	ash”) These figures represent a 46% increase in quality of ash produced. The annual generation rate of ash is important because it determines the size of the ash pond needed to contain the waste. Therefore gives us the figures of exact quantum of Fly ash and bottom ash which will be generated by the proposed project.	ash pond.
28.	The EIA also states that “during emergency only” the ash will be sent to the ash pond “with a provision for storage of ash upto 15 m level as per CEA norms.”(EIA at 54). The proponents claim that the ash dyke and 400 acre ash pond will have a storage capacity of “3 to 9 years ash generation c as per CEA recommendations, to cater for any exigencies”. However even at the lower estimate of ash generation, a 400 acre pond would exceed a height of 15 meters in 9 years, Using a conversion rate of 1 ton per cubic yard, a 400 -acre pond would receive 6 acre - feet per year assuming 100 % disposal. At the end of 9 years the levels would exceed 15 meters. Furthermore the life span of plant , according to the EIA , is at least 25 years, which would result in an ash dyke that is roughly 46 meters high. At the higher estimate, the height of the dyle at 9 years and 25 years far exceeds “CEA norms”, If the higher Hydro-geological studies figures are correct, dykes of the 400 - acre pond would have to be raised about 3 meters a year, thus exceeding the 15 meter limit in 5 years . At 25 years the ash pnd dykes would need to be 67 meters tall to contain the ash. In view of the above facts, give us “ Detailed explanation” of the sufficiency of the size of the Ash Pond area and explain as to how the height and breadth of Ash Pond will not be increased in the years of operation of the proposed project. Please also explain us the consequences if the height and breadth of Ash Pond is increased in future.	As there are many cement industries located around the project site, TSGENCO will implement 100% Fly Ash utilization as per the MoEF&CC notification as per the schedule given in the EIA report. Also necessary steps will be taken to utilize bottom ash for filling low lying areas, embankment constructions, etc., through other Government Departments.
29.	The EIA Report is completely silent on Health impacts of the proposed project. Please give us a “ detailed explanation” of the impacts that the proposed project will have on People's health.	Details were provided in Sec. 7.8 of Chapter 7 of EIA reprot.
30.	Far from Cummilative Impact Assesement study, not even the list of industries within the project have been given in the EIA Report. Further, the Cummilative Impact Assesement Study has also not been carried out by the Project Proponent. Why has the cummilative Impact Assesement study has not been done.	List of industries in the 10 km radius are provided in Chapter 1 of the EIA report. The baseline study was conducted with in the 10 km radius of the project area. The cumulative impact assessment study duly considering the existing industries was carried out and incorporated in the EIA report.
31.	What is the per unit cost of generating power through COAL vis - a vis generating power through Solar Energy and Wind Energy. ?	The cost of power generation from Coal is Rs. 4.57 per unit, Wind is Rs. 4.70 per unit and Solar is Rs. 5.17 per unit .
32.	Isn't true that Coal is diriest form of producing Electricity ?	No



Annexure 15: Action Plan and Proponent for representation received

33.	When the simple deficiency of about 2700 MW power deficiency of state can be easily met Solar and other renewable energy power production, what is the need of such a huge expenditure project which is certainly does not in any way contribute to Sustainable Development ?	The solar power plants are not a base load stations which run only at 18% to 19% PLF. It is only a supplementary to existing thermal & Hydel power stations to fill the deficit to some extent. However the Telangana state Government has initiated steps for setting up of 5000 MW solar power plants in the state. Already 800 MW is connected to the grid and 2000 MW will be commissioned by end of March 2017. Further, balance 2200 MW solar power plants will come within two years.
34.	Fundamentally there is no need of the proposed project only. The Telengana State Governement aims to generate over 6000MW of electricity through Solar power by the year 2018-19, Further in the next 3 years the government also aims to 4000 MW power through Wind Power. Reference is invited " Power for all document " on deficiency will be met by the Telengana State, it will be far in excess of required power. In addition , the state has recently started producing 600 MW power from Kakatiya Project in Warangal and 800MW power project in Kothagudem. This further adds to the net power production. In view of the above facts, please give us " detailed explanation of the fundamental necessity of the project" ?	Also the solar power plants cannot fulfill the needs of the newly formed state and the cost of generation is also high when compared to the Coal based thermal power plants since the land required for each MW of solar power plant is 5 acres where as for thermal power plants , the land requirement is varying from 0.50 acre/MW to 0.70 acre/MW. Availability of land is also a major problem in Telangana state. The people of the state will not afford the power at higher tariff where power is supplied to the agricultural sector at free of cost and domestic sector at subsidized prices.
35.	Further when a number of nations together across the globe are switching to power production through the renewable energy , how can it be that TSGENCO and Telengana state government cannot learn anything from it and generate power through renewable sources of energy ?	Further, Telangana state will require installed capacity of 17,041 MW by the end of 2018-19 as per the 18th Electrical Power Survey conducted by CEA.
36.	As you would certainly agree, the Coal energy and its environmental impacts especially in the India scenario as far, far many and irreversible. The present project is a classical example of how there will be many irreversible impacts as a result of the project. This can be easily done way with by producing power through renewable energy. Why cannot TSGENCO produce this amount of power through the Renewable Energy ?	Further to the above, Telangana state requires substantial capacity addition to meet the progressive power demand for other sectors viz., 9 hours power supply for agriculture sector, estimated demand of 7000 MW for lift irrigation schemes, 24/7 power supply etc., As such the above project is very much essential to meet the future demand.



Annexure 15: Action Plan and Proponent for representation received

S.No	Issue	Proponent Response
II	‘Queries on the draft EIA for YTPS’, N Harinder, General Secretary, Human Secretary Forum, Nalgonda, Telangana	
1	Many of the Terms of Reference have not been complied and EIA Study has not been conducted accordingly	All the conditions of TOR are complied with and incorporated in the EIA report. Details provided in the EIA report.
2	There is no confirmed Fuel linkage and therefore the Coal characteristics are unknown for the EIA Study to be conducted.	
3	The source from which Fuel will be obtained and the route from which is not brought to the project is not certain. The impact of transportation on AAQ has not been studied	
4	The list of industries within 15 kilometer radius of the project has not been given	
5	The Cumulative Impact Assessment study has not been done.	
6	The Hydro-geological study is inadequate and incomplete on many aspects	
7	The Impact of the project on Aquatic Ecology has not been studied.	
8	The Health impacts of the proposed project have not been studied, etc.	



CSR Plan for Yadadri Thermal Power Station (5X800 MW) of TSGENCO, Veerlapalem, Dameracherla Mandal, Nalgonda District

Final Report



Submitted to:



Chief Engineer / Civil / Thermal
Telangana State Power Generation Corporation Ltd
Vidyut Soudha
Hyderabad – 500 082
Telangana State.

Submitted by:



**CENTRE FOR MANAGEMENT
& SOCIAL RESEARCH**
Development Support Specialists

Plot No. 101, Flat No.103, RR Residency,
Opp: GHMC Park, Srinagar Colony
Hyderabad – 500073
Website: www.cmsrindia.org
Tel: 040-23737571, Fax: 040-66687015
E-mail: mail@cmsrindia.org
cmsrindia@yahoo.co.in

Document Control

- Document Title** : Corporate Social Responsibility (CSR) Plan for Yadadri Thermal Power Station (5X800 MW) of TSGENCO, Damaracharla, Nalgonda District, Telangana State.
- Document Status** : Submission after the completion of fieldwork and preparation of CSR Plan.
- Abstract** : This document details the key consultations conducted by the study team and thereafter preparing a Corporate Social Responsibility Plan based on the priorities accorded by the community.

Submission Details

Date	Author	Version	Remark
24.4.2016	Centre for Management & Social Research	1.0	Preliminary Draft (Soft Copy) Report submitted after the completion of fieldwork and preparation of CSR Plan.

Distribution

Version	Name	Copies	Location

Project Details

1.	Title of the Project	TSGENCO –Preparation of detailed report on the activities to be taken up under Corporate Social Responsibility (CSR) for YTPS (5X800 MW)
2.	Implementing Agency	TSGENCO
3.	Project Funding	TSGENCO
4.	Project Tenure	1.5 Months
5.	Project Initiator Details	Chief Engineer/Civil/Thermal Room No.258, 'A' Block, TSGENCO, Vidyut Soudha, Hyderabad - 500 082.
6.	Name and Job Title of the Key Contact Person	V. Venkata Ramana, Associate Director, CMSR
7.	Other Field CMSR Contact Persons	T. Veerraju :9885976373 PH-040-23737571,Fax-040-66687015

TABLE OF CONTENTS

DOCUMENT CONTROL.....	2
PROJECT DETAILS.....	3
CHAPTER 1 - INTRODUCTION.....	6
1.1 BACKGROUND	6
1.2 OBJECTIVES OF THE STUDY	6
1.3 SCOPE OF WORK.....	7
1.4 APPROACH AND METHODOLOGY	8
1.4.1 Initial Round of Consultations in Sampled Villages.....	9
1.4.2 Socio-Economic Survey at the Household Level	9
1.4.3 Qualitative Survey	10
1.4.4 Coverage & Sampling.....	10
1.4.5 Data Analysis & Reporting	11
1.4.6 Reconnaissance Field Visit	11
1.4.7 Launch of Fieldwork.....	14
1.5 INTRODUCTION TO THE SURVEY AREA	14
2.1 INTRODUCTION	17
2.2 PROFILES OF VILLAGES/TOWNS.....	17
2.2.1 VEERLAPALEM & Hamlets : Dubba Thanda and Sath Thanda	18
News Paper Report : Andhra Jyoti, dated 25 th March, 2016	24
2.2.2 MUDIMANIKYAM.....	25
2.2.3 ADAVI DEVULA PALLI	29
2.2.4 IRKIGUDEM.....	33
2.2.5 TALLA VEERAPPA GUEDEM.....	38
2.2.6 KALLEPALLI & Hamlet : Shantinagar	40
2.2.7 BOTHALAPALEM	43
2.2.8 DILAWARPUR.....	46
2.2.9 DAMERACHERLA & Hamlets : Rajagattu and Veerbhadrapuram.....	50
2.2.10. CHAMPLA THANDA & Hamlets : Jilakarakunta Thanda, Gonja Thanda and Banjara Thanda.	54
2.2.11. NARSAPURAM	58
2.2.12 WADAPALLI (VAZIRABAD)	61
2.2.13 KONDRAPOLU & Hamlet : Rallavagu Thanda	65
2.2.14 THIMMAPURAM (Putlagadda, Padamata Thanda, Thoorpu Thanda)	68
2.2.15 ULSHAIPALEM & Hamlets : Bangaru Gadda, Kaluva Katta, Gandhi Nagar, Indira Nagar	72

2.2.16	DONKATHANDA & Hamlet : Badaigadda	75
2.2.16	DONKATHANDA & Hamlet : Badaigadda	75
	CONSULTATION WITH WOMEN, MPTC& SARPANCH AT DONKATHANDA	77
2.2.17	APPALAMMAGUDEM & Hamlets : Lokiya Thanda and Seethya Thanda	78
2.2.18	RAGADAPA & Hamlets : Kunkuduchettu Thanda and Pedda Thanda	81
2.2.19.	GANDHINAGAR	83
2.3	SUMMARY OF DEVELOPMENT PRIORITIES IDENTIFIED.....	86
CHAPTER 3 – FINDINGS OF THE SOCIO-ECONOMIC BASELINE SURVEY.....		87
3.1	INTRODUCTION	87
3.2	FINDINGS OF THE HOUSEHOLD SURVEY	87
3.2.1	Principal Source of Livelihood	88
3.2.2	Land Holding & Cropping Pattern	89
3.2.3	Demographic Profile of the Households	90
3.2.4	Education Profile of the Population	91
3.2.5	Occupation of the Respondents.....	91
3.2.6	Income Levels among the Households.....	92
3.2.7	Health Status & Access to Services	93
3.2.8	Educational Status & Access to Educational Facilities.....	95
3.2.9	Access to Water and Sanitation Services	97
3.2.10	Household Assets & Livestock	98
CHAPTER 4 – CORPORATE SOCIAL RESPONSIBILITY (CSR) PLAN.....		100
4.1	NEED BASED COMMUNITY DEVELOPMENT INITIATIVE	100
4.2	CSR INITIATIVES.....	100
4.2.1	CSR Objectives of YTPS & Core Areas of Intervention	100
4.3	THE CORPORATE SOCIAL RESPONSIBILITY PLAN	101
4.5	DETAILS OF PROPOSED CSR INITIATIVES & BUDGET	104
4.6	INTERNAL MONITORING MECHANISM	105
4.7	CONSOLIDTED ACTIVITY WISE CSR BUDGET	107
ANNEX 1 – STUDY PHOTOGRAPHS.....		109
ANNEX 3 –TERMS OF REFERENCE		121

Chapter 1 - Introduction

1.1 BACKGROUND

Telangana State Power Generation Corporation Limited (TSGENCO) is one of the pivotal organizations of Telangana, engaged in the business of Power generation. Apart from operation & Maintenance of the power plants it has undertaken the execution of the ongoing & new power projects scheduled under capacity addition programme and is taking up renovation & modernization works of the old power stations. TSGENCO has proposed to set up a coal based thermal power generation power generation unit of 4000 MW Yadadri Thermal Power Station, Veerlapalem, Damaracharla, Nalgonda District, Telangana State. TSGENCO is in the process of obtaining environmental clearance for the project. MOE&F, Gol directed to furnish report on the activities to be taken up under Corporate Social Responsibility (CSR) for considering Environmental Clearance.

However, in order to improve the socio-economic status of the local population, a set of interventions aimed at raising the socio-economic status and human development indicators of the local community are proposed through a community development plan. In recognition of this and in line with the guidelines of the Ministry of Environment and Forests (MoEF), Government of India, it is proposed to objectively assess development needs of the local communities, to plan and implement measures and to conduct a socio-economic baseline survey. The outcome of the needs assessment and the baseline survey would serve as inputs in preparing a Corporate Social Responsibility (CSR) plan for the local population.

1.2 OBJECTIVES OF THE STUDY

The objective of the study is to prepare a CSR Plan to develop the geographic area on the periphery of the project site and study how to contribute to the socio-economic development of the areas contiguous in area of operation.

1.3 SCOPE OF WORK

The scope of the study shall cover environmental conditions of MoE&F, GOI in the TOR prescribed for Yadadri Thermal Power Project (YTPS) (5 X800 MW) at Veeralapalem village, Damaracharla Mandal, Nalgonda District, Telangana State.

Identification of activities to be taken up under CSR in the nearby villages within 10Km from YTPS and preparation of action plan. While identifying CSR activities it shall be ensured that need based assessment for the nearby villages within 10Km radius from the project shall be conducted to study economic measures with action plan which can help in upliftment of poorer sections of society.

Income generating projects consistent with the traditional skills of people shall be identified and implementation programme shall be prepared. Development of fodder farm, fruit bearing orchards, vocational training etc. shall form part of such programme. Vocational training programme for possible self employment shall be identified for imparting to pre- identified villagers free of cost. The study shall also cover various schemes under implementation by Government Agencies and establish effectiveness and suggest suitable measures to strengthen infrastructure in collaboration with the Government.

The following fields were considered while identifying activities to be taken up under CSR. They include the following:

1. Education;
2. Healthcare;
3. Drinking Water;
4. Roads;
5. Sanitation;
6. Training facilities;
7. Rehabilitation of Physically handicapped people etc.

The study covered all villages that are affected due to the YTPS. The study shall be exhaustive, focused and shall meet the requirements of MoE&F, GOI and CSR objectives. The scope of study includes carrying out a sample baseline socio-economic survey to

generate the necessary data and information, so as to prepare an appropriate CSR Plan for local population. The broad scope of work includes the following:

1. To generate a baseline profile of the villages neighboring the project site and detailing the existing community infrastructure facility;
2. To generate a profile of accessibility and availability of basic amenities such as schools, colleges, ITI, Polytechnics, health facility, water facility, transport facility, roads, recreation facility etc in the identified villages;
3. To generate a baseline skill profile of the local population;
4. To provide details of income generation and employment programmes and schemes implemented locally by the concerned administrative setup;
5. To generate a baseline of skill upgradation and training programmes implemented locally;
6. To generate a baseline of institutions that provide the skill development and training for income generation;
7. To verify the presence of vulnerable groups such as widows, SC/ST, disabled, women headed etc., among the affected land owners;
8. Conduct consultation with the local representatives and undertake a gap analysis and prioritize development interventions;
9. To prepare preliminary estimates for the proposed development interventions as part of the CSR Plan;
10. Prepare a detailed CSR plan including both capital and recurring cost provision;
11. Prepare a detailed CSR plan including both capital and recurring cost provision;
12. The scope also shall cover point No.30 to No 34 of standard TOR approved by MOE&F, GoI (Copy of the Standard ToR presented as **Annexure-3**);

1.4 APPROACH AND METHODOLOGY

This study carried out wide-ranging consultations with various stakeholders and collected both primary and secondary data. The study adopted both quantitative and qualitative approaches to the data collection and analysis. The quantitative data collection inevitably included socio-economic survey of identified households in the habitations of surrounding villages. The qualitative data collection employed participatory methods such as village-level meetings, focus group discussions (FGDs) with diverse stakeholder groups, and interviews with functionaries of relevant implementing agencies, community leaders, civil

society representatives and other stakeholders. Key tasks undertaken as part of the study include the following.

1.4.1 Initial Round of Consultations in Sampled Villages

The core purposes of the initial round of consultations were: to gain a broad understanding of each village and to inform the village communities of the proposed survey; to identify the core development gaps; to get an idea of the sample size, that is, the number of households that could be surveyed and to gauge their willingness to be surveyed and if so check on their availability; to identify all stakeholders who should be consulted during the study such as the village representatives, community leaders, government officials such as MPDOs, Village Secretaries, Mandal Educational Officers (MEOs), Mandal Revenue Officers (MROs), Mandal Agricultural Officers (MAOs), Animal Husbandry Officers (AHOs), PHC staff members, SHG members, Doctors and other Village Medical Practitioners (VMPs).

1.4.2 Socio-Economic Survey at the Household Level

The sample socio-economic survey for the households identified will help in identifying the existing socio-economic conditions, and living standards of local people, their vulnerability, status of infrastructure and access to people including health and education facilities. A socio-economic survey questionnaire was used for the household survey. The core issues covered by the survey questionnaire include:

- Socio-Economic Profile: it covered dimensions such as family structure, occupations, income levels, housing status, and assets owned;
- Access to basic services; health status; participation in development schemes of the government; and the level of linkages with mainstream economic and social systems;
- Access to employment including labour wages; living and working conditions of workers; and educational and skills status;
- Poor and vulnerable persons/families: such as the SCs, STs, women headed households, elderly, physically or mentally challenged; and their socio-economic profile;
- Perceptions and feedback on issues related to social and physical infrastructure, welfare schemes and the interventions needed to address the gaps and deficiencies.

1.4.3 Qualitative Survey

Quantitative surveys may not always reveal the complete picture. This is particularly true with regard to assessing the development needs and priorities of the poor and vulnerable sections. Qualitative methods are particularly useful in assessing the larger and systemic issues that need to be addressed in order to raise the socio-economic status of the local communities. In other words, qualitative approaches supplement and complement the quantitative methods and help us in either qualifying or confirming or modifying the results of quantitative surveys.

The qualitative survey included community consultations, focus group discussions and in depth interviews with various sections of the local people such as Panchayat members, community leaders, women, children, persons with disabilities, knowledgeable persons/key informants, and government officials to elicit their interests, needs, expectations and suggestions, which were incorporated into the CSR Plan. The consultations also focused on exploring mechanisms for participation in planning, implementation and monitoring of community development measures.

1.4.4 Coverage & Sampling

The study covered 41 villages, rather habitations falling under 2 Mandals (Damaracharla and Tripuraram) and 18 Gram Panchayats within the vicinity of the project site located in the core zone area, that is, within 10 km radius of the plant. The list of villages was finalized after a preliminary field visit and consultations with the local people and the Executive Engineer. An average sample of 10 households—with the actual sample depending on the size of the habitation—was selected from each location for the socio-economic household survey. Thus a total of 405 households were covered under this study.

Multistage stratified random sampling method was adopted in selecting the households for the socio-economic survey. The selection of the households was based on criteria such as large farmers (high income households), medium farmers (middle income households) and low income households (BPL Households) and social status such as SC/ST/OBC.

1.4.5 Data Analysis & Reporting

The quantitative data collected through the structured questionnaire was systematically coded, validated, tabulated and analyzed. Wherever required, the analysis was supplemented with information collected through desk research. The detailed qualitative information collected from a range of stakeholders supplemented the primary data. The deliverables of this survey consist of a Draft CSR Report, submitted after systematic analysis of primary data and a synthesis of qualitative information. The report contained a detailed CSR plan for the company.

1.4.6 Reconnaissance Field Visit

The study team made a preliminary visit to the plant site and the surrounding locations on March 25th 2016. The preliminary field visit was aimed at familiarizing with the study locations, to interact with the local community members, to identify the villages falling within the 10 kms radius of the plant, to inform and prepare the local public for the field survey to be launched soon.

The secondary purpose of the site visit was to get a sense of basic socio-economic conditions of the villages in the core zone that would be helpful in preparing the study instruments (such as questionnaires and checklists) and plan survey logistics. The following villages have been selected based on our field visits and consultations with the communities and the client. Therefore the CSR study was carried out in the villages of:

Coverage :

<u>Gram Panchayats</u>	<u>Hamlets</u>
<u>Damarcharla Mandal</u>	
<u>Damaracharla</u>	Rajagattu, Veerabhadrapuram
<u>Veerlapalem</u>	Sath Thanda, Dubba Thanda
<u>Talla Verrappagudem</u> <u>Erikagudem</u>	
<u>Adavidevulapalli</u>	Vadderagudem
<u>Mudimanikyam</u> <u>Narsapuram</u>	
<u>Thimmapuram</u>	Putlagadda, Padamata Thanda, Thurpu Thanda
<u>Kallepalli</u> <u>Bothapalem</u>	
<u>Ulsaipalem</u>	Bangarugadda, Kalava Katta, Indira Nagar, Gandhi Nagar
<u>Vadapalli</u> <u>Dilawarpur</u>	
<u>Kondrapol</u>	Rallavagu Thanda
<u>Champla Thanda</u>	Jilakarakunta Thanda, Gonja Thanda, Banjara Thanda
<u>Tripuraram Mandal</u>	
<u>Appallamma Gudem</u>	Lokia Thanda, Sitya Thanda,
<u>Donka Thanda</u>	Badaigadda
<u>Ragadapa</u>	Kunkudichettu Thanda, Pedda Thanda, Meetia Thanda

The team leader of the study apprised the client of the preliminary visit; the interaction also focused on the core issues that need to be addressed by the study. The above processes helped the team in preparing the questionnaires and checklists for the study. The study tools consist of:

- Socio-Economic Survey: Household Questionnaire;
- Socio-Economic Profile of the Village;
- Checklist for Community Consultations; and
- Checklist for Focus Group Discussions.

Figure 1.1: Maps showing the survey area around the power plant in Nalgonda district, Telangana State, India



1.4.7 Launch of Fieldwork

The field survey was launched on the 25th March, 2016. An experienced team of investigators lead by a Social Specialist were mobilized for the survey. They had been trained on the basic concepts and methods of the survey. The deliverables of the study were submitted in accordance with the timeframe that was set through mutual agreement.

1.5 INTRODUCTION TO THE SURVEY AREA

The next chapter presents the results of extensive consultations held with a cross section of the local communities and other stakeholders. This section provides the broad context to the survey by presenting a brief socio-economic profile of the study area so as to enable the readers to better appreciate the findings.

Dameracherla is a Mandal in Nalgonda District of Telangana State, India. Dameracherla Mandal Head Quarters is at Damercherla town . It belongs to Telangana region . It is located 62 KM towards East from District head quarters, Nalgonda.

Dameracherla Mandal is bounded by Miryalaguda Mandal and Nereducherla Mandal towards North, Dachepalle Mandal and Gurazala Mandal towards South. Miryalaguda City, Macherla City, Suryapet City, Kodad City are the nearby Cities to Dameracherla.

Dameracherla consist of 90 Villages and 24 Panchayats . Irkigudem is the smallest Village and Dameracherla is the biggest Village . It is in the 91 m elevation(altitude) . This Place is in the border of the Nalgonda District and Guntur District. Guntur District Gurazala is South towards this place . It is near to the Andhra Pradesh State Border.

The nearest town is Miryalaguda which is about 25 km from the site. The nearest railway station is Vishnupuram which is 5 km away from the plant. Nearest airport is Hyderabad which is about 135 km away from site. Water requirement for this project is planned to be drawn from Krishna river which is located at a distance of about 5 KM.

The proposed Thermal Plan is situated in Veerlapalem village, Dameracherla mandal, Nalgonda district. The study area is surrounded by Adavidevulapalli (10 km), Appalammagudem (8 km), Badaigadda Thanda (7 Km), Bangarigadda Thanda (8 Km),

Banjara Thanda (7 km), Bottalapalem (8 Km), Champala Thanda (8 km), Damaracharla (6 km), Dilavarpur (10 km), Donka Thanda (4 km), Irikagudem (4 km), Gandhi Nagar (6 km), Gonya Thanda (7 km), Indiran Nagar (10 km), Jilakarakunta Thanda (8 km), Kallepalli (5 km), Kalvakatta (6 km), Kondrapole (9 km), Kunkuduchettu Thanda (9 km), Lokya Thanda (9 km), Malabandu (7 km), Mudhimanikyam (5 km), Narsapuram (3 km), Padamati Thanda (6 km), Pedda Thanda (8 km), Pittalagadda Thanda (5 km), Ragadapa (9 km), Rajagattu (5 km), Rallavagu Thanda (9 km), Sath Thanda (2 km), Sithya Thanda (8 km), Shanthi Nagar (3 km), Talla Veerappagudem (2 km), Timmapuram (6.5 km), Toorpu Thanda (5 km), TV Gudem (2 km), Ulsaipalem (8 km), Vadapalli (8 km), Vadderagudem (8 km), Veerlapalem (3 km). All the villages of survey area fall under two mandals namely Damaracharla and Tripuraram

The survey area consists of 41 habitations within 10 km around the YTPS. Most of the villages are connected by roads with Miryalaguda Mandal head quarter, the most preferred town which has an Area Hospital, urban market and various educational institutions. The study area is also connected with railway station at Miryalaguda.

The habitations of these relatively thinly populated areas are well-connected with roads and government transport, especially those located on the roadside; but the approach roads leading to a couple of villages are unpaved (kutchra).

The area is predominantly inhabited by the Scheduled Tribes and Schedule Castes apart from Backward Castes and Other Castes. The local economy is predominantly agricultural with irrigated farming being the norm; and most farmers are small land holders. 80% of the labour force depends on the agriculture with a daily wages of Rs. 150-200 for females and Rs.200-300 for males. During the lean period people tend to go to NREGA works for about two months. With little diversification into non-farm activities, casual and regular work in the nearby towns, auto driving and construction work are the most important form of non-farm activities supplementing land-based activities. Women mostly work as agriculture laborers.

Agriculture in this zone is very low due to un-assured irrigation; in most villages farmers cultivate their lands under rain fed conditions. Only few thandas have irrigation facility from Thungapadu vagu. Two villages are cultivating their lands through lift irrigation from Krishna River. Therefore the area is predominantly sown under Non- irrigated conditions with high-value crops such as Paddy, Green Gram, Black Gram, Pigeon Pea, Cotton and *Mirchi* in two seasons. Major agriculture season is Khariff in the study area. .

However, the integration of the area with the mainstream economy has picked up momentum over the past few years or so owing to improvements in infrastructure (state high way), industrialization, private transport (auto rickshaws and two-wheelers), an increasing number of government welfare schemes and communications (cell phones). However, in terms of Infrastructural facilities such as internal roads, drinking water, education, sanitation and health facilities the study area needs to be developed a lot. The area is lagging behind in terms of technical education and employment opportunities.

Chapter 2 – Community Needs Assessment and Development Priorities

2.1 INTRODUCTION

Extensive consultations were held with the local communities and other stakeholders in an effort to identify community needs and priorities for designing and implementing CSR initiatives. The participatory stakeholder consultative processes involved tools such as village level open meetings, focus group discussions (FGDs), key informant interviews (KIIs) and transect walks and visits to personally ascertain the status of infrastructure and other facilities that are available in each of the villages in the project area. Other stakeholders whom the study team consulted both at the village and Mandal levels are: elected representatives, government officials, teachers and other government and semi-government functionaries working in the area such as Auxiliary Nurse Midwife (ANM)s, Asha workers and Anganwadi teachers. The following sections provide profiles of the villages and the key community development priorities that have been identified through a consultative process.

2.2 PROFILES OF VILLAGES/TOWNS

The following sections provide profiles of the villages and the key community development priorities that have been identified through a consultative process.

2.2.1 VEERLAPALEM & Hamlets : Dubba Thanda and Sath Thanda



Veerlapalem is a Gram Panchayat village and it has two hamlets. 1. Dubba Thanda and 2. Sath Thanda. It is situated approximately 3 km from the proposed YTPS by road. Veerlapalem village has a total population of 4600 and 1094 households. Male population comprises of 2400 and female 2200. Dubba Thanda has a total population of 300 and 60 households. Male population is 160 and female is 140. Satha Thanda has 286 populations with 64 households. Male population is 156 and female is 130. Veerlapalem village population consists of ST, SC, BC and OC. ST is the major community and major caste among the ST is LAMBADA in this village. Dubba Thanda and Sath Thanda are completely predominant by ST community.

The main economic activity of the population is agriculture. The second important source of income is farm wage labor supporting the workers for about 9 months. The normal daily wage rates for farm work are Rs 200-250 for women and Rs 300-350 for men during the season. During the local lean season, around 50% of the workers have MGNREGS job cards and work in the MGNREGS in their proximity for 100 days.

With regard to the cropping pattern it is noticed that most of the farmers grow Paddy and Chilly during Rabi season and Cotton, Green Gram, Black Gram and Pigeon pea during the Kharif season. Crops are grown under both Rabi and Kharif farming seasons. Main source of irrigation is through rain fed conditions. In Dubba Thanda the main source of irrigation is through Thungapadu Bandham vagu for agriculture purpose.

In Veerlapalem village the main source of drinking water is from bore wells and hand pumps (18 Nos). Out of 18 hand pumps 7 are in working condition. There are around 6 small water tanks with a capacity of 5,000 liters in the main corners of the village. Villagers use this water for drinking and washing purpose. The local community reported that drinking water taste is sweet and it was also reported that fluorine content is bit high in the water. Water supply found sufficient during the



survey. However people reported that there will be water scarcity during the summer season. Some of the villagers fetch water also from private bore well from one of the farmer's agriculture land.

In Dumpa Thanda major source of drinking water is through wells and small 5000 liter capacity water tanks. There are 5 handpumps out of which 4 are working. People use this water for washing and cleaning purpose.



In Sath Thanda major source of drinking is bore water as presented in the picture. There are 2 hand pumps. Only one is working. There is only one water tank built under Balempalli Reservoir Scheme but they have not started functioning. Villagers have been facing lot of water scarcity.

In Veerlapalem 90% of the houses are connected with electricity. In Dubba Thanda out of 60 houses 45 houses have electricity supply. In Sath Thanda all the 48 houses have electricity connection. Street lights are available in all parts of the village.

In Veerlapalem village has *Kutch* approach road without proper side drains. 85% of Internal roads in the village are unpaved and *kutch*. In Dubba Thanda approach road is *kutch* but internal roads is CC. In Sath Thanda has 100 mtrs CC approach road. There is no drainage system.



Shared autos and RTC buses are major source of transport for the villagers. There is access of RTC buses to reach this village from Damaracherla. But it was observed that there is no RTC bus stop and shelter.

With regard to sanitation, Veerlapalem has 20% of villagers have individual toilets and there are no community toilets. Dubba Thanda and Sath Thanda have no individual toilets. In Dubba Thana side drains are available at one side of the road. Drainage system is not available in these Thandas. People in these two Thandas tend to go for open defecation.



In Veerlapelm there are three Anganwadi centres functioning out of which 2 are mini centers and one is major centre. Anganwadi centre has no own building and it has been functioning in rented building. In both the Thandas mini Anganwadi centers are functioning in rented houses.

There is no health sub-centre functioning in the villages but ANM visits the village once in a week. For major treatments villagers go to private and government health facilities in Miryalaguda,



Health checkups are organized once a month by 104 mobile health facility in Dubba Thanda and Sath Thanda and they feel that there is no shortage of medicines. It was reported that 108 ambulance facilities is also available within half an hour in case of any medical emergency. The common diseases prevailing in the Veerlapalem village are typhoid, malaria, joint pains, diabetic and heart problems. In Dubba Thanda , dengue, malaria and typhoid. In Sath Thanda common disease are blood pressure, malaria, typhoid, jaundice and platelets. It was also reported that there is veterinary hospital in the Veerlapalem village.

There are 96 active women's self-help groups (SHGs) existing in the Veerlapalem village. In Dubba Thanda and Sath Thanda there are 8 and 7 SHGs respectively. Their activities are small savings, in-group lending and using for crops purpose. The borrowed money is mostly used for purchasing live stock and agriculture purpose.

All the government welfare schemes such as Indiramma housing scheme, widow pensions , old age pensions, physically handicapped pensions and MGNREGS are being utilized by the villagers. In Veerlapalem Old age pensions are availed by 264, handicapped by 57, widow pension is accessed by 202 persons. In Dubba Thanda old age pension is acces by 7, PHC 6, widow 10. In Sath Thanda, old age 30, PHC 2 and Widows 7.

Most of the unemployed youth go to agriculture labour and stone cutting work. The highest educational qualification in the village is MA Bed.



There are two primary schools and ZP High School functions in one compound. ZP high schools which offers education from 6th up to 10th standard and the two Primary schools offers education upto 5th standard in Veerlapalem village. The school has a compound wall three sides, basic facilities such as benches, drinking water and toilets are found adequate. There are no schools in both Dubba Thanda and Sath Thanda.

Development Priorities Identified in VEERLAPALEM :

1. Drinking water facility by providing water purifying plant
2. Community Hall
3. Hospital/Primary Health Center
4. Provision for individual toilets
5. Construction of Library Building
6. Renovation of street lights
7. Internal CC road 3 to 4 KM with drainage.
8. Anganwadi building repair.
9. School compound wall 200 mtrs, toilets for boys and girls
10. Racks, tables, chairs and computers (20 Nos) for school
11. Tree gaurds 15 Nos
12. Play ground and playing material for the children.

13. 6 chairs and 15 benches for one primary school
14. 20 benches, 10 chairs and lunch plates 100 and water glasses 100 Nos

Development Priorities Identified in Dubba Thanda :

1. BT road 500 mtrs from PWD road to Dubba Thanda
2. Internal CC roads 2.5 kms
3. Drinking water facility
4. Construction of temple
5. Construction of Primary School building
6. Bus stop at PWD road
7. PHC and Veterinary hospital building
8. Street lights on both sides of the road (10 Nos)

Development Priorities Identified in Sath Thanda :

1. Drinking water facility
2. Internal CC roads 3 kms
3. Street lights (10 Nos)
4. Construction of primary school building
5. Temple construction
6. Individual toilets

PHOTOGRAPHS OF CONSULTATIONS HELD



Consultations with Community in Dubba Thanda

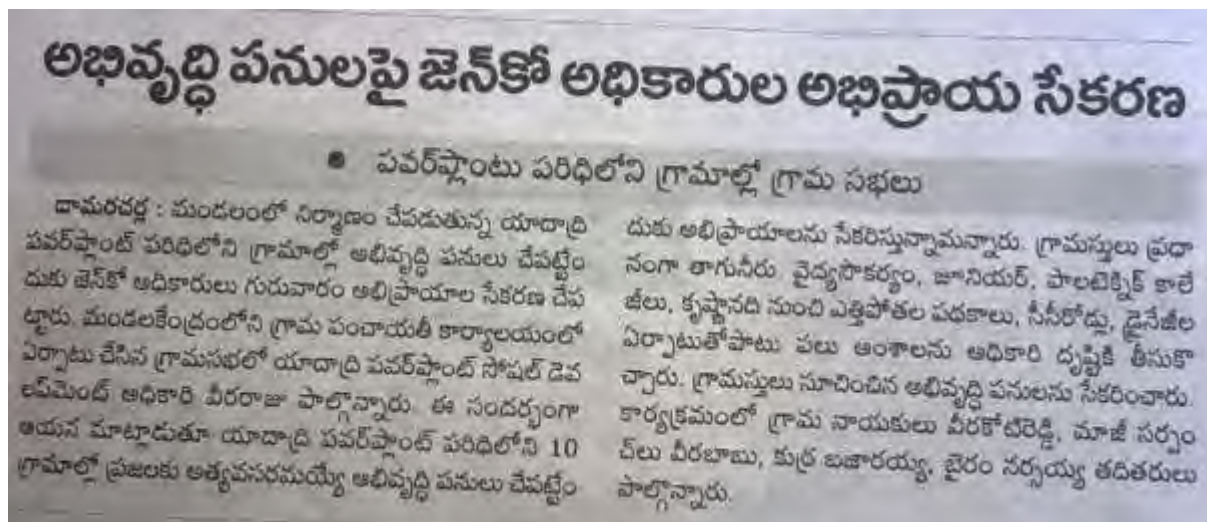


Consultations with Community in Sath Thanda



Consultations with Community in Veerlapalem Panchayat Office

News Paper Report : Andhra Jyoti, dated 25th March, 2016



2.2.2 MUDIMANIKYAM



Mudimanikayam is GP village and it has no hamlets. It is situated approximately 7km from proposed YTPS by road. There are around 535 households with a total population of 1879. The male and female population comprises of 961 and 918 respectively. The entire village population consists of BC, SC, and OC but majority of

population is BC (Yadav).

The main economic activity of the population is agriculture. The second important source of income is farm wage labor and stone cutting supporting the workers for about 12 months. The normal daily agriculture wage rates for farm work are Rs 200-250 for men and Rs 100-150 for women during the season. During the local lean season, all the agriculture wage laborers work in the MGNREGS in their proximity for 100 days.



With regard to the cropping pattern it is noticed that most of the farmers grow cotton, pigeon pea, Chilly, black gram, jowar during the Kharif which is the main farming season for this village. Cultivation is happening under rainfed condition. There is no other source of irrigation.

The main source of drinking water is borewells. The same water is used for washing and cleaning. It was reported the taste of the water is salty and fluoride content is high. There are small size 5000 liter water tanks available in the village. There is no separate overhead tank.



Villagers felt that the water supply will be improved by installation of water treatment plants. Apart from bore well there are 4 hand pumps which are not working.



80% of the houses are connected with electricity. Street lights are available in all parts of the village and are in working condition. The village has BT approach road for 500 meters without any side drains. At five places Internal roads are CC and remaining places roads are unpaved and *Kutcha*.

Auto are major source of transport for the villagers. There is no access of RTC buses to reach this village.

With regard to sanitation, only 15 houses have individual toilets and there are no community toilets. Drainage is not available in the village. People tend to go for open defecation. There are two Anganwadi centre functioning in the village. One of the Anganwadi center has no own building. There is no health sub-centre functioning in the village but ANM visits the village once in a month. For major treatments villagers go to private and government health facilities in Miryalaguda or Hyderabad.



Health checkups are organized once in a month by 104 mobile health facility and they feel that there is no shortage of medicines. It was reported that 108 ambulance facilities is also available within two hours in case of any medical emergency. The common diseases prevailing in the village are viral fever, typhoid, malaria, dengue, joint pains, chickengunya, cough and fever. It was also reported that there is no veterinary hospital in the village. They take animals to Adavidulapalli veterinary hospital (5km)

There are 32 active women's self-help groups (SHGs) existing in the village. Their activities are small savings, in-group lending and using for crops purpose. The borrowed money is mostly used for purchasing household and agriculture purpose.

All the government welfare schemes such as Indiramma housing scheme (50 houses), widow pensions (32), old age pensions (96), physically handicapped pensions (22) and MGNREGS (520) are being utilized by the villagers. Unemployed youth are around 450 who are going to farm wage labor and non-farm wage labour work (stone cutting). The highest education qualification is observed in the village is Post Graduation.

There is a primary school which offers education up to 7th standard. The school has no compound wall and facilities such as benches, drinking water and toilets are found inadequate. For higher studies students go to ZPHS Adavidevulapalli.

Development Priorities identified in Mudimanikyam

1. Drinking water facility (Mineral Water Plant)
2. Internal CC road 4 to 5 KM with drainage facility
3. BT road from Mudimanikaym to TV Gudem (5 km)
4. Hospital (PHC)
5. Veterinary Hospital
6. Temple consultation
7. Community hall
8. Basic facilities in school (Compound wall, benches (50), tables (6), Chairs (20), fans (6) stationery and books (600 Nos), Computer s 2, projector 1,drinking water, toilets, etc)
9. Training on Income Generation Activity for local youth and women
10. Library
11. Individual toilets (400)
12. Compound wall for GP office
13. Burial ground
14. Repairing of the road from Mudimanikyam to Adavidevalupalli village

PHOTOGRAPHS OF CONSULTATIONS HELD



2.2.3. ADAVI DEVULA PALLI



Adavi devula palli is a GP villages and it is situated approximately 8km from proposed YTPS by road. There are 2146 households with a total population of 8226. The male and female population comprises of 4221 and 4005 respectively. The entire village population consists of 60% BC, OC 20% and SC 20% Major caste among BC is Munnuru Kaapu.

The main economic activity of the population is agriculture and agriculture labor. The other important source of income is business. The normal daily wage rates for farm work are Rs 150 for women and Rs 200-250 for men during the season. During the local lean season most of the wage laborers (120 groups) work in the MGNREGS in their proximity for 100 days.



With regard to the cropping pattern it is noticed that most of the farmers grow Paddy, Cotton and Chilly. Rabi and Kharif are the two farming seasons. Paddy is cultivated in Rabi season. Main source of irrigation is through pipelines from Krishna river.

The main source of drinking water is from bore well as well as from Krishna River. There is no over head tank in the village. The local community reported that drinking water taste and the quality is good and the supply of water insufficient due to lack of water in the river. Therefore, they felt that the water supply can be improved by installation of pipelines from Krishna River completely which will remove their water scarcity. Apart from bore well there are 30 hand pumps in the village but none of them are working due to no ground water

All the houses are connected with electricity.. Street lights are available in all parts of the village. The village has BT road approach road for 500 meters without any side drains. Internal roads are unpaved and *Kutchha*.

RTC buses and autos are major source of transport for the villagers. There is access of RTC buses to reach Miryalaguda from this village. But there is a RTC bus shelter.

With regard to sanitation, 650 of the households have individual toilets and there are no community toilets. Drainage is available in the village but there is no proper maintenance and cleaning. People tend to go for open defecation. There are 5 Anganwadi centres functioning in the village. There is a health sub-centre functioning in the village and only ANM visits the village daily. For major treatments villagers go to private and government health facilities in Miryalaguda.

Health checkups are organized once in a quarter by 104 mobile health facility and they feel that there is no shortage of medicines. It was reported that 108 ambulance facilities is also available within half an hour in case of any medical emergency. The common diseases prevailing in the village are Malaria, dengue, platelets, cough, asthma and joint pains. It was also reported that there is a veterinary hospital in the village.

There are 80 active women's self-help groups (SHGs) existing in the village. Their activities are small savings, tailoring, in-group lending and using for crops purpose. The borrowed money is mostly used for purchasing live stock and agriculture purpose.

All the government welfare schemes such as Indiramma housing scheme, widow pensions (216), old age pensions (326), physically handicapped pensions (58) and MGNREGS (120 groups) are being utilized by the villagers. Unemployed youth are around 2000 who are going to farm wage and non-farm wage labor work (Stone cutting). The highest education qualification in the village is Post Graduation.

There is a High school which offers education upto 10th standard. The school has a complete compound wall, facilities such as benches, drinking water are found adequate.

Development Priorities identified in Adavi devula palli

1. Drinking water for entire village (Mineral Water Plant)
2. CC roads 10 km
3. Individual toilets

4. Computer training center for youth
5. Library
6. Income Generation Activity for 800 unemployed youth
7. Construction of toilets and drinking water at bus stop.
8. Building for junior college and ITI
9. Primary Health Care Centre
10. Construction of Temple
11. Tricycles for 100 numbers of Physically handicapped persons

SC Colony

1. Community Hall
2. CC roads with drainage 500 mtrs.
3. Tricycles for Handicapped 20 persons
4. Burial ground
5. Home for old age people

PHOTOGRAPHS OF CONSULTATIONS HELD IN ADAVI DEVULA PALLI



2.2.4. IRKIGUDEM

Irkgudem is a GP village and it is situated approximately 4 km from YTPS by road. There are around 557 households with a total population of 1760. The male and female population comprises of 863 and 897 respectively. The entire village population consists of BC, SC, OC and ST. Major caste is BC (Munnuru Kaapu).

The main economic activity of the population is agriculture and agriculture labour. Another important source of income is non-farm wage labour in India Cement Limited. The normal daily wage rates for farm work are Rs 250-300 for men and Rs 150-200 for women during the season. During the local lean season, around 52 groups work in the MGNREGS in their proximity for 100 days. Per day Rs 70 – 80 income is generated to MGNREGS.



With regard to the cropping pattern it is noticed that most of the farmers grow Paddy and Chilly. During Rabi season Chilly and vegetables are cultivated and during Kharif Paddy and Chilly are cultivated. Main source of irrigation is through Lift Irrigation from Krishna River.

The main source of drinking water is Krishna River through pipelines in the village. There is an overhead tank in the village. Drinking water is also supplied through individual taps with the help of Gram Panchayat pipeline for drinking purpose. Same water is being used for cleaning and washing. It was reported that the ground water level is good.



All the houses are connected with electricity. But power meters are not installed. Street lights are available in all parts of the village (90%). The village has a very good BT approach road. Internal roads are also cc roads in all the parts of the village (80%).

RTC bus is major source of transport for the villagers which runs five times in a day .

There is access of RTC buses to reach Miryalaguda from this village. There is no RTC bus shelter in the village.



With regard to sanitation, 30% of households have individual toilets and there are no community toilets. Drainage system is not available in the village. People tend to go for open defecation. There are two Anganwadi centres functioning in the village one is mini and another is major. There is no health sub-centre functioning in the village. ANM visits the village

15 days in a month. For major treatments villagers go to private and government health facilities in Miryalaguda, Damarcherla, Guntur and Hyderabad.

Presently health checkups are not being organized by 104 mobile health facility and they feel. It was reported that 108 ambulance facilities is also available within half an hour in case of any medical emergency. The common diseases prevailing in the village are Malaria, Typhoid, and fever. There is no veterinary hospital in the village.

There are 42 active women's self-help groups (SHGs) existing in the village. Their activities are small savings, tailoring, in-group lending and using for crops purpose. The borrowed money is mostly used for purchasing live stock, household use and agriculture purpose.



All the government welfare schemes such as Indiramma housing scheme, widow pensions (80), old age pensions (100), physically handicapped pensions (13) and MGNREGS (52 groups) are being utilized by the villagers. Unemployed youth are around 176 who are going to labor work. Having highest education qualification is Post Graduation.

There is a High school which offers education upto 8th. For 9th and 10th students tend to go to high school run under Raasi Cements Limited. Few students also go to Damarcharla. The High school has a compound wall, facilities such as benches, drinking water and toilets are found adequate.

CASE STUDIES OF SOME OF THE SELF HELP GROUP MEMBERS WHO ARE DOING PETTY BUSINESS IN IRKI GUEDEM

	
Kanakam Venkataramana, W/O Adinarayana, Age 45. Running kirana store with the financial assistance from SHGs. Earning Rs 300-400 per day.	L. Amaralingamma, D/O China Nagaiah, Age 25 yrs. Handicapped. Running a Kirana Store with the financial assistance from SHGs. Earning Rs 300-400 per day.
	
L Samrajyam, W/o Ramaiah, Age 50. Running a Kirana Store with the financial assistance from 2 years. Earning Rs 300-400 per day.	Puramchetty Lakshmi, W/O Venkateshwarlu, Age 35. Running a Kirana, Cloth and Tailoring for the last one and half years. Earning Rs 200-300 per day.

Development Priorities Identified in IRKIGUDEM :

1. Mineral water plant (RO) for drinking purpose
2. Individual toilets for 250 houses
3. Hospital/Primary Health Center
4. CC roads with drainages 2 Km
5. Community hall
6. Library building
7. Training on Income Generation Activity for local youth around 150 persons.
8. Drainage 2 kms
9. A. Gravel road to reach farm fields from Gagamma Temple to Drinking water pump house (750 mts)
B. Gravel road Kamatam Shekar to Lift Irrigation Pump house 1 km
C. Gravel road from Potla Nageshwar rao house to Muthavarapu Nageshwar rao farm field 2 kms
D. Gravel road from Gram Panchayat's RWS road to Bayya Basavaiha farm field 2.5 km.
E. Gravel road from Gollavani Kunta to Kanakam Gopaiah's farm field 1 km
F. Gravel road from Gollavani Kunta to Kotika Kistaiah's farm field 500 mtrs
G. Gravel road from Dakshineni Venkateshwarlu farm field to Bhadasasala Kalava 1 km
H. Gravel road from Gunda Veera Raghava Rao farm field to Kotika Kondaiah's farm field 1 km
I. Gravel road from Golla Kunta to Degala Managalagiriah's farm field 1 km
10. Construction of Temple
11. Renovation of dais in the village.
12. Renovation of Mutyalamma Temple
13. Construction of veterinary hospital

PHOTOGRAPHS OF CONSULTATIONS IN IRKIGUDEM VILLAGE



2.2.5. TALLA VEERAPPA GUEDEM

Talla veerappa gudem is a Gp village of Damaracharla Mandal it is adjacent to proposed YTPS. There are 721 households with a total population of 2526. The male and female population comprises of 1291 and 1231 respectively. The entire village population consists of BC, SC, and OC and majority consists of BC (Gouds).

The main economic activity of the population is agriculture, agriculture labor and Taddy. The normal daily wage rates for farm work are Rs 300 for men and Rs 200 for women during the season. During the local lean season, around 50 groups of wage laborers work in the MGNREGS in their proximity for 100 days. Through MGNREGS the earnings of these labour will be Rs.70-80 perday.

With regard to the cropping pattern it is noticed that most of the farmers grow Cotton and Chily. Kharif is the farming season. Main source of irrigation is rain.

The main source of drinking water, cleaning and washing is through bore wells. There are 7 bore wells and 8 hand pumps in the village. Only four hand pumps are in working condition. There is a overhead tank in the village. The taste of the water is salty. Villagers reported that the ground water level is very poor.

All the houses are connected with electricity. Street lights are available in all parts of the village all are working. The village has BT road approach without any side drains. Internal roads are unpaved and *Kutch*a. Only 30% of the internal roads are CC and paved.

RTC buses and Autos are major source of transport for the villagers. There is access of RTC to reach Miryalaguda and Damaracharla from this village. But there is a RTC bus stop but there is no bus shelter.

With regard to sanitation, 100 number of households not have individual toilets and there are no community toilets. Drainage is not available in the village. People tend to go for open defecation. There are three Anganwadi centres functioning in the village. There is no health sub-centre functioning in the village but ANM visits the village once in a month. There is a PHC center building but it is not under functioning. For major treatments villagers go to private and government hospitals in Miryalaguda.

Health checkups are organized once a month by 104 mobile health facility and they feel that there is no shortage of medicines. It was reported that 108 ambulance facilities is also available within half an hour in case of any medical emergency. The common diseases prevailing in the village are Malaria, Typhoid and Platelets etc.. It was also reported that there is no veterinary hospital in the village. They take animals to Damaracharla veterinary hospital (5km)

There are 45 active women's self-help groups (SHGs) existing in the village. Their activities are small savings, in-group lending and using for crops purpose. The borrowed money is mostly used for household expenses and children education purposes.

All the government welfare schemes such as Indiramma housing scheme (300), widow pensions (98), old age pensions (155), physically handicapped pensions (47) and MGNREGS (50 groups) are being utilized by the villagers. Unemployed youth are around 250 who are going to farm wage and non-farm wage labor work. Having highest education qualifications is Post Graduation.

There is a high school which offers education up to 8th standard. After 8th students go to ZPHS Damaracharla. The school has a compound wall and facilities such as benches, drinking water and toilets are found adequate. For higher education students go to Miryalaguda.

Priorities Identified in TALLA VEERAPPA GUDEM:

1. Drinking water through RO plant
2. Individual Toilets 500
3. CC roads with drainages 4 kms
4. Training on Income Generation Activity for local youth and women
5. Veterinary hospital
6. Lift Irrigation facility from Krishna River
7. Construction of Temple
8. Provision of Health cards to avail medical treatment in YTPS hospital
9. Construction of Library building
10. Financial assistance for poor and widows
11. CC Retention wall to prevent from floods Irkigudem road to Ura Cheruvu
12. Mini water tanks (5 Nos)
13. Renovation of electrical lines and provision of 3 phase transformer
14. Burial grounds for BC and SC community
15. Construction of metal road 3 kms

2.2.6. KALLEPALLI & Hamlet : Shantinagar



Kallepalli is a GP village which comes under Damaracharla Mandal and it is 5km from YTPS by road. It has one hamlet namely Shantinagar. There are 772 households with a total population of 2942. The male and female population comprises of 1507 and 1435 respectively. The entire village population consists of SC, ST, and BC. Majority of population is

ST (*Lambada*) in this village.

The main economic activity of the population is agriculture labour. The normal daily wage rates for farm work are Rs 250 for men and Rs 150 for women during the season. During the local lean season, all the wage laborers work in the MGNREGS (56 groups) in their proximity for 60 days. Earnings will be Rs 100-200 per day.

With regard to the cropping pattern it is noticed that most of the farmers grow Cotton, Paddy, Chilly and Pigeon pea. During the Rabi season if water is available Paddy is grown. Main source of irrigation is through rains.



The main source of drinking water is can water from RO plant and through mini tanks of 5000 ltrs (5 Nos) and bore well for drinking purpose. RO water Per Can Rs. 5 is being paid. There is around 47 hand pumps but only 27 working. Ground water level is very low. There is no over head tank in the village.

80% of the houses are connected with electricity. Street lights are available in all parts of the village. The village has CC approach without any side drains. Some Internal roads are unpaved and *Kutcha* roads. Only 20% of the internal road are CC.

RTC buses and Shared autos are major source of transport for the villagers. There is access of RTC buses to reach Miryalaguda from this village. There is no RTC bus shelter.

With regard to sanitation, 30 number of households have individual toilets and there are no community toilets. Drainage is not available in the village. People tend to go for open defecation. There are two Anganwadi centres functioning in the village. There is no health sub-centre functioning in the village and ANM visits the village daily. For major treatments villagers go to private and government hospitals in Miryalaguda.



Health checkups are organized once in three months by 104 mobile health facility and they feel that there is no shortage of medicines. It was reported that 108 ambulance facilities is also available within half an hour in case of any medical emergency. The common diseases prevailing in the village are Malaria, typhoid, platelets, etc. It was also reported that there is RLSU hospital in the village.

There are 56 Groups of active women's self-help groups (SHGs) existing in the village. Their activities are small savings, in-group lending and using for crops purpose. The borrowed money is mostly used for household needs and agriculture purpose.

All the government welfare schemes such as Indiramma housing scheme, widow pensions(42), old age pensions(92), physically handicapped pensions(16) and MGNREGS(56) are being utilized by the villagers. Unemployed youth are around 250 who are going to labor work. The highest education qualification in the village is M.Tech.

There is one primary schools and one high school in the village. Both the schools have compound wall and facilities such as benches, drinking water and toilets are found inadequate. For higher education students go to Miryalaguda, Guntur and Hyderabad.



Development Priorities identified in KALLEPALLI

1. Internal CC roads with side drains 3 km
2. Drinking water through RO plants
3. Community hall
4. Individual toilets
5. Library
6. Construction of Temple

Development Priorities identified in SHANTINAGAR Hamlet Of KALLEPALLI

1. CC roads with drainage 2km
2. Compound wall for Ramalayam temple
3. RO plant for drinking water
4. Individual toilets (25)
5. Old age pensions (10)

PHOTOGRAPHS OF CONSULTATIONS IN KALEPALLI VILLAGE



2.2.7. BOTHALAPALEM

Bothalapalem is a GP village under Damaracharla mandal. It is situated approximately 8 kms from proposed YTPS by road. There are 482 households with a total population of 1888. The male and female population comprises of 954 and 934 respectively. The entire village population consists of SC, OC, BC and STs. Major caste among the SCs community is *Madiga*.

The main economic activity of the population is agriculture and agriculture labor. The normal daily wage rates for farm work are Rs 200-300 for men and Rs 200 for women during the season. During the local lean season, around 53 groups of wage laborers work in the MGNREGS in their proximity for 60 days.

With regard to the cropping pattern it is noticed that most of the farmers grow Paddy under Rabi season and Mandarin(*Bathai*) in Kharif season. The main source of Irrigation is sagar canal water and bore wells.

The main source of drinking water is Krishna River water pipe lines and for washing and cleaning hand pumps. Nearly 200 houses have bore connection. There is no over head tank in the village. Apart from above there are 9 hand pumps but only 3 are working.

All the houses are connected with electricity. But street lights are also available in all parts of the village. The village has BT approach road without proper side drains. 50% of the internal roads are CC.

RTC buses and autos are major source of transport for the villagers. There is access of RTC to reach Miryalaguda from this village. There is a RTC bus shelter. This village is connected to NAM SH2 road.

With regard to sanitation, 50% of households have individual toilets and there are no community toilets. Drainage is not available in the village. People tend to go for open defecation. There are two Anganwadi centre functioning in the village. Main anganwadi center has building. There is no health sub-centre functioning in the village but ANM visits the village daily. For major treatments villagers go to private and government hospitals in Miryalaguda.

Health checkups are organized twice a month by 104 mobile health facility and they feel that there is no shortage of medicines. It was reported that 108 ambulance facilities is also available within an 20 minutes in case of any medical emergency. The common diseases prevailing in the village are Fevers like Dengue, and Joint Pains etc.,

There are 48 active women's self-help groups (SHGs) existing in the village. Their activities are small savings, in-group lending and using for crops purpose. The borrowed money is mostly used for purchasing live stock, children's education and agriculture purpose.

All the government welfare schemes such as Indiramma housing scheme (250), widow pensions(108), old age pensions (72), physically handicapped pensions (46) and MGNREGS (53) are being utilized by the villagers. Unemployed youth are around 200 who are going to agriculture labor work. The highest education qualification in the village is M.Tech.

There is a Primary school in this village which offers education upto 7th. There are 50 students in the school. For high school education students go to Damaracharla ZPHS. For higher education students go to Miryalaguda and Hyderabad.

Priorities in BOTHALAPALEM

1. CC roads with drainages 4 kms
2. Drinking water
3. Compound wall to the existing school, benches (20), chairs (10), Tables (5 Nos), TV (1) Computers (3) and Projector (1)
4. Training on Income Generation Activity for local youth and women
5. Veterinary hospital
6. Compound wall to GP office
7. Plantation and Tree Guards (20)
8. Construction of Temple
9. Provision of play ground

PHOTOGRAPHS OF CONSULTATIONS IN BOTHALAPALEM VILLAGE



2.2.8. DILAWARPUR

Dilawarpur is a GP village which comes under Damaracharla Mandal and it is approximately 10km from proposed YTPS by road. There are 816 households with a total population of 2232. The male and female population comprises of 1154 and 1078 respectively. The entire village population consists of SC, ST, OC and BC. Majority of population is SCs (*Madiga*) in the village. There are 30 ST community families (Erukala) who prepare baskets which are used for poultry and other household purpose. Every day they make 3 to 4 baskets and sell for Rs. 50-60 per each basket. Sarpanch of the village also belongs to the same community.



The main economic activity of the population is agriculture. The second important source of income is agriculture labor. The normal daily wage rates for farm work are Rs 250 for men and Rs 200 for women during the season. During the local lean season, around 100% wage laborers work in the MGNREGS in their proximity for 100 days. Through MGNREGS laborers earn Rs. 80-90 per day.

With regard to the cropping pattern it is noticed that most of the farmers grow Paddy under rainfed conditions during Kharif season. During Rabi paddy is cultivated with the support of bore well water. Apart from bore wells and rainfed there is no other major source of irrigation.



The main source of drinking water is bore water through pipelines. Water is being supplied to all the 700 houses through two existing bore wells. Apart from bore wells there are 10 hand pumps which are in working conditions. Some of the villagers also buy RO water for drinking purpose by paying Rs. 3 per liter. People use water from hand pumps for cleaning and washing clothes. There is

no over head tank in the village.

All the houses are connected with electricity. Street lights are available in some parts of the village. The village has BT road approach without any side drains. Most of the Internal roads are Unpaved and *Kutcha*.

Shared autos are major source of transport for the villagers. There is no access to RTC buses to reach Miryalaguda from this village. People go either by Autos or own bikes to nearby villages.



With regard to sanitation, around 100 number of houses have individual toilets and there are no community toilets. Drainage is not available in the village. People tend to go for open defecation. There are 4 Anganwadi centres functioning in the village out of which 2 are mini



existing in the village.

and 2 are major centers. Main centers have own buildings and mini centers have not buildings. There is no health sub-centre functioning in the village but ANM visits the village once in a week. For major treatments villagers go to private and government hospitals in Miryalaguda, Narketpalli and Hyderabad. There is a veterinary hospital

Health checkups are organized once a month by 104 mobile health facility and they feel that there is no shortage of medicines. It was reported that 108 ambulance facilities is also available within 15 minutes in case of any medical emergency. The common diseases prevailing in the village are joint pains, fever, dengue, malaria, typhoid, hernia, etc.

There are 400 active women's self-help groups (SHGs) existing in the village. Their activities are small savings, in-group lending and using for crops purpose. The borrowed money is mostly used for household purpose, children education and agriculture purpose.



All the government welfare schemes such as Indiramma housing scheme, widow pensions (30), old age pensions (30), physically handicapped pensions (20) and MGNREGS (70 groups) are being utilized by the villagers. Unemployed youth are around 185 who are going to labor work. The highest education qualification observed in the village is Post Graduation.

There is a ZPH school which offers education up to 10th standard. The school has basic facilities such as benches, drinking water and toilets.

Priorities identified in DILAWARPUR

1. CC roads with side drains 2.5 kms
2. Drinking water through RO Plant
3. Individual toilets for 300 Nos
4. Construction of Anganwadi buildings 2 Nos
5. Community hall
6. Construction of Temple
7. Hospital/Primary health center
8. Construction of Market centre
9. Training on Income Generation Activity for local youth and women
10. Burial ground
11. Electricity poles – 100 Nos

PHOTOGRAPHS OF CONSULTATIONS IN DILAWARPUR VILLAGE



2.2.9. DAMERACHERLA & Hamlets : Rajagattu and Veerbhadrapuram



Dameracherla is a GP and Mandal Head Quarters and it is situated approximately 7km from proposed YTPS by road. It is situated adjacent to the NAM SH-2 road. It has two hamlets namely ; Rajaguttu and Veerabhadrapuram. There are around 3291 households with a total population of 13663. The male and female population comprises of 6841 and 6822 respectively. The

entire village population consists of ST, SC, BC and OC. Major social category in the village is OC and caste is *Reddy*.

The main economic activity of the population is agriculture, agriculture labor, non-farm wager labour in Raasi Cements limited and business. The normal daily wage rates for farm work are Rs 300-350 for men and Rs 150-200 for women during the season. During the local lean season, around 100% wage laborers work in the MGNREGS (180 groups) in their proximity for 100 days. Earning per day is Rs.70-80.



With regard to the cropping pattern it is noticed that most of the farmers grow Paddy, Mirchi, Pigeon Pea and Cotton during the Kharif season. During Rabi vegetables like tomato and watermelon is cultivated. Main source of irrigation is through Krishna water through pipes.



The main source of drinking water is bore wells but due to low level of Ground water the water is being supplied from agriculture field by tankers. Taste of the water is good but fluoride content is found high. There is an overhead tank. There are around 35 hand pumps and none of them are working due to no ground water. However, most of the people are purchasing mineral water cans

for drinking purpose.

80% of the houses are connected with electricity. Street lights are available in all parts of the village. The village has BT approach road. 80% of the internal roads are Unpaved and *Kutcha*.

RTC buses and autos are major source of transport for the villagers. There is access of RTC buses to reach Miryalaguda from this village. There is no RTC bus shelter.

With regard to sanitation, 20% of households have individual toilets and there are no community toilets. People tend to go for open defecation. There are four Anganwadi centers functioning in the village. Only one main anganwadi center has building and other three centers are function in rented buildings. There is primary health center functioning in the village. ANM visits the village regularly. For major treatments villagers go to private and government health facilities in Miryalaguda, Guntur and Hyderabad.

Health checkups are not being organized by 104 mobile health facility. It was reported that 108 ambulance facilities is also available within half an hour in case of any medical emergency. There is a veterinary hospital in the village.

There are 122 active women's self-help groups (SHGs) existing in the village. Their activities are small savings, tailoring, in-group lending and using for crops purpose. The borrowed money is mostly used for purchasing live stock, children's education and agriculture purpose.

All the government welfare schemes such as Indiramma housing scheme (450), widow pensions (426), old age pensions (470), physically handicapped pensions (56) and MGNREGS (180 groups) are being utilized by the villagers. Unemployed youth are around 1000 who are going to labor work. Highest education qualification among the youth is Post Graduation.

There is a high school which offers education upto 10th . The school has a compound wall and other basic facilities such as benches, drinking water and toilets are found adequate.

Priorities identified in DAMERACHERLA & VEERABHADRAPURAM

1. Lift irrigation facility
2. Training on Income Generation Activity for local youth and women through Skill Development Center

3. Drinking water facility
4. CC road with drainage 6 kms
5. Electricity lines
6. Individual toilets – 800 Nos
7. Construction of temples
8. Construction of health facility
9. Community Hall/Marriage hall
10. Free medical camps twice in a year and distribution of medicines.
11. Development of Veerlapalem road

Priorities identified in RAJAGATTU HAMLET

1. Re-construction of existing school building
2. CC road with drainage 2 kms
3. Drinking water facility
4. Construction of primary health center
5. Play ground
6. Construction of Temple
7. Individual toilets – 100 Nos
8. Construction of Community Hall
9. Training on Income Generation Activity for local youth and women - 120 Nos

Priorities identified in KGR COLONY

1. CC road with drainage 3 kms
2. RO Plants 3 Nos
3. Community Halls – 4 Nos

PHOTOGRAPHS OF CONSULTATIONS IN DAMERACHERLA VILLAGE



2.2.10. CHAMPLA THANDA & Hamlets : Jilakarakunta Thanda, Gonja Thanda and Banjara Thanda.



Champla Thanda is a GP village which comes under Damaracharla Mandal. It has three hamlets namely ; Jilakarakunta Thanda, Gonja Thanda, Banjara Thanda. It is situated approximately 8 km from YTPS by road. There are around 756 households with a total population of 2692. The male and female population comprises of 1386 and 1306 respectively. The entire village population consists of ST, BC and OC. Major caste is ST (*Lambada*).

The main economic activity of the population is agriculture. The second important source of income is agriculture labor. The normal daily wage rates for farm work are Rs 250-300 for men and Rs 100-200 for women during the season. During the local lean season, around 100% wage laborers work in the MGNREGS (50 Groups) in their proximity for 100 days. Per day the earnings will be Rs. 100-110 per day.



With regard to the cropping pattern it is noticed that most of the farmers grow Paddy, Cotton and Mirch. Kharif is the main farming season. Main source of irrigation is through bore wells and wells. During Rabi season groundnut, greengram, black gram, etc is cultivated.



The main source of drinking water is bores wells in the village. The taste of the water is found salty. But in Banjara Thanda the taste of water is sweet. Same water is being used for general usage such as washing and cleaning.

All the houses are connected with electricity in all the three villages. Street lights are available in all parts of the villages. In all the three villages there is BT approach road. In all the three villages 40% of the internal roads are Unpaved and *Kutchha*.

RTC buses and Shared autos are major source of transport for the villagers. There is access of RTC buses to reach Miryalaguda and other towns from this village. There is no RTC bus shelter.

With regard to sanitation, none of households have individual toilets and there are no community toilets. Drainage is not available in the village. People tend to go for open defecation. There are Anganwadi centre functioning in the each village. There is no health sub-centre functioning in the village. ANM visits the village once in a week. For major treatments villagers go to private and government health facilities in Miryalaguda.



Health checkups are not being organized by 104 mobile health facility for the last one year.. It was reported that 108 ambulance facilities is also available within half an hour in case of any medical emergency. The common diseases prevailing in the village are malaria, typhoid and diabetes. There is no veterinary hospital in the village.

There are 20 active women's self-help groups (SHGs) existing in the village. Their activities are small savings, tailoring, in-group lending and using for crops purpose. The borrowed money is mostly used for purchasing live stock, children education and agriculture purpose.

All the government welfare schemes such widow pensions (22), old age pensions (28), physically handicapped pensions (23) and MGNREGS are being utilized by the villagers. Unemployed youth are around 255 who are going to labor work. Having highest education qualification is B.tech.

There is a primary school which offers education upto to 5th standard. Students go to Miryalaguda and Hyderabad for higher education. The school has a no compound wall, facilities such as benches, drinking water and toilets are found inadequate.

Priorities in CHAMPLA THANDA & JILAKARAGUNTA THANDA:

1. School building in Jilakaragunta Thanda
2. Mineral water plant
3. CC roads with drainages 2 km
4. Water tank with a capacity of 60,000 ltrs with taps in Gonia Thanda
5. Training on Income Generation Activity for local youth and women - 160
6. Street lights – 5 Nos
7. Library
8. Bore wells – 6 Nos
9. Bus stand
10. Individual toilets – 400
11. Godowns for storage – 3 Nos
12. CC Roads upto lake – 200 mtrs

Priorities in BANJARA THANDA:

1. Drinking water facility
2. CC road with drainage – 2 kms
3. Individual toilets
4. Community Hall
5. Street lights – 5 Nos
6. Temple construction
7. Anganwadi Building

PHOTOGRAPHS OF CONSULTATIONS IN CHAMPALA THANDA VILLAGE



2.2.11. NARSAPURAM



Narsapuram is a GP village which comes under Damaracharla Mandal and it is situated approximately 5km from YTPS by road. There are around 602 households with a total population of 1763. The male and female population comprises of 865 and 898 respectively. The entire village population consists of ST, BC, SC and OC. Major caste among ST is (*Lambada*).

The main economic activity of the population is agriculture. The second important source of income is agriculture labor. The normal daily wage rates for farm work are Rs 300-400 for men and Rs 200-300 for women during the season. During the local lean season, around 100% wage laborers work in the MGNREGS (60 groups) in their proximity for 100 days.

With regard to the cropping pattern it is noticed that most of the farmers grow Cotton, Chilly and Paddy. Kharif is the main farming season. During Rabi season if bore wells are working paddy will be cultivated. Main source of irrigation is bore wells and rain.



The main source of drinking for the entire village is supplied through water tanks. There are few hand pumps in the village which are not functioning.



All the houses are connected with electricity. Street lights are available in all parts of the village. The village has BT approach road. 60% of the internal roads are Unpaved and *Kutcha*.

Shared autos and individual bikes are major source of transport for the villagers. There is no access to RTC buses to reach near by villages.

With regard to sanitation, 100 number of households have individual toilets and there are no community toilets. Drainage is not available in the village. People tend to go for open defecation. There is one Anganwadi centers functioning in the village. There is no health sub-centre functioning in the village. ANM visits the village once in month. For major treatments villagers go to private and government health facilities in Miryalaguda and Damaracherla.

Health checkups are not being organized by 104 mobile health facility. It was reported that 108 ambulance facilities is also available within half an hour in case of any medical emergency. The common diseases prevailing in the village are fevers such as typhoid and Malaria

There are 45 active women's self-help groups (SHGs) existing in the village. Their activities are small savings, tailoring, in-group lending and using for crops purpose. The borrowed money is mostly used for purchasing live stock, children's education and agriculture purpose.

All the government welfare schemes such as Indiramma housing scheme (250), widow pensions(47), old age pensions (62), physically handicapped pensions(18) and MGNREGS (60 groups) are being utilized by the villagers. Unemployed youth are around 700 who are going to labor work. Highest education qualification is Post Graduation in the village.

There is a Upper Primary school which offers education upto 7th only. The school has no facilities such as benches and toilets.

Priorities identified in NARSAPURAM

1. Drinking water facility
2. CC road with side drains 3 kms
3. Training on Income Generation Activity for local youth and women
4. Construction of temple
5. Construction of Library building
6. Renovation of GP office
7. Veterinary Hospital
8. Individual toilets – 300
9. Health Facility
10. Street lights – 10 Nos
11. Road toward Peddamma Temple

PHOTOGRAPHS OF CONSULTATIONS IN NARSAPURAM VILLAGE



2.2.12 WADAPALLI (VAZIRABAD)



Wadapalli is a GP village which comes under Damaracharla Mandal and it is situated approximately 8km from YTPS by road. There are around 2112 households with a total population of 6952. The male and female population comprises of 3492 and 3460 respectively. The entire village population consists of BC, Minority, SC,

ST and OC. Majority of the population belongs to BC and caste among BCs is *Mudhiraj, Washermen and Yadav*.

The main economic activity of the population is agriculture and agriculture labour. The another important source of income for around 1000 members is casual labour in India Cements Limited. The normal daily wage rates for farm work are Rs 300-350 for men and Rs 150-200 for women during the season. During the local lean season, around 100% wage laborers work in the MGNREGS (58 groups) in their proximity for 100 days and earn Rs. 90 – 100 per day.



With regard to the cropping pattern it is noticed that most of the farmers grow Cotton and Chilly during Kharif season. During Rabi only cotton is cultivated under rainfed conditions.

The main source of drinking water is Krishna River water which is being supplied through pipelines. There is an overhead water tank in the village. There is a RO water plant where people tend to buy

water at a cost of Rs 5 per bottle. There are two hand pumps in the village out of which only one is working.

All the houses are connected with electricity. Street lights are available in all parts of the village. The village has *Kutcha* approach road. New BT road is being constructed. 80% of Internal roads are *pucca* CC roads

RTC buses and shared autos are major source of transport for the villagers. There is access of RTC buses to reach Miryalaguda from this village..

With regard to sanitation, 60% of households have individual toilets and there are no community toilets. Drainage is not available in the village. People tend to go for open defecation. There are five Anganwadi centre functioning in the village. Three Anganwadi centers have own buildings. There is a health sub-centre functioning in the village. ANM visits the village regularly. For major treatments villagers go to private and government health facilities in Miryalaguda, Narketpalli, Vazirabad and Dachepalli. .

Health checkups are organized once a month by 104 mobile health facility and they feel that there is no shortage of medicines. It was reported that 108 ambulance facilities is also available within 10 minutes in case of any medical emergency. The common diseases prevailing in the village are Typhoid, Malaria, TB, Platelets and Skin diseases.

There are 120 active women's self-help groups (SHGs) existing in the village. Their activities are small savings, tailoring, in-group lending and using for crops purpose. The borrowed money is mostly used for purchasing live stock, children's education and agriculture purpose.

All the government welfare schemes such as Indiramma housing scheme (389), widow pensions (296), old age pensions(332), physically handicapped pensions (22) and MGNREGS (58 groups) are being utilized by the villagers. Unemployed youth are around 500 who are going to agriculture and non-farm wage labor work. The highest education qualification in the village is Post Graduation

There is one primary and high schools functioning in this village. For higher education students go to Miryalaguda, Hyderabad, Suryapet and Kodad.

Development Priorities identified in WADAPALLI (VAZIRABAD):

1. Drinking water facility with pipe line 2 km
2. RO water plant
3. Individual toilets-600
4. Internal CC roads with side drains 4 km
5. Veterinary hospital
6. Training on Income Generation Activity for local youth and women-500
7. Lift irrigation
8. Temple compound wall (Lakshminarasimha Swamy temple)
9. Renovation of Hanuman Temple
10. Compound wall to PHC
11. Burial ground
12. Compound wall for minorities burial ground
13. Marriage hall for Minorities
14. Metal road – 2 km
15. Construction of walls in Batist Churst and CSI church in SC colony

CONSULTATIONS IN WADAPALLI VILLAGE



2.2.13 KONDRAPOLU & Hamlet : Rallavagu Thanda



Kondrapolu is a GP village which comes under Damaracharla Thanda and it is situated approximately 9km from YTPS by road. This GP has Rallavagu Thanda. There are around 550 households with a total population of 2672. The male and female population comprises of 1351 and 1321 respectively. The entire village

population consists of SC, ST, BC and OC but majority of the population belongs to SC. Major caste among SC community is (*Madiga*)

The main economic activity of the population is agriculture. The second important source of income is agriculture labor. The normal daily wage rates for farm work are Rs 300 for men and Rs 250 for women during the season. During the local lean season, around 100% wage laborers work in the MGNREGS (120 groups) in their proximity for 100 days and their wage rates will be Rs. 70-80 per day.



With regard to the cropping pattern it is noticed that most of the farmers grow Paddy during Kharif and Rabi seasons. Main source of irrigation is through Sagar water canal and lake.

The main source of drinking water is through bore and tankers in the village. The local community reported that drinking water taste and the quality not good and the supply of water insufficient. There are 60 hand pumps existing in the village but only 45 are working. People use these water for cleaning and washing purposes.

All the houses are connected with electricity. Street lights are available in all parts of the village. The village has BT approach road for without any side drains. 65% of the Internal roads are unpaved and *Kutcha*.



RTC and shared autos are major source of transport for the villagers. There is access of RTC buses to reach Miryalaguda and other places from this village.

With regard to sanitation, 25% of households have individual toilets and there are no community toilets. Drainage facility is not available in the village. People tend to go for open defecation. There are three Anganwadi centre functioning in the village, one in Kondrapole and other two in Rallavagu Thanda which is functioning in school building. There is a health sub-centre functioning in the village and ANM visits the village regularly. For major treatments villagers go to private and government health facilities in Miryalaguda and Hyderabad.

No Health checkups are being organized by 104 mobile health facility. Villagers they felt that there is a need of regular health checkups. It was reported that 108 ambulance facilities is also available within 15 minutes in case of any medical emergency. The common diseases prevailing in the village are Typhoid and Malaria.



There are 90 active women's self-help groups (SHGs) existing in the village. Their activities are small savings, tailoring, in-group lending and using for crops purpose. The borrowed money is mostly used for purchasing live stock, children's education and agriculture purpose.

All the government welfare schemes such as Indiramma housing scheme , widow pensions (302), old age pensions (342), physically handicapped pensions (56) and MGNREGS are

being utilized by the villagers. Unemployed youth are around 250 who are going to labor work. The highest education qualification achieved in the village is Post Graduation. There is a high school which offers education upto 10th Standard. The school has a compound wall and other facilities such as benches, drinking water and toilets adequately

Development Priorities identified in KONDRAPOLU & RALLA VAGU THANDA

1. Drinking water facility for 400 houses
2. CC roads with drainages 4 kms.
3. Training on Income Generation Activity for local youth and women
4. Hostel building for high school students
5. Library facility
6. Bus shelter
7. Individual toilets for 100 houses

2.2.14 THIMMAPURAM (Putlagadda, Padamata Thanda, Thoorpu Thanda)



Thimmapuram is a GP village which comes under Damaracharla Mandal and it is situated approximately 6.5 km from proposed YTPS by road. There are around 608 households with a total population of 2286. The male and female population comprises of 1162 and 1124 respectively. The entire village population consists of ST, SC, BC and OC. Major community is and caste is (*Lambada*).

The main economic activity of the population is agriculture. The second important source of income is agriculture labor. The normal daily wage rates for farm work are Rs 200-250 for men and Rs 100-120 for women during the season. During the local lean season, around 100% wage of laborers work in the MGNREGS (52 groups) in their proximity for 100 days and their wage rate is Rs. 60-100 per day.



With regard to the cropping pattern it is noticed that most of the farmers grow Paddy and Cotton during the Kharif season. During Rabi season Chilly crop is being cultivated. Main source of irrigation is through lift irrigation from Thungapadu Bandham canal.

In Thimmapuram the main source of drinking water is bore wells. There are four hand pumps in the village. The local community reported that drinking water taste and the quality is not good.

In Padamata Thanda the water is supplied through tap and people reported that the taste of the water is sweet. There are two taps and a water tank. There are 4 hand pumps out of which only one is working.



In Thoorpu Thanda source of drinking water is through bore well. It was reported that the taste of the water is salty. There are 8 hand pumps but only 1 is working. This village has water tank for drinking water purpose.

In Potlagadda the main source of drinking water is through hand pumps and can water. There are 6 hand pumps but only 2 are working.

All the houses are connected with electricity. Street lights are available in all parts of the village. All the four villages has BT approach road. In Thoorpu Thanda there are internal CC roads all over the village. In Padamata Thanda most of the internal roads are unpaved and *Kutch* only 50 mtrs of the internal CC road. In potlagadda internal CC roads is available only in one street.

Shared autos are major source of transport in Padamata Thanda. In Thimmapuram, Potlagadda and Thoorpu Thanda RTC buses and shared autos are major source of transport.



With regard to sanitation, in all the three villages there are no individual toilets and there are no community toilets. Drainage facility is not available in the village. People tend to go for open defecation.

Anganwadi centre are functioning in all the three villages. There is no health sub-centre functioning in the villages but ANM visits the village once in month in Padamata Thanda and Thimmapuram and once in 15 days in Thoorpu Thanda. In potlagadda one Anganwadi center is functioning but there is no own building.

For major treatments villagers go to private and government health facilities in Miryalaguda, Damaracharla.



Health checkups are not being organized by 104 mobile health facility in any of the four villages and villagers felt that there is a need of frequent health checkups.

It was reported that 108 ambulance facilities is also available within one hour in case of any medical emergency in all the four villages. The common diseases prevailing in

the villages are Malaria and Typhoid.

There are 50 active women's self-help groups (SHGs) existing in all the four villages. Their activities are small savings, tailoring, in-group lending and using for crops purpose. The borrowed money is mostly used for purchasing live stock and agriculture purpose.

All the government welfare schemes such as Indiramma housing scheme (180), widow pensions (38), old age pensions (69), physically handicapped pensions (20) and MGNREGS are being utilized by the villagers. Unemployed youth are around 350 who are going to labor work. The highest educational qualification is B.Tech and Post Graduation in the village.

In Padamata Thanda, Potlagadda and Thoorpu Thanda there is a primary school in each village which offers education upto 5th There is no school in Thimmapruram. The schools have no compound wall around the building and facilities such as benches, drinking water and toilets are found inadequate.

Development Priorities Identified in PUTLAGADDA

1. Drinking water facility
2. Internal CC roads with side drains 1.5 km.
3. Individual toilets – 150 houses
4. Income Generation Training for unemployed youth - 220
5. Provision of English medium education.

6. New electrical transformer
7. Community Hall
8. Anganwadi school building
9. Ramalayam temple

Development Priorities Identified in PADAMATA THANDA

1. Drinking water facility
2. Internal CC roads with side drains 600 mtrs
3. Anganwadi school building
4. Compound wall, benches – 10, Chairs – 5, Tables – 2, toilets and water facility existing primary school
5. Individual toilets
6. Construction on Rama temple

Development Priorities Identified in TOORPU THANDA

1. Community Hall
2. Veterinary hospital
3. Internal CC roads with side drains 1000 mtrs
4. Drinking water facility
5. Streetlights – 25 Nos
6. English medium school
7. Construction of Church and Shiva Temple
8. Individual toilets – 300 Nos.



2.2.15 ULSHAIPALEM & Hamlets : Bangaru Gadda, Kaluva Katta, Gandhi Nagar, Indira Nagar



Ulshaipalem is a GP village and it is situated approximately 8 km from YTPS by road. This village has four hamlets namely; Bangaru Gadda, Kaluva Katta, Gandhi Nagar, Indira Nagar. There are around 592 households with a total population of 1986. The male and female population comprises of 1024 and 962 respectively. The entire village population consists of ST, SC, BC and OC. Major

community is ST and caste among ST is (*Lambada*).

The main economic activity of the population is agriculture. The second important source of income is agriculture labor. The normal daily wage rates for farm work are Rs 250-300 for men and Rs 100-200 for women during the season. During the local lean season, around 100% wage laborers work in the MGNREGS (39 groups) in their proximity for 100 days.



With regard to the cropping pattern it is noticed that most of the farmers grow Paddy. Rabi and Kharif are the farming seasons. Main source of irrigation is through bore wells.

The main source of drinking water is through Gram Panchayat borer wells. The local community reported that

drinking water taste and the quality is good. There is an over head tank in the village. There are also 8 hand pumps but only 4 are working in Ulsai palem. In Gandhi Nagar out of 8 only 1 is working.

All the houses are connected with electricity. Street lights are available in all parts of the village but majority are not working. These villages has BT approach road without any side drains. Internal roads are unpaved and *Kutcha*. In Ulsasi palem has only 10% roads are pucca roads.

RTC buses and Shared autos are major source of transport for the villagers. There is access of RTC buses to reach Miryalaguda from this village. There is no RTC bus shelter in these villages..

With regard to sanitation, most of households do not have individual toilets and there are no community toilets. Drainage is not available in the village. People tend to go for open defecation. There is no Anganwadi centre Kalavakatta, but in Ulsaipalem and Gandhi Nagar there is one center in each village.. Health sub-centre centre in these villages are not available.

Frequency of visits by ANM is varying in all these villages. In Ulsaipalem ANM visits once in a month, in Kalava Katta weekly once, In Indira Nagar visits once in 15 days. For major treatments villagers go to private and government health facilities in Miryalaguda.

Health checkups are organized once in a month by 104 mobile health facilities in Ulsaipalem and Kalavakatta. But in Indiranagar no health check ups being organized by 104 for the last one year. It was reported that 108 ambulance facilities is available within 30 minutes in all the villages in case of any medical emergency. The common diseases prevailing in the village are Malaria, Typhoid, Dengue, fever, etc.

There are 54 active women's self-help groups (SHGs) existing in the village. Their activities are small savings, tailoring, in-group lending and using for crops purpose. The borrowed money is mostly used for agriculture and purchase of Livestock purpose.

All the government welfare schemes such as Indiramma housing scheme, widow pensions (122), old age pensions (156), physically handicapped pensions (39) and MGNREGS are being utilized by the villagers. Unemployed youth are around 350 who are going to labor work. The highest educational qualification is Post Graduation in the village.

There is Primary school which offers education. The school has a no compound wall and facilities such as benches, drinking water are found inadequate.

Development Priorities Identified in ULSHAIPALEM

1. Drinking water – RO Plant
2. CC roads with side drains – 1600 mts
3. Street lights – 125 Nos
4. Check walls for Jalu Canal
5. BT road 1 km from Gangadevipeta to Indira Nagar Thanda
6. BT Road 2 km from Ulsaipalem to Gandhinagar Thanda
7. BT Road 1.5 km from R&B Road to Thungapadu Bandham
8. CC road at Gangamma Temple and platform
9. Construction of Temple
10. Training on Income Generation Activity for local youth and women
11. Hand Pumps – 3 Nos

Development Priorities Identified in KALAVUAKATTA

1. Drinking water – RO Plant
2. Cc road with drainage – 300 mtrs
3. Construction of Individual Toilets – 25
4. Anganwadi Center
5. Medical Camp
6. Bus Shelter
7. Community Hall
8. Church
9. Streetlights – 8 Nos
10. Training on Income Generation Activity for local youth and women – 15 Nos
11. Financial Assistance to Widow and Handicapped

Meeting at Ulshaipalem



2.2.16 DONKATHANDA & Hamlet : Badaigadda



Donka Thanda is a GP village and it is situated approximately 8 km from YTPS by road. This GP comes under Tripuram Mandal. It has one hamlet namely Badaigadda. There are around 522 households with a total population of 1750. The male and female population comprises of 913 and 837 respectively. These two

villages comprises of ST population only. Major caste among ST (*Lambada*)

The main economic activity of the population is agriculture. The second important source of income is agriculture labor. The normal daily wage rates for farm work are Rs 300 for men and Rs 150 for women during the season. During the local lean season, around 100% wage laborers work in the MGNREGS (47) in their proximity for 100 days.



With regard to the cropping pattern it is noticed that most of the farmers grow Paddy, Cotton, Pigeon Pea, Blackgram and Groundnut during the Khariff season. In Rabi cotton is being cultivated. Main source of irrigation is through Lift irrigation from Thungapadu stream.



The main source of drinking water is through hand pumps. The local community reported that drinking water taste is salty and quality is not good. There is no over head tank.

All the houses are connected with electricity. Street lights are available in all parts of the village. These villages has BT approach road without any side drains. 80% of the Internal

roads are paved and *pucca* CC roads.

Only shared autos and individual bikes are major source of transport for the villagers.



With regard to sanitation, none of the households have individual toilets and there are no community toilets. Drainage is not available in the village. People tend to go for open defecation. Anganwadi center is functioning in the village but none of them have own building. There is no health sub-centre functioning in the villages. ANM visits the Badaigadda village once in 3 months and in Donka Thanda once in a

month. For major treatments villagers go to private and government health facilities in Miryalaguda.

Health checkups are not being organized by 104 mobile health facility in both the villages. It was reported that 108 ambulance facilities is also available within half an hour in case of any medical emergency. The common diseases prevailing in the village are Typhoid, Malaria, Jaundice and Dengue.

There are 30 active women's self-help groups (SHGs) existing in the village. The borrowed money is mostly used for purchasing live stock, children's education purpose and agriculture purpose.

All the government welfare schemes such as Indiramma housing scheme, widow pensions (18), old age pensions (32), physically handicapped pensions (7) and MGNREGS are being utilized by the villagers. Unemployed youth are around 150 who are going to labor work.

In both the villages there is Primary school functioning which offers education upto 5th Students go to Ulsaipalem village for high school studies.

Development Priorities Identified in BADAI GADDA

1. Drinking water Facility
2. Internal CC roads with drainages 2 km
3. Training on Income Generation Activity for local youth and women - 100
4. Anganwadi building
5. Financial assistance to vulnerable – 60 Nos

6. Street lights and poles - 100
7. Individual toilets – 370
8. Construction of Gram Panchayat Building
9. Health Facility

Development Priorities Identified in DONKA THANDA

1. Drinking water Facility
2. Borewell in Indira Colony
3. Drainage
4. Individual toilets – 100 Nos
5. Training on Income Generation Activity for local youth and women - 200
6. Construction of Temple (Ramalayam)
7. Community hall

CONSULTATION WITH WOMEN, MPTC& SARPANCH AT DONKATHANDA



2.2.17 APPALAMMAGUDEM & Hamlets : Lokiya Thanda and Seethya Thanda



Appalammagudem is a GP village comes under Tripuraram Mandal and it is situated approximately 9 km from YTPS by road. This GP has two hamlets namely ; Lokiya Thanda and Seethya Thanda. There are around 352 households with a total population of 1626. The male and female population comprises of 839 and 787 respectively. The entire

village population consists of ST, BC and Minority communities. Predominant community is ST and caste among ST is *Lambada*.

The primary economic activity of the population is agriculture. The second important source of income is agriculture labour. The normal daily wage rates for farm work are Rs 300 for men and Rs 200 for women during the season. During the local lean season, all wage laborers work in the MGNREGS (40 groups) in their proximity for 100 days.

With regard to the cropping pattern it is noticed that most of the farmers grow Paddy and Cotton during Kharif season. Main source of irrigation is through Sagar Canal Vazirabad R-7.

The main source of drinking water is through hand pumps and bore well. There is an over head tank in the village. There are 20 hand pumps but only 15 are in working condition. The local community reported that drinking water taste and the quality is good and the supply of water insufficient due to low level ground water. Therefore, they felt that the water supply will be improved by installing RO Plant.



All the houses are connected with electricity. Street lights are available in all parts of the village and are working. The village has BT approach road without any side drains. Most of the Internal roads (80%) are unpaved and *Kutcha*.

Shared autos are major source of transport for the villagers. There is no access to RTC buses to reach Miryalaguda from this village.



With regard to sanitation, 20% of households have individual toilets and there are no community toilets. Drainage is not available in the village. People tend to go for open defecation. There are three Anganwadi centres functioning in the village but none of them have own building. There is a health sub-centre functioning in the village but ANM visits the village every

Wednesday in a week. For major treatments villagers go to private and government health facilities in Miryalagudem and Hyderabad.

Health checkups are organized twice a month by 104 mobile health facility and they feel that there is no shortage of medicines. It was reported that 108 ambulance facilities is also available within 15 mins in case of any medical emergency. The common diseases prevailing in the village are malaria and typhoid. It was also reported that there is no veterinary hospital in the village..

There are 25 active women's self-help groups (SHGs) existing in the village.. The borrowed money is mostly used for children's education and agriculture purpose.

All the government welfare schemes such as Indiramma housing scheme, widow pensions(15), old age pensions (30); physically handicapped pensions (8) and MGNREGS are being utilized by the villagers. Unemployed youth who have completed education between 10th and Post Graduation are around 750 who are going to labor work. The highest education qualification observed in the village is Post Graduation.

There are primary schools in all the three vilalges which offers education upto 5th. After 5th students go to Miryalayaguda school for higher studies. The school facilities such as benches, toilets and drinking water are found adequate.

Development Priorities Identified in APPALAMMAGUDEM and Its hamlets

1. Drinking water for entire village
2. CC roads with drainages 3 km
3. Training on Income Generation Activity for local youth and women – 500
4. Renovation of electrical poles
5. Veterinary hospital
6. Individual toilets - 300

CONSULTATION WITH VILLAGERS OF APPALAMMA GUEM



2.2.18 RAGADAPA & Hamlets : Kunkuduchettu Thanda and Pedda Thanda



Ragadapa is a GP village which comes under Tripuraram Mandal. It has two hamlets namely ; Kunkuduchettu Thanda and Pedda Thanda. It is situated approximately 9km from YTPS by road. There are around 386 households with a total population of 1695. The male and female population comprises of 861 and 834 respectively. The entire village population consists of ST, BC,

Minorities and SC. Major caste among ST are *Lambada*.

The main economic activity of the population is agriculture. The second important source of income is agriculture labor. The normal daily wage rates for farm work are Rs 200-300 for men and Rs 200 for women during the season. During the local lean season, around 100% wage laborers work in the MGNREGS (52 groups) in their proximity for 100 days.

With regard to the cropping pattern it is noticed that most of the farmers grow Paddy and Cotton during Kharif season. During Rabi cotton and Pigeon pea is cultivated. Main source of irrigation is from Thungapadu Vagu and left canal of Nagarjunasagar.



The main source of drinking water is through Krishana River and hand pumps. There are around 20 hand pumps out of which 15 are working. The local community reported that drinking water taste and the quality is good and the supply of water insufficient.

All the houses are connected with electricity. Street lights are not available in all parts of the village. The village has BT approach road without any side drains. Internal roads are unpaved and *Kutcha* roads.

With regard to sanitation, 10% of households have individual toilets and there are no community toilets. Drainage is not available in the village. People tend to go for open

defecation. Three Anganwadi centres functioning in the village but they do not have own buildings. There is no health sub-centre functioning in the village but ANM visits the village once in a week. For major treatments villagers go to private and government health facilities in Miryalaguda, Hyderabad and Guntur.



Health checkups are organized weekly once by 104 mobile health facility and they feel that there is no shortage of medicines. It was reported that 108 ambulance facilities is also available within an hour in case of any medical emergency. The common diseases prevailing in the village are Malaria, Typhoid and Dengue. It was also reported that there

is no veterinary hospital in the village.

There are 56 active women's self-help groups (SHGs) existing in the village. The borrowed money is mostly used for household purpose, purchase of live stock and agriculture purpose.

All the government welfare schemes such as Indiramma housing scheme, widow pensions (56), old age pensions (99), physically handicapped pensions (25) and MGNREGS are being utilized by the villagers. Unemployed youth are around 300 who are going to labor work. Having highest education qualification is Degree.

There is a Primary school which offers education upto 5th..

Development Priorities identified in RAGADAPA

1. Drinking water for villagers
2. Internal CC Roads with drainages 2 km.
3. Training on Income Generation Activity for local youth and women
4. Primary Health care Centre
5. Individual toilets – 300
6. Veterinary hospital
7. Anganwadi buildings – 3
8. Construction of Temple
9. Electricity poles
10. Mini lift irrigation facility
11. Community hall
12. Play ground
13. Green belt development

2.2.19. GANDHINAGAR



Gandhinagar is a hamlet which comes under Balajinagar GP. This comes under Damaracherla Mandal. It is around 6 km from YTPS. There are 179 households with a total population of 679. The male and female population comprises of 393 and 286 respectively. The entire village population consists of BC (Gouds). Population of this

village has migrated from Nagarjunasagar during the construction of Dam. These villagers are resettled in this village since 1968. Each family was compensated with 4-5 acres of agriculture land.

The main economic activity of the population is agriculture, agriculture labor and Taddy. The normal daily wage rates for farm work are Rs 200 for men and Rs 120-150 for women during the season. During the local lean season, around 12 groups of wage laborers work in the MGNREGS in their proximity for 100 days. Through MGNREGS the earnings of these labour will be Rs.50-60 per day.



With regard to the cropping pattern it is noticed that most of the farmers grow Cotton and Paddy under rain fed conditions. Kharif is the farming season. There is no source of irrigation in this village.



The main source of drinking water, cleaning and washing is through bore wells. Apart from bore wells there are 8 hand pumps in the village but only 1 is working. The taste of the water is sweet but fluoride content is very high. Villagers reported that the ground water level is very poor.

All the houses are connected with electricity. Street lights are available in all parts of the village all are working. The village has metal approach road without any side drains. Around 8 Internal roads are unpaved and *Kutch*a. Only two road are CC and pucca.

Autos are major source of transport for the villagers. There is no access of RTC to reach Miryalaguda and Damaracharla from this village.

With regard to sanitation, 15 number of households have individual toilets and there are no community toilets. Drainage is not available in the village. People tend to go for open defecation. There is one Anganwadi centre functioning in the village in own building. There is no health sub-centre functioning in the village but ANM visits the village once in a 15 days. For major treatments villagers go to private and government hospitals in Miryalaguda. Presently no health checkups are being organized by 104 mobile health facility and they feel that there is no shortage of medicines. It was reported that 108 ambulance facilities is also available within 40 minutes in case of any medical emergency. The common diseases prevailing in the village are Fever, Dengue, Malaria and Typhoid. It was also reported that there is no veterinary hospital in the village

There are 11 active women's self-help groups (SHGs) existing in the village. The borrowed money is mostly used for agriculture and live stock specifically milch cattle.

All the government welfare schemes such as Indiramma housing scheme (45), widow pensions (45), old age pensions (22), physically handicapped pensions (5) and MGNREGS (12 groups) are being utilized by the villagers. Unemployed youth are around 100 who are going to farm wage and non-farm wage labor work. Having highest education qualifications is Post Graduation.

There is a primary school which offers education up to 5th standard. After 5th students go to ZPHS Damaracharla. The primary school has a compound wall but facilities such as benches, drinking water and toilets are found in-adequate. For higher education students go to Miryalaguda and Damarcharla.

Priorities Identified in GANDHINAGAR:

1. Drinking water through RO plant
2. Individual Toilets 100
3. CC roads with drainages 2 kms
4. Training on Income Generation Activity for local youth and women-120
5. Veterinary hospital
6. Construction of Temple
7. Construction of Community Hall
8. Construction of Health Facility
9. Construction of Tank (Water)
10. Play ground

CONSULTATIONS WITH VILLAGERS AND WOMEN AT GANDHINAGAR



2.3 SUMMARY OF DEVELOPMENT PRIORITIES IDENTIFIED

The following listing (Table 2.1) summarizes the development priorities of the study area that have been identified through community consultations.

Summary of Development Priorities Identified in the Villages	
S.No	Summary of Priorities
1	Safe and reliable supply of drinking water since the quality and taste of the ground water in some of the surveyed villages is not good. There are two options in this regard, which are NOT necessarily mutually exclusive: (1) Installation of Mineral water plants; (2) Laying of pipelines and construction of OH Tanks for supply and storage of water from bore wells.
2	Internal CC roads in the villages with drainage
3	Toilets: Financial support to households to build toilets of their own
4	Provision of street lights and poles
5	Assistance to Panchayats for providing drinking water and maintenance of toilets in schools
6	Regular conduct of health camps in the village with specialist doctors or well-equipped hospital that is accessible from the village (in or near the village);
7	Rehabilitation of physically challenged land losers
8	New or additional overhead water tank in the villages to augment water supply; public tap system and additional bore wells in some villages
9	Improvements and facilities to the existing schools such as furniture (benches for pupils), compound wall; library; sports equipment and material; toilets; new or additional water source.
10	Skills training or vocational or job-oriented training for Women and youth
11	All-weather approach road to the villages (where applicable)
12	Resurfacing of WBM roads
13	Training and financial support or facilitation for members of women's self help groups to start income-generating enterprises
14	Plantations: avenue as well as in open spaces. Supply of tree guard and maintenance of the trees.
15	Provision of hand pumps
16	Construction of building for Anganwadi centres and schools
17	Construction of building for Veterinary Hospital
18	Extension of water pipe line in some of the colonies identified
19	Development of Playground and park for children
20	Laying of BT roads
21	Awareness campaigns for sexually transmitted diseases such as HIV/AIDS, Waterborne diseases, Sanitation and Hygiene, etc.
22	Construction of boundary walls for schools and Anganwadi centres
23	Construction of toilets in Anganwadi centres (where applicable)
24	Development of school building and construction of additional class rooms
25	Provision of bore well in school
26	Construction of buildings for PHC/health sub-centres
27	Burial ground development and providing necessary infrastructure
28	Street lights (where applicable)
29	Fencing and bore well for burial ground
30	Provision of English medium education

Chapter 3 – Findings of the Socio-Economic Baseline Survey

3.1 INTRODUCTION

This chapter sets out the findings of the quantitative household survey. As outlined in the introduction, carrying out a baseline socio-economic survey, on a sample basis, to generate the relevant data is an integral part of this survey to prepare an evidence-based CSR Plan for the local population. The household survey was conducted through a structured questionnaire that covered the household level socio-economic profile, livelihood dynamics and educational and health status. The sample consists of 403 households spread across the habitations of: Adavidevulapalli, Appalammagudem, Badaigadda Thanda, Bangarigadda Thanda, Banjara Thanda, Bottalapalem, Champala Thanda, Damaracharla, Dilavarpur, Donka Thanda, Irikagudem, Gandhi Nagar, Gonya Thanda, Indiran Nagar, Jilakarakunta Thanda, Kallepalli, Kalvakatta, Kondrapole, Kunkuduchettu Thanda, Lokya Thanda, Malabandu, Mudhimanikyam, Narsapuram, Padamati Thanda, Pedda Thanda, Pittalagadda Thanda, Ragadapa, Rajagattu, Rallavagu Thanda, Sath Thanda, Sithya Thanda, Shanthi Nagar, Talla Veerappagudem, Timmapuram, Toorpu Thanda, TV Gudem, Ulsaipalem, Vadapalli, Vadderagudem, Veerlapalem. The sample was derived through a multistage stratified random sampling method.

3.2 FINDINGS OF THE HOUSEHOLD SURVEY

The surveyed locations in general are inhabited by disadvantaged communities, who are officially categorized as the Scheduled Tribes (STs), the Scheduled Castes (SCs) and Backward Castes (BCs). The STs, BCs and SCs which are the largest category of groups in the study area accounts for 47.15%, 27.05%, and 16.87% of the households respectively.; the general caste or OCs make up 8.93% of the households.

As the chart below shows the surveyed habitations reported 22 main sub-castes or communities from the sample survey. The *Lambadas* are the numerically leading community making up 46.90 % of the households. The Mala and Madiga communities constitute 1.74% and 14.89% respectively. The other leading communities include: Yadav (8.19%), Reddy (6.70%), Gouda (7.69%) Munnuru Kapu (2.73%), Muslim (2.23%) Vaishya and Mudhiraj (1.74%) Naidu (0.99%), Vadrangi (Carpenter) and Chakali (Washerman) (0.74%), Vaddera,

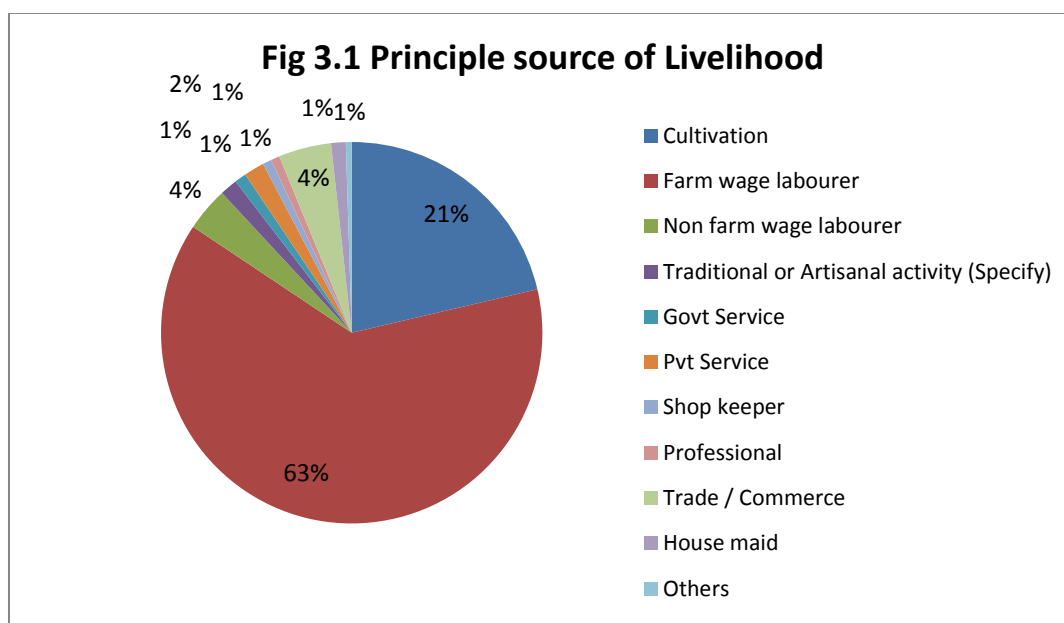
Nagula, Kummari (0.50%), Padmashali – Mangali (Barber) – Kammari – Kamma – Erukala-Chowdhary- (0.53% each).

In terms of religion, the area population is essentially Hindu 93.62%; Christian 1.60% and Muslim 4.79%. Nuclear family system is widespread in the area with more than 64% of the households reporting such a family structure; the remainder 35.11% are joint families.

Housing does not seem to be a big constraint for most households as 95.21% of the households have own dwellings; more than half of the respondents (54.19%) reported pucca structures; where as 25.58% have semi-pucca houses; and the remaining 21.23% have kutcha homes. One important finding that needs to be taken into account here is that the government housing schemes have more than thirty nine per cent coverage in the area with 39.89% reporting that they benefited from such a scheme.

With regard to the level of access to insurance related social security arrangements, 54.79% of the households have not been covered by any insurance scheme. The highest proportion being 44.15 % of Insurance holders have the Life Insurance policy, and the rest have Health Insurance and Crop Insurance (0.53% each)

3.2.1 Principal Source of Livelihood



Farm-wage labour is by far the most important source of livelihood for 63% of the households, followed by Cultivation and Non-farm wage labour from which 21% and 4% respectively of the households derive their largest proportion of income. This finding

illustrates that the vast majority of them rely on agriculture and allied work. It is observed that farm work is the leading source of household incomes. A majority of those who reported non-farm activities work at for India Cements Limited, stone cutting and polishing of stone other activities such as masonry works, auto driving, etc.

Other sources of livelihood include: trade and commerce (4.47%), private service (1.74%) Traditional or Artisanal activity (1.49%) such as hair-dressing, carpentry, tailoring and laundry services, house maid servant (1.24%), government service (0.99% each), professional and shop keeper (0.7% each) shop keeping (3.19%) and other category (0.50%) which includes auto driving, etc.

3.2.2 Land Holding & Cropping Pattern

Table 3.1: Landholding Pattern of the Area			
S.No	Land Categories (Size of the Landholding)	No. of HH	%
1.	<=2.5 acres	69	61.06
2.	>2.5 to 5 acres	38	33.63
3.	5.1 to 10 acres	4	3.54
4.	10.1 to 15 acres	2	1.77
	Total	113	100.00

The landholding at the household level ranges from a half acre upto 15 acres. The results presented in table 3.1 shows the area is dominated by small land

holder agriculture. Close to 95% of them are small and marginal farmers, owning below 5 acres. Slightly less than a tenth (3.54%) of them are medium farmers with landholdings between 5 and 10 acres. The proportion of households owning more than 10 acres is (1.77%).

As per the Table 3.2, the leased land holding pattern shows that almost 57% of the household have leased land upto 2.5

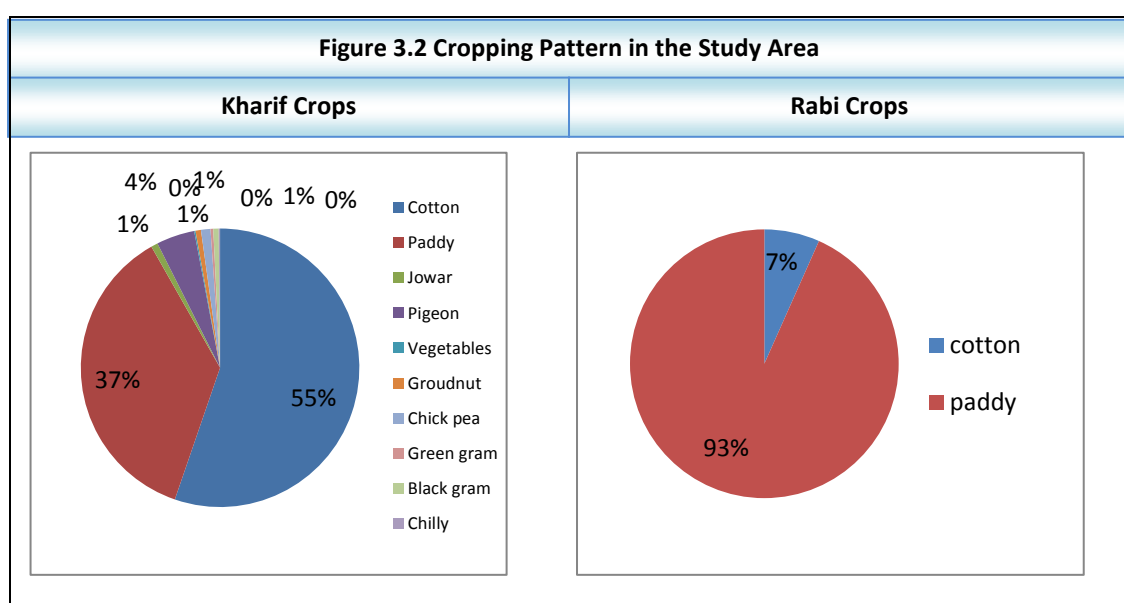
Table 3.2: Leased Landholding Pattern of the Area			
S.No	Leased Land Categories (Size of Landholding)	No. of HHs.	%
1.	Up to 2.5 acres	12	57.14
2.	2.5 to 5 acres	6	28.57
3.	> 10 acres	3	14.29
	Total	21	100.00

acres, around 28.57% have leased land holdings from 2.5 to 5 acres and 14.29% have leased land holding more than 10 acres.

Almost 54.37% of the households reported irrigated agriculture – this means they have assured source of irrigation; 45.63% of the households pursue un-irrigated agriculture – farming is rainfed. The extent of household landholding under irrigated farming ranges from 1.0 and 5 acres; and the corresponding figures for un-irrigated farming are 1 acre to 15

acres respectively. The sources of irrigation for the irrigated parcels are: borewells; tank/lake; dug wells, lift irrigation and stream or canal.

Paddy, Cotton, Jowar, Pigeon pea, Vegetables, groundnut, chick pea, green gram, black gram, chilly are the dominant crops of the study area. Except paddy and vegetables other crops are grown mostly under rainfed conditions. As figure 3.2 shows, Cotton accounts for the largest proportion of extent in Kharif occupying 55.27% and paddy 36.52% of the cultivated land, followed by pigeon pea, 28.30%, Chick pea 7%, Jowar 5%, Groundnut and black 4% each, Green Gram 2%, Chilly 1% and Vegetables 1%.. Rabi cropping trend shows that 93%% of the land is cultivated by paddy followed by 1% cotton.



3.2.3 Demographic Profile of the Households

Males constitute 52.50% of the population and the remainder are females (47.50%). The age profile of the local population is presented in the following table (3.2), which is self-explanatory. School-age children (6-14) make up 11.96% of the population. The elderly persons (60 and above) account for almost 9.93% of the local population. And the “youth” (19-35 years) make up a third (37.99%) of the population.

Table 3.2: Age profile of the population (in percentages)				
S.No	Age groups	Male	Female	All
1.	0-5 Years	9.85	10.28	10.05
2.	6-14 Years	13.93	9.77	11.96
3.	15-18 Years	7.93	9.52	8.69
4.	19-25 Years	20.95	19.55	20.29

5.	26-35 Years	15.74	18.55	17.07
6.	36-59 Years	20.50	23.68	22.01
7.	60 and above	11.10	8.65	9.93
	Total	100.00	100.00	100.00

3.2.4 Education Profile of the Population

Educational profile of the population presented in the table below (3.3) shows that literacy levels are relatively high in the area. Almost a quarter of the population is illiterate but illiteracy level is high among women at 47.12%. In fact females have lower educational levels except in Literate but no formal education and Others education. Around 5.06% of them learnt how to read and/or write without formal education. The disparities between male and female educational levels are all education stages. The general educational levels dip after the 10th to Technical level, indicating that it is a crucial stage that needs to be addressed.

Table 3.3 Education Levels amongst the Population				
S.No	Educational level	Male	Female	All
1.	Illiterate	25.93	47.12	35.99
2.	Literate but no formal education	4.64	5.51	5.06
3.	Primary (up to 5th)	14.50	12.41	13.50
4.	Middle (Below 10th)	16.65	10.28	13.62
5.	Secondary (10th Pass)	9.63	7.77	8.74
6.	Intermediate (+2)	6.91	5.89	6.42
7.	Graduate	7.13	3.13	5.23
8.	Post Graduate	2.15	0.63	1.43
9.	Technical	5.66	0.63	3.27
10.	Professional	0.57	0.38	0.48
11.	Others	6.23	6.27	6.25
	Total	100.00	100.00	100.00

3.2.5 Occupation of the Respondents

Table 3.4 shows the Occupation profile of the respondents. This survey collected data on the work status of the respondents. The results show that a three fourth of the population reported to be working regularly– involved in economic activity; the rest are essentially non-workers comprising such categories as students/pupils, housewives, the elderly and persons with disabilities. In terms of the crucial dimension of occupation, 37.30% of the working persons reported Farm wage labour as their primary occupation, followed by a 9.22% of the work force for whom Non-farm wage labour is the primary occupation. Obviously a vast majority of them work in other occupations like driving, construction work, daily wages in

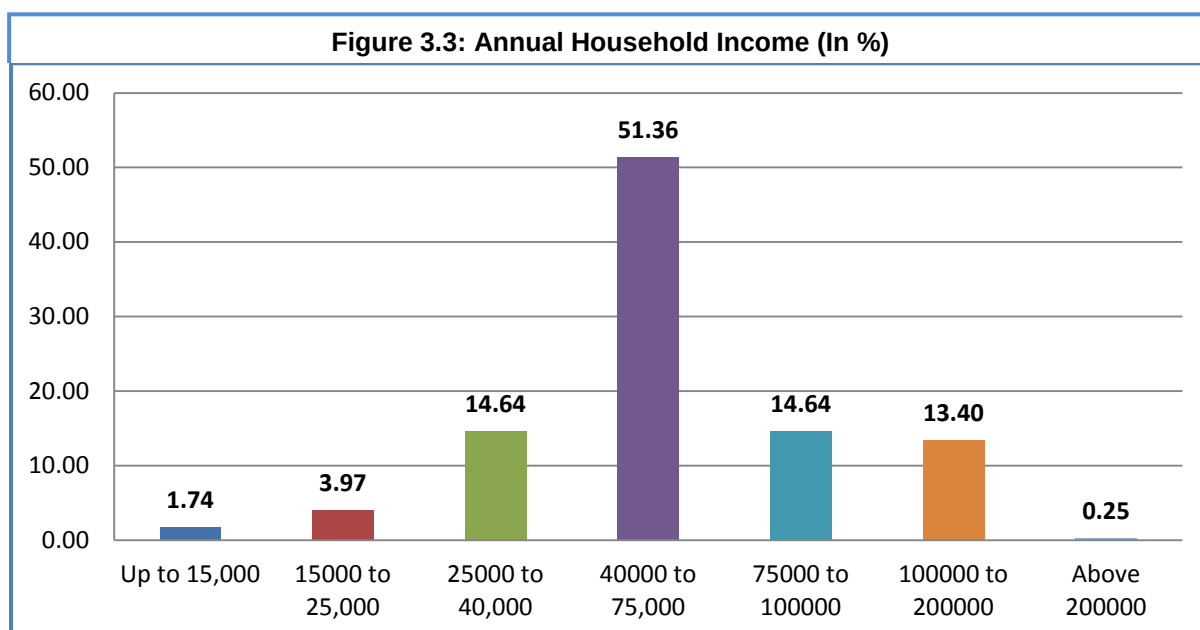
other nearby towns. The results in this respect clearly show that 39.92% of the work force depends on agriculture and allied activities, demonstrating that there is a diversification outside agriculture.

Cultivation assumes third place from which 2.62% of the work force derive their primary income.. Other occupations are relatively less important as primary activities; the following listing presents the findings with regard to reported primary occupations and the status of non-workers (with their respective percentages):

Table 3.4 Occupation Profile of the Population		
S.No	Type of Occupation	Percentage
1.	Cultivation/cropping	2.62
2.	Farm wage labourer	37.30
3.	Non-Farm wage labourer	9.22
4.	Traditional or Artisanal activity (Specify)	0.54
5.	Govt Service	0.36
6.	Pvt Service	1.61
7.	shop keeper	0.77
8.	Professional	0.12
9.	Driver/transport	1.67
10.	Housemaid	0.06
11.	Petty business/Shop	0.36
12.	street hawking	0.06
13.	Too old to work	1.96
14.	Housewife	5.47
15.	Student	28.14
16.	Un-employed	1.25
17.	retired	0.06
18.	Not Applicable	7.91
19.	Others	0.54

3.2.6 Income Levels among the Households

As regards the annual household income, it ranges from a minimum of Rs 10,000 to a maximum of Rs 3,70,000. The high-end incomes were reported by a few large farmers of the area. The pattern emerging from a distribution of annual income into different categories shows that nearly 1.74% of the households are “poorest” with incomes below Rs 15,000; 3.97% of them have incomes between Rs 15,000 and Rs 25,000. The “middle income” group (Rs 25,000 to Rs 40,000) 14.64% of the households. 79.65% of them belong to high-income households (between Rs 40,000 and above 2,00,000).



3.2.7 Health Status & Access to Services

The people of the study area suffer from a broad range of medical conditions. The respondent households were asked questions not only about the prevalence of common or regular ailments but also about relatively long-term and chronic conditions. Regarding “common ailments”, 82.84% of the households reported that they suffer from Fever. And almost all of the households reported more than one type of common complaints. The reported ailments include:

1. Asthma
2. Malaria
3. Cold / Cough
4. Typhoid
5. Head ache
6. Joint/leg/Knee pains
7. Kidney related.
8. Fever
9. Body pains

The reported number of household members who suffer from these ailments ranges from 1 to 7. In order to get treatment for such conditions, 96.77% of the households go to the area local PMP. A nearly 1% of them visit the nearest private hospital and other nearby urban centres. 0.75% of them visit the PHC. About 1.49% of them reported that they go to the Town/Area Hospital in Miryalaguda.

The reported long-term or chronic health problems include:

1. Malaria
2. Cold Cough
3. Chikungunya
4. Dengue
5. Fever
6. Typhoid
7. Body Pain
8. Hypertension
9. Head Ache
10. Joint/Knee Pain
11. Stomach Ache
12. Heart Disease
13. Cancer
14. Diabetes
15. Arthritis
16. Hiv
17. Asthma
18. Eye Problem
19. Nervous Weakness
20. Blindness
21. Handicapped
22. Others include Sight Problem/Gas trouble/Kidney Problem/Nervous weakness

In order to get treatment for such long-term and recurring conditions, the patients go to a range of healthcare providers; the highest proportion of the surveyed households (81.95%) visit the nearest Private hospital in Miryalaguda. Another 13% approach Town/Area Hospital and nearby towns. Almost 3% visit Local PMP. The remaining cases are taken to the government district hospitals and nearby clinics. The detailed findings are as follows (with the percentage of cases going to the respective health care provider):

Table 3.5 Access to Health Care Provider		
S.No	Type of Health Facilities Available to HHs	%
1.	Local PMP	3.01
2.	Town /Area hospital	13.53
3.	Nearest Private Hospital	81.95
4.	District Hospital	0.25
5.	Others	1.25

With regard to the expenses incurred, the reported households spend on an average Rs 450 per visit with respect to common ailments and Rs 8000 per visit with regard to relatively chronic conditions. The per-visit costs for the first category of conditions (common ailments)

range from Rs 300 to Rs 40,000 and the corresponding figures for the second category (chronic) are Rs 1000 to Rs 7,00,000.

Around 36.72% of the households said that free medical check-up camps or visits are conducted in their village. The weekly medical facility is provided by the Government (104). 8.78% of the respondents reported that the camp is organized once in a week, 72.97% reported that camps are being conducted once in a month and the rest 6.76% said once in three months and six months, 2.70% said once in six months and 8.78% said once in a year. 41.89% of the respondents of the habitations where such health camps are held reported to be availing the services.

When asked about the most difficult health problems of the house hold, 26.91% of the respondents of the study area reported that they suffer from Malaria, 24.36% suffer from Typhoid, 7.65%, 5.67%, 5.38 suffer from Dengue, Hypertension and Body Pains respectively.

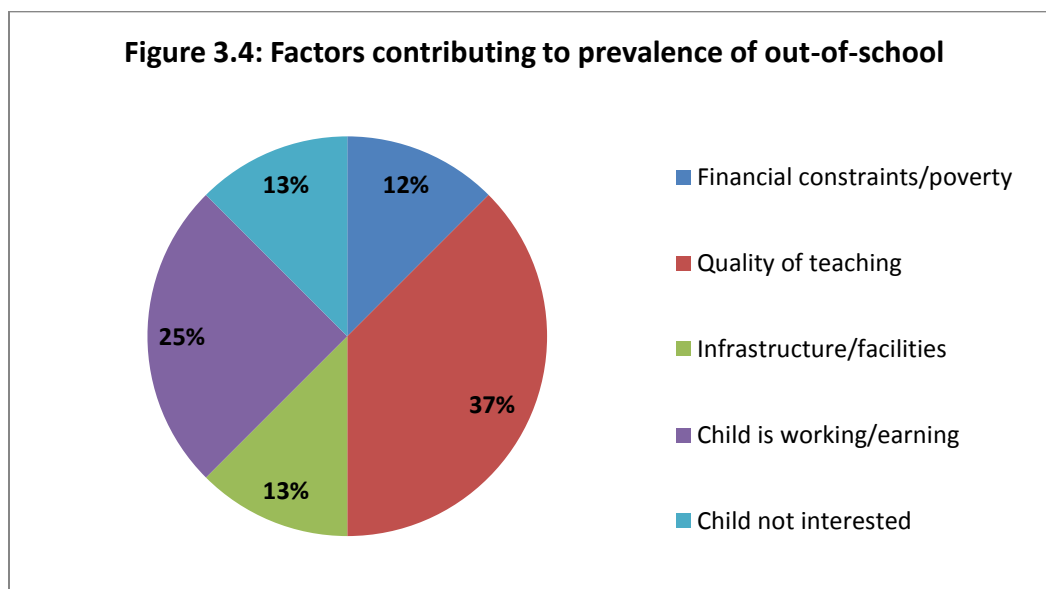
3.2.8 Educational Status & Access to Educational Facilities

All the study habitations have primary schools but majority of the schools are lacking basic facilities such as class rooms, benches, chairs, book racks, toilets, drinking water, play ground etc. Since most habitations are relatively small, the local primary school in those locations offers education only up to 5th standard. Most of the villages have no private schools in the village. But the private schools and colleges are available in Damarcharla and Miryalaguda.

All the households reported that they have school in or near their village. Out of the total 403 households it was reported that 140 households (34.73%) avail school facilities. Among the households who do not avail the school facilities, 69.34% (181) of the households reported that they do not have school-going children. 4.9% (13) said that their children go to a higher grade school in other location or village. 12.64% (33) send their children to better school in other village. Rest of the households of the study 65.24%(263) said that they are not availing facilities due to lack of quality of teaching and lack of basic facilities in the school. Damarcharla and Miryalaguda town has several colleges and other higher and technical educational institutions (such as ITI and Engineering colleges) under government and private managements. All the surveyed households reported that there are such institutions within approachable distance.

94.28% of the households reported to be availing the services of the above institutions. Rest of the households that are not accessing the facilities reported that there were no members in the households pursuing higher education. The rest attributed their inability to access educational infrastructure due to the following factors (in the descending order of importance): no college going children, education is too expensive; and inaccessibility due to infrastructure and transport constraints.

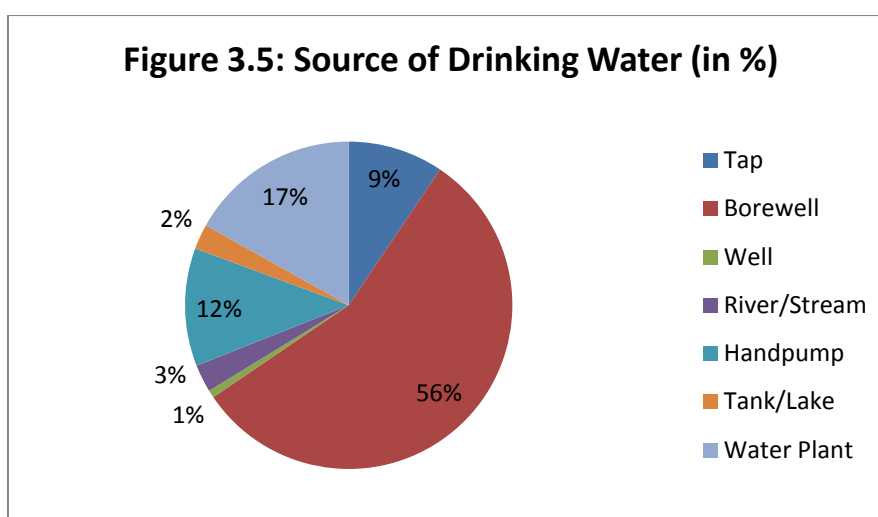
In contrast to the official statistics, which claim that there are no child workers in the surveyed villages, this study found that there are cases of child labour in some of the study locations. To a question whether there are out-of-school children (aged between 5-15 years) in the household, 3.72% of the households responded affirmatively. When asked about the reasons for having out-of-school children, it was stated that the child is not interested and go for work, lack of quality teaching facilities and financial constraints.



Tenth class is a critical phase of education for most households. Therefore this study asked whether the household had member (s) who dropped out after passing 10th standard. 27.05% of the households responded affirmatively to the question. The survey also tried to find out the most difficult education-related problem or issue that the household is confronted with. This is needed to plan CSR initiatives in education sector.

3.2.9 Access to Water and Sanitation Services

Drinking water is critical to a healthy life. Therefore the source and the quality of drinking water assume great significance. As the figure 3.5 illustrates, bore wells installed by the Gram Panchayat is the leading source of drinking water. In most of the villages the bore well water is supplied through 5000 ltrs water tanks. 9.43% of the households have access to tap water. A 56.08% of the households depend on bore well, 0.74% on well, 2.73% on river and stream, 11.66% on hand pump, 2.48% on tank or lake and 16.87% on mineral water cans..



The pattern shows that the people of the area mostly depend on bore water. The quality of the water in general is not good except one or two villages. It was reported in most of the villages the ground water is not good. Fluoride content is high in the water therefore the water is not suitable for drinking purposes. 89.33% of the households fetch drinking water from outside their house premises. In other words, remaining 10.67% of the households have a drinking water source within their house premises.

Distance of drinking water source also matters as it has a variety of social, health and economic implications. The findings of the survey in this regard are as follows (with their respective percentages): A few metres away (11.11%); about 250 m away (61.94%); about half a km away (12.22%) and about 1 km and beyond 1 km reported (9.72%) and (5.00%) respectively. The results show that the vast majority of the households fetch drinking water by walking to the nearest common source such as Tap, Bore well and Hand pump.

As far as the quality of drinking water is concerned, 63.28% of them said that the water is fit for drinking. With regard to general quality of water 54.09% said it is sweet and tasty, 28.54% said it is salty and 17.37 said it is treated and chlorinated. A 37.72% of the households said that they incur expenses accessing drinking water; this was found in villages where people either buy drinking water or pay the person who transports water from a better source away from the village.

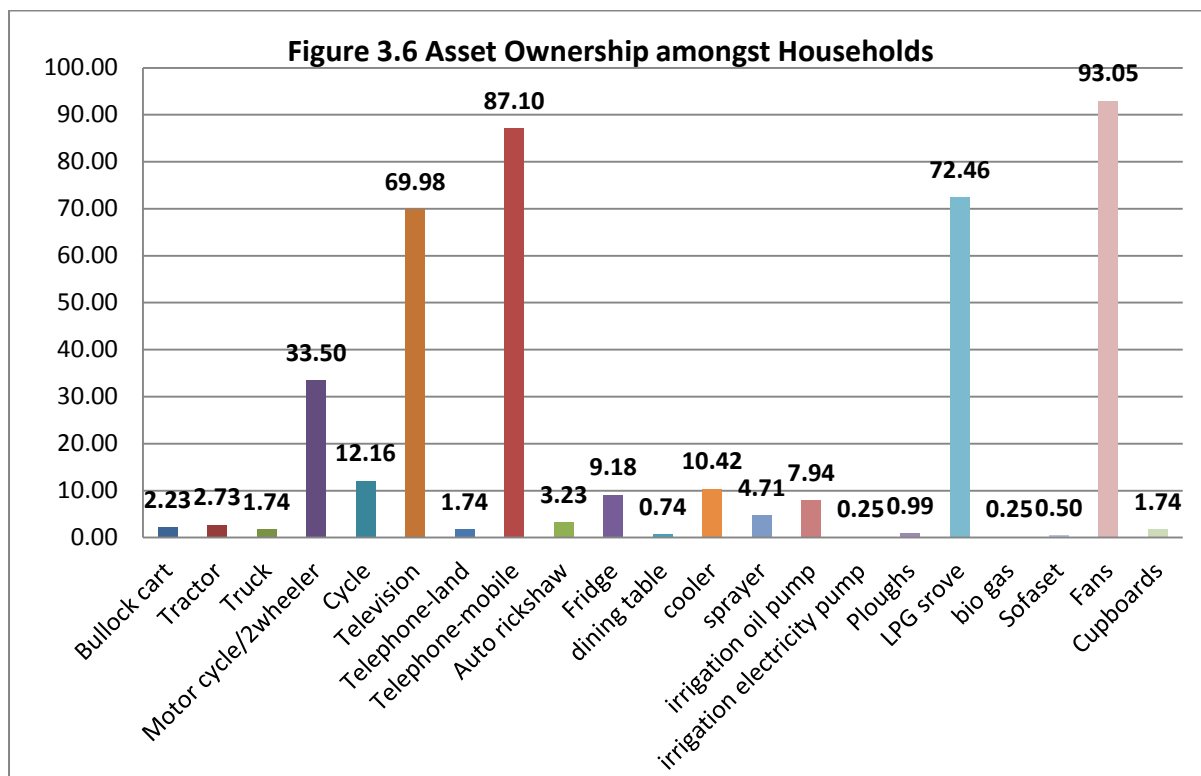
The survey results with regard to the sources of water for household purposes such as cleaning and washing presents a similar picture with the bore well (68.98%), tap (11.66%) and hand pump (12.16%) emerging as the leading sources. Other sources include well (0.99%) and river / stream (2.73%), Tank and lake (2.73%). Almost 85.85% of the households fetch water for these purposes from outside their house premises. Regarding the distance, the findings are as follows (with their respective percentages): A few metres away (24.81%); about 250 m (58.56%); about half a km (10.67%) and about one km (4.71%) and beyond 1km (1.24%).

About 19.11% of the households have toilets within their house premises. But 80.89 % of the respondent households reported that they go for open defecation as they are habituated to it. None of the households have access to common toilet. 83.62% of the households reported that their houses have not connected to drainage system as there is no drainages. 66.75% of the families reported availability of street lighting near their homes 97.02% of the households have electricity connection in their houses. Most of the households (97.02%) conveyed that they have no access to a common meeting place or community hall. In terms LPG (59.55%) and firewood (40.45%).

3.2.10 Household Assets & Livestock

The survey collected data on household assets to ascertain the quality of living of the people of the study area. Leading assets include (with respective percentages of households reporting ownership): Bullock Cart (2.23%), Tractor (2.73%), Truck(1.74%), Motor Cycle/2 wheeler (33.35%), Cycle (12.16%), Television (69.98%), Telephone – landline (1.74%), Telephone – mobile (87.10%), Autorickshaw (3.23%), Fridge (9.18%), Dining table (0.74%), Cooler (10.42%), Sprayer (4.71%), Irrigation pump – oil (7.94%), Irrigation pump – Electric (0.25%), Ploughs (0.99%), LPG stove (72.46%), Bio-gas (0.25%). Sofa set (0.50%), Fans (93.05%), and Cupboards (1.74%). The following figure 3.6 illustrates the ownership profile.

Livestock keeping is an integral part of the survey area's mixed farming system that combines cultivation and livestock rearing. In an agricultural economy such as the study area livestock is either the main or supplementary source of livelihood for the local population. The survey results in this respect show that cows, bullocks, buffalos, goats, sheep, pigs and poultry are the species kept by the local people. Keeping buffalos, poultry is relatively more widespread with almost one third of the households owning them. Other types of livestock such as cows, bullocks and pigs are owned by a relatively small proportion of households.



Cows, bullocks, buffalos, goats, sheep and poultry are kept by 12.40%, 11.20%, 36.0%, 5.0%, 2.2%, and 14.9% of the area's households respectively. Bullocks are used for draught purposes while cows are mostly kept as dairy animals. Overall, more than half of the study households keep either one or more of the above mentioned types of animals. The number of livestock reared ranges from: cows (1-6), bullocks (1-3), buffalos (1-6), goats (1-80), sheep (1-120) and backyard poultry (1-50)

Chapter 4 – Corporate Social Responsibility (CSR) Plan

4.1 NEED BASED COMMUNITY DEVELOPMENT INITIATIVE

On the basis of participatory community consultations, focus group discussions, key informant interviews, a baseline socio-economic survey and the relevant secondary data on the socio-economic and human development status of villages around the power plant, this study prepared a comprehensive CSR plan. In order to improve the socio-economic status and human development indicators of the local population, an interrelated and mutually reinforcing set of initiatives are proposed as part of Corporate Social Responsibility plan of the Yadadri Thermal Power Station (YTPS).

At the outset, this chapter lays out the broad CSR policy of the YTPS, followed by a brief review of the CSR initiatives that the YTPS would like to implement for the next 10 year or so. The subsequent sections contain detailed CSR interventions that have been planned for the local communities and their initial and recurring allocations.

4.2 CSR INITIATIVES

The YTPS has demonstrated its commitment to Corporate Social Responsibility by effectively implementing a wide range of CSR initiatives in a transparent and participatory manner. The company's CSR activities are firmly anchored in socio-economic development of the surrounding villages.

4.2.1 CSR Objectives of YTPS & Core Areas of Intervention

On the basis of the CSR policy, the company has formulated a set of objectives and identified core areas of intervention for an impact-oriented implementation of CSR policy; the objectives and the core areas are as follows:

1. To improve the economic, health and social status of men and women where the operations of the company take place.

Core Sectors of Corporate Social Responsibility

1. Education and capacity building
2. Health and family welfare
3. Sustainable development
4. Infrastructure development
5. Rehabilitation of Physically challenged people among land losers.

YTPS will contribute the following socio-economic development of surrounding villages due to existing units:

1. Conducting Medical camps and awareness camps on adult education
2. Distribution of plants
3. Infrastructure development (Construction of Community buildings & Bridges)
4. Education to the students of surrounding villages
5. Bus facility to the students of surrounding villages who will be studying in YTPS schools
6. Payment of better wages leading to improvement of living conditions

Apart from the above activities, YTPS will also be involved other development activities such as:

1. Providing drinking water facility
2. Water source for agriculture lands from decanted Ash Pond
3. Health camps and distribution of Homeo medicines
4. Cooking gas supply through YTPS Co-operative stores
5. Providing accommodation for Public utilities

4.3 THE CORPORATE SOCIAL RESPONSIBILITY PLAN

The following CSR plan has been prepared by adhering to a scientific and participatory methodology as outlined above. The sector-wise CSR activities proposed in villages falling within a radius of 10 km of the yTPS include:

1. Drinking Water

- a. Construction of new or additional overhead water tanks in habitations where these are needed;
- b. Providing PVC pipe line from bore wells to over head tanks in the required villages;
- c. Ensuring safe drinking water to the people of villages by providing RO plants wherever required.

2. Education

- a. Provision of furniture, computers, sports kits, books for libraries and development of play grounds in the schools wherever there is requirement;
- b. Provision of additional infrastructural facilities such as boundary walls for the schools in the villages wherever required;
- c. Provision of assistance for providing drinking water facility and maintenance of toilets in the schools;
- d. Provision of new buildings for schools and Anganwadi centres in the required villages;
- e. Provision of bore well in the schools wherever required

3. Health

- a. Conducting health camps once in every 6 months and distribution of free medicines for major ailments;
- b. Addressing local health related issues through awareness campaigns in the villages;
- c. Construction of buildings for Veterinary hospitals wherever there is a need;
- d. Construction of buildings for PHC/Sub-centre where required.

4. Sanitation

- a. Provision of individual toilets in a phased manner;
- b. Construction of roadside drainage system in the villages wherever there is a requirement;
- c. Construction of toilets in Anganwadi centres wherever required

5. Electrification

- a. Provision of street lights in the required habitations with solar mechanism;

6. Infrastructure

- a. Paving of internal roads in the villages wherever required;
- b. Construction of all-weather approach roads to villages where these are required;
- c. Resurfacing of WBM road wherever applicable in the villages;
- d. Laying of BT roads wherever required;
- e. Culvert development wherever applicable;
- f. Fencing and bore well for burial ground wherever required;
- g. Provision of dust bins wherever required

7. Livelihood Enhancement

- a. Training in vocational or job-oriented activities, particularly for youth, in collaboration with the existing institutions such as ITIs and junior colleges. The trades in which training can be imparted would include, but not limited to: tailoring/embroidery, dairy, desk top publishing and basic IT skills, digital photography, vehicle servicing, electrician, diesel mechanic, fitter, masonry, para-medical services, mobile phone servicing and interior design/decoration;
- b. Assistance and facilitation in setting up and managing income-generating activities to vulnerable groups.

8. Rehabilitation of Physically Challenged People

- a. Rehabilitation of the families of the Physically Challenged people who lost their lands for the project.

The above activities are indicative reflecting the needs and priorities of the local communities. These core activities will be upgraded and further prioritized from time to time to better reflect the needs and aspirations of the local people.

4.5 DETAILS OF PROPOSED CSR INITIATIVES & BUDGET

Based on the present BSR rates of Telangana State the cost estimations were prepared and for some activities lump sum provisions are made for the CSR activities proposed in selected villages around YTPS. To ensure that a detailed budget can be developed, attempt is made to derive at a unit cost for each activity. The **Table 4.2** below provides the details of unit costs.

Table 4.2 Item wise estimation for implementing the CSR activities			
Catego ry no.	Activities	Unit	Cost in Rs.
1	Construction of drains	100 m	85000
2	Construction of CC Roads with a width of 4.0M	1000 m	5500000
3	Providing over Head Tank with 5 HP motor	60000 ltr capacity	2500000
4	Laying of BT road	1 km	1500000
5	Laying Drinking Water supply pipelines (100 mm dia PVC pipe)	1 km	300000
6	Providing Solar Street lights	1 No.	30000
7	Providing Mineral water plant (RO Plant) for safe drinking water The location for setting up of RO plant will be decided by the local Panchayat/Municipality and operation costs of the plant will be borne by Panchayat/Municipality. Only annual equipment maintenance will be provided by TSGENCO	1 No.	1000000
8	Development of green belt (including cost of plant, labour charges, tree guard etc.) - Capital expenditure Rs. 1500/- per 1 sapling for initial plantation and one year maintenance @ Rs. 500/- per 1 sapling	1 sapling	2000
9	Conducting of Training programme for youth and employment opportunities (for one year)/Income Generating Activities trainings for women	Training cost per person	28000
10	Providing Individual Toilets	1 No.	25000
11	Providing furniture, computers, Lab equipment, sports kits, books for libraries and development of play ground	Lump Sum/Per school	500000
12	Boundary wall for schools	1 Rm	2500
13	Providing maintenance cost of toilets in schools and replacement of sanitary fittings and salary of cleaner per annum	Lump sum/ school	180000
14	Development of school buildings and construction of additional class rooms for schools in 5 villages	Lumpsum/ 5 villages	4000000
15	Construction of building for Anganwadi centre (15'X15')	1 No.	500000
16	Provision of bore well in schools	1 No	70000
17	Rehabilitation of physically challenged persons, widows and senior citizens	Lumpsum	2183066
18	Conducting awareness campaigns against sexually transmitted diseases	Lumpsum	20000
19	Conducting health camps once in 6 months	Lumpsum	100000
20	Assistance to vulnerable groups	Lumpsum/Unit	50000
21	Community Halls	Lumpsum /1No	800000
22	Hand pumps	Lumpsum /1No	20000

The following **Table 4.4** provides the details of number of works under each activity and the total budget under each activity have been calculated based on the unit rate given above.

4.6 INTERNAL MONITORING MECHANISM

A Station Level Committee would be constituted to review the progress of CSR initiatives once in every six months. In addition, annual evaluation and social audits of CSR activities would be carried out by an independent agency of high repute.

TABLE 4.4 : GP/VILLAGE WISE CONSOLIDATED CSR BUDGET						
Sl. No.	Village Name	Distance from Plant	Total Population	No of Households	No of Unemployed youth	Estimated Budget (Rs)
1	Damaracharla Rajagattu, Veerabhadrapuram	7km	15117	4267	1120	72335000
2	Veerlapalem Sath Thanda, Dubba Thanda	3km	5186	1218	460	75302550
3	Talla Verrappagudem	2 km	2526	721	250	54780000
4	Irkigudem	4km	1760	557	150	29648000
5	Adavidevulapalli, Vadderagudem	8km	8226	2146	800	131750000
6	Mudimanikyam	7km	1879	535		66762500
7	Narsapuram	5km	1763	602	700	52100000
8	Thimmapuram Putlagadda, Padamata Thanda, Thurpu Thanda	6.5km	2286	608	350	45422500
9	Kallepalli, Shantinagar)	5km	2942	722	250	45565000
10	Bothalapalem	8km	1888	482	200	41550000
11	Ulsaipalem, Bangarugadda, Kalava Katta, Indira Nagar, Gandhi Nagar	8km	1986	592	350	42775000
12	Vadapalli	8km	6952	2112	500	55050000
13	Dilawarpur	10km	2232	816	185	32230000
14	Kondrapolu, Rallavagu Thanda	9km	2672	550	250	41450000
15	Gandhinagar	6km	679	179	100	24750000
16	Appallamma Gudem, Lokia Thanda, Sitya Thanda	9km	1626	352	500	40300000
17	Donka Thanda, Badaigadda	8km	1750	522	150	41820000
18	Ragadapa Kunkudichettu Thanda, Pedda Thanda, Meetia Thanda	9km	1695	386	300	34130000
19	KG Reddy colony	9km	1763	458	150	27050000
Total						1004000550

A total of Rs. 100.40 Crores which is approximately 0.4% of the total cost of the project has been allocated..

4.7 CONSOLIDATED ACTIVITY WISE CSR BUDGET

Following Table 4.5 presents the activity wise CSR budget allocation:

Sl. No.	Table 4.5 CSR Activity Wise Budget for YTPS	
A	DRINKING WATER	
1	Construction of OH tanks with 5 HP submersible pumps	40000000
2	Providing safe drinking water through RO Plants	28100000
3	Drinking water supply pipe lines : 100 mm dia PVC Pipe @ Rs. 3 lakh per 1 Km (4")	6900000
	TOTAL OF A	75000000
B	SANITATION	
4	Providing Individual Toilets in a Phased manner in all the villages	110900000
	TOTAL OF B	110900000
C	EDUCATION	
5	Providing furniture, computers, sports kits, books for library and development of play ground,	3500000
6	Boundary wall for schools and Anganwadi centres	175000
7	Construction of building for School	3000000
8	Construction of toilets in Anganwadi Centre / Schools	25000
9	Construction of building for Anganwadi centre	4950000
	TOTAL OF C	11650000
D	HEALTH CARE	
10	Conducting Health Camps once in 6 months at Gram Panchayat Office /Ward of each village	3250000
11	Awareness campaigns on Sexually Transmitted Diseases such as HIV/AIDS, water borne diseases, Sanitation and hygiene etc.	
12	Construction of Veterinary hospitals	4500000
	TOTAL OF D	7750000
E	INFRASTRUCTURE DEVELOPMENT	
13	Construction of side drains	62050000
14	Solar Street lights	16980000
15	Construction of CC Roads with a width of 4.0M	422400000
16	Provision of hand pumps	80000
17	Construction of community hall	20000000
18	Construction of Library Building	4500000
19	BT Road	17250000
20	Bus shelter	600000
21	Burial ground	1500000
22	Gravel road	5000000
23	Construction of Gram Panchayat Building	500000
24	Construction of bridge	2000000
	TOTAL OF E	552860000

Sl. No.	Table 4.5 CSR Activity Wise Budget for YTPS	
F	LIVELIHOOD ENHANCEMENT AND YOUTH EMPOWERMENT	
25	Training to the identified people in the surrounding villages through industry Dept. (or) State Govt. Depts. in the ITI's for trades such as electrician, welders, fitters, drafts men, fly ash based products like bricks, sheets etc	228367550
	TOTAL OF F	228367550
G	ENVIRONMENT AND GREEN BELT DEVELOPMENT	
26	Plantation proposed in vacant lands/Government lands and Capital expenditure Rs. 1500/- per 1 sapling for initial plantation including tree guards and one year maintenance @ Rs. 500/- per 1 sapling.	13373000
	TOTAL OF G	13373000
H	ASSISTANCE TO VULNERABLE GROUPS	
27	Assistance to Anganvadi, Self Help Groups, Women empowerment, SC & STs	3000000
	TOTAL OF H	3000000
I	REHABILITATION OF PHYSICALLY CHALLENGED	
28	Rehabilitation of physically challenged persons, widows and Senior citizens belonging to land loser households	1100000
	TOTAL OF I	1100000
	Total (A+B+C+D+E+F+G+H+J+I)	1004000550

ANNEX 1 – STUDY PHOTOGRAPHS

DISCUSSIONS WITH THE OFFICIALS



Discussions with Mr Ajay, CE



Discussions with Mrs. Arudra, SE



Discussions with Mr Ramakrishna Reddy, EE



Discussions with MRO, Damercherla



Consultations at Adavi Devula Palli Villlage with GP Vice President



Discussions with Serpanch and MPTC of TV Gudem

EXISTING CONDITIONS OF INFRASTRUCTURE IN THE VILLAGE	
	
Dried Well in one of the villages	Unpaved and kutchha road
	
Un-hygenic MPP School	Source of Transportation
	
Water Scarcity	Un hygienic existing water tank

CONSULTATIONS AND DISCUSSIONS IN THE VILLAGES



SOME OF THE EXISTING INFRASTRUCTURE FACILITIES IN THE STUDY AREA



PHOTOGRAPHS OF SOCIO ECONOMIC SURVEY IN PROGRESS



ANNEX 2 –HOUSE HOLD QUESTIONNAIRE

SOCIO-ECONOMIC STUDY: HOUSEHOLD QUESTIONNAIRE

To be administered to the sample households

I. BACKGROUND

1.1	Name of the respondent	
1.2	Name of the habitation/hamlet (if applicable)	
1.3	Distance from the power plant (kms)	
1.4	Name of the village	
1.5	Name of the Gram Panchayat	
1.6	Name of the <i>Mandal</i>	
1.7	Name of caste or tribe (see codes)	
1.8	Caste category	1. ST; 2. SC ; 3. BC; 4. General or OC
1.9	Religion	1. Hindu 2. Muslim 3.Christian 4. Sikh
1.10	Family structure	1. Joint family 2. Nuclear family
1.11	Do you have own house?	1. Yes 2.No (if No go to Q.1.13)
1.12	Type of house	1. Pucca 2. Semi-pucca 3.Kutchra
1.13	Are you a beneficiary of government housing scheme?	1. Yes 2. No
1.14	Do you or your family have any form of insurance?	1. Life insurance 2. Health insurance 3. Crop insurance 4. Asset insurance 5. Other (specify)..... 6.No insurance
1.15	Is the household headed by a woman?	1. Yes 2.No (if No go to Q.1.18)
1.16	Age of the woman (if yes)	Age :
1.17	Work status of the woman	1. Working 2.Not working
1.18	Do your household receive rent and other payment for rented/leased or sharecropped property or land?	1. Not receiving 2. Receiving –(amount per year): Rs. _____
1.19	Do your household receive remittances?	1. Not receiving 2. Receiving –(amount per year): Rs. _____
1.20	Which type of benefit do you receive from PDS? (Type of ration card)	1. White card (BPL) 2. Pink card (APL) 3. Anthyodaya 4. Annapurna. 5. No Ration Card 6. Others (Specify): _____
1.21	Most important source of income for the household (in terms of income)	
1.22	Do you own farm land?	1. Yes 2.No

2. LAND DETAILS (in acres)

Land Type	Own	Major Source of Irrigation (Codes*)	Leased		Sharecropped		Total Operated land
			In	Out	In	Out	
2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8
Irrigated							
Unirrigated Or rainfed							
Fallow							
Total							

* **Codes:** 1. Bore well 2. Dug well 3. Tank/Lake 4. Lift irrigation 5. Stream/canal 6. Other (specify)

3. HOUSEHOLD PROFILE (Start with head of the household)

1.1.	Name of the member	Relati on to HH Head	Se x (1 M 2 F)	Ag e (Y rs)	Ma rita l sta tus	Ed uca tio n	He alth	If han dic app ed	Occupation		Annual income		Migration for Livelihood purposes	
									Prim ary	Sec ond ary	Pri mar y	Sec on dar y	Ty pe	Desti natio n
	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	3.10	3.11	3.12	3.13	3.14	3.15
1		Head												
2														
3														
4														
5														
6														
7														
8														
9														
10														
11														
12														

4. HEALTH STATUS OF THE HOUSEHOLD

4.1	What are the common ailments that usually affect your family?	1. 2. 3.
4.2	Number of members affected	
4.3	Which doctor/hospital do you normally go to?	1. Local PMP 2. Local PHC 3. Town/Area hospital (govt) 4. Nearest pvt hospital 5. Dist hospital (govt). 6. Dist hospital (pvt). 7. Other (specify).
4.4	Average expenses per visit for ailments	Rs.
4.5	What are the chronic conditions that your family suffer from?	1. 2. 3.
4.6	Number of members affected	
4.7	Which doctor/hospital do you normally go to?	1. Local PMP 2. Local PHC 3. Town/Area hospital (govt) 4. Nearest pvt hospital 5. Dist hospital (govt). 6. Dist hospital (pvt). 7. Other (specify).
4.8	Average expenses per visit – emergency/chronic conditions	Rs.
4.9	Are free check-up camps or mobile health service conducted in your village?	1. Yes 2. No (if No go to Q. 4.12)
4.10	Frequency of such camps (if yes)	1. Once a week 2. Once a month 3. Once in 3 months 4. Once in 6 months 5 Once a year.
4.11	Do you visit such camps or use services?	1. Yes 2. No
4.12	What is the most difficult health problem/issue does your household have?	

5. EDUCATIONAL FACILITIES & ACCESS

5.1	Do you have school in or near your village?	1. Yes 2. No (if No go to Q. 5.6)
5.2	Type of school	1. Govt 2. Private 3. Both
5.3	If Yes, how many schools?	1. Govt 2. Private
5.4	Do you avail these facilities?	1. Yes 2. No
5.5	If no, give reasons (multiple responses possible)	1. Quality of teaching. 2. Infrastructure/facilities. 3. Too far 4. Too expensive. 5. No school-going children. 6. Children go to a higher grade school in other village/location. 7. Children go to a better school in other village/location. 8. Other (specify)
5.6	Do you have colleges, ITIs & other professional educational institutions nearby?	1. Yes 2. No (if No go to Q. 5.11)
5.7	Type of such institutions	1. Govt 2. Private 3. Both
5.8	If Yes, how many such institutions?	1. Govt 2. Private
5.9	Do you avail these facilities?	1. Yes 2. No
5.10	If no, give reasons (multiple responses possible)	1. Quality of teaching. 2. Infrastructure/facilities. 3. Too far 4. Too expensive. 5. No college-going children. 6. Other (specify)
5.11	Do you have out-of-school children in the family (5-15 years)	1. Yes 2. No (if No go to Q. 5.13)
5.12	Reasons, if yes (multiple responses possible)	1. Financial constraints/poverty 2. Quality of teaching 3. Infrastructure/facilities 4. Child is working/earning 5. Child takes care of other family members 6. Too far 7. Child not interested 8. Other (specify) 9. Other (specify)
5.13	Are there any members who dropped out after passing 10 th class?	1. No 2. Yes
5.14	What is the most difficult educational problem/issue does your household have?	

6. WATER, SANITATION & ENERGY RELATED QUESTIONS

6.1	Source of drinking water	1. Tap 2. Borewell 3. Well. 4. River/stream 5. Common facility or reservoir 6. Handpump 7. Tank/lake 8. Other (specify)
6.2	Location of source	1. Within house premises 2. Outside house premises
6.3	Distance of source (if outside)	1. A few minutes away 2. About 250 meters 3. About a half a km 4. About one km. 5 Beyond 1 km
6.4	Is the water fit for drinking?	1. Yes 2. No
6.5	General quality of water	1. Good/sweet 2. Salty 3. Treated/chlorinated 4. Other
6.6	Do you incur any expenses to get drinking water?	1. Yes 2. No
6.7	Source of water for cleaning/washing	1. Tap 2. Borewell 3. Well. 4. River/stream 5. Common facility or reservoir 6. Handpump 7. Tank/lake 8. Other (specify)
6.8	Location of source	1. Within house premises 2. Outside house premises
6.9	Distance of source (if outside)	1. A few minutes away 2. About 250 meters 3. About a half a km 4. About one km. 5 Beyond 1 km
6.10	Are there toilets in your house	1. Yes 2. No
6.11	Is your house connected to drainage system	1. Yes 2. No
6.12	Electricity connection	1. Yes 2. No
6.13	Piped water supply	1. Yes 2. No
6.14	Access to common toilet facility	1. Yes 2. No
6.15	Open defecation	1. Yes 2. No
6.16	Streetlighting near your house	1. Yes 2. No
6.17	Access to community hall	1. Yes 2. No
6.18	Main Cooking fuel	1. Firewood 2. LPG 3. Dung cakes 4. Farm residue. 5. Kerosene 6. Other

7. HOUSEHOLD CROPPING PATTERN (current year; area in acres)

	Crop name	Extent in Kharif	Extent in Rabi
7.1	Cotton		
7.2	Paddy		
7.3	Jowar (sorghum)		
7.4	Pigeon pea		
7.5	Maize		
7.6	Vegetables		
7.7	Groundnut		
7.8	Chick pea		
7.9	Greengram		
7.10	Other (specify)		
7.11	Other (specify)		

8. HOUSEHOLD ASSETS

	Asset	Number		Asset	Number
8.1	Bullock Cart		8.14	Sprayer	
8.2	Tractor		8.15	Irrigation pump (oil)	
8.3	Truck		8.16	Irrigation pump (electricity)	
8.4	Jeep		8.17	Thresher	
8.5	Motor Cycle/2 wheeler		8.18	Harvester	
8.6	Cycle		8.19	Ploughs	
8.7	Television		8.20	LPG stove	
8.8	Telephone - land		8.21	Biogas unit	
8.9	Telephone - mobile		8.22	Sofa set	
8.10	Autorickshaw		8.23	Fans	
8.11	Fridge		8.24	Cupboards	
8.12	Dining table		8.25	Cycle rickshaw	
8.13	Cooler		8.26		

9. HOUSEHOLD LIVESTOCK OWNERSHIP

	Species	Number
9.1	Cows	
9.2	Bullocks	
9.3	Buffalos	
9.4	Goats	
9.5	Sheep	
9.6	Poultry	
9.7	Pigs	
9.8	Others	

Name of Investigator_____ Coordinator's Signature_____

(Write name after thoroughly checking questionnaire)

Date:

Date:

CODES FOR HH PROFILE TABLE

Relationship with household head

1. Head	2. Spouse of head	3. Child
4. Spouse of married child	5. Grandchild	6. Father/Mother/Father-in-law/Mother-in-law
7. Brother/Sister/Brother-in-law/Sister-in-law/Other relatives	8. Servants/ Employees/ Other non-relatives	9. Other (specify)

Marital Status

1. Married	2. Unmarried	3. Divorced
4. Separated	5. Widow	6. Widower

Education

1. Illiterate	2. Literate but no formal education	3. Primary (up to 5th)
4. Middle (Below 10th)	5. Secondary (10th Pass)	6. Intermediate
7. Graduate	8. Post Graduate	9. Technical
10. Professional(Doctors/ Engineers/ Lawyers		11. Other (specify)

Health

1. Handicap by birth	2. Handicapped later	3.Chronic illness
4. Suffers from ailment(s)	5.Healthy/no illness	

If Handicapped

1. Visual handicap	2. Speech handicap	3. Hearing handicap
4. Orthopedic (physical) handicap	5. Mental disability	6. Other (specify)

Occupation

1. Cultivation/cropping	2. Farm wage labourer	3. Non-Farm wage labourer
4. HH or cottage industry	5. Traditional or Artisanal activity (Specify)	6. Govt.Service
7. Pvt.service	8. Shopkeeper	9. Professional
10. Trade /Commerce	11. Driver/transport	12. Housemaid
13. Petty business/shop	14. Priest	15. Street Hawking
16. Too old to work	17. Housewife	18.Student
19. Un-employed	20. Retired	21. Not Applicable
22. NTFP collection	23. Others(Specify)	

Migration Type

1. Seasonal	2. Permanent	

Migration Destination

1 Within district	2. Outside district	3. Outside State
4. Outside country (abroad).		

Diseases

1. Malaria	2. Cold / Cough	3. Chikungunya	4. Filaria	5. Dengue Fever	6. Fever		
7.Tuberculosis	8. Typhoid	9. Polio	10. Diarrhea	11. Jaundice	12. Hydrocele	13. Allergy	14. Back pain
15. Body pains	16. Hypertension	17. Head ache	18. Joint/leg/Knee pains	19. Stomach ache			
20. Heart Disease	21. Cancer	22. Stroke	23. Diabetes	24. Arthritis	25. Obesity	26. HIV/AIDS	
27. Asthama	28. Skin disease	29. Florosis	30. Paralysis	31. Anemia	32. Epilepsy (fits)		
33. Eye/visual/sight problems	34. Nervous weakness	35. Blindness	36. Leprosy	37. Handicapped			
38. Others							

ANNEX 3 –TERMS OF REFERENCE

No.J-13012/18/2015-IA.I (T)s
Government of India
Minister of Environment, Forest and Climate Change
Impact Assessment Division

Indira Paryavaran Bhavan,
Vayu Wing, 3rd Floor, Aliganj,
Jor Bagh Road, New Delhi-110003
02 Nov 2015

To,

M/s TELANGANA STATE POWER GENERATION CORPORATION LIMITED
VIDYUT SOUDHA, KHAIRATABADHYDERABAD,
Hyderabad-500082
Telangana

Tel.No.040-23499417; Email:cecthermal2@yahoo.com

Sir/Madam,

This has reference to the proposal submitted in the Ministry of Environment, Forest and Climate Change to prescribe the Terms of Reference (TOR) for undertaking detailed EIA study for the purpose of obtaining Environmental Clearance in accordance with the provisions of the EIA Notification, 2006. For this purpose, the proponent had submitted online information in the prescribed format (Form-1) along with a Pre-feasibility Report. The details of the proposal are given below:

1. Proposal No.:	IA/TG/THE/31153/2015
2. Name of the Proposal:	5 X 800 MW YADADRI THERMAL POWER STATION
3. Category of the Proposal:	Thermal Projects
4. Project/Activity applied for:	1(d) Thermal Power Plants
5. Date of submission for TOR:	19 Sep 2015

In this regard, under the provisions of the EIA Notification 2006 as amended, the Standard TOR for the purpose of preparing environment impact assessment report and environment management plan for obtaining prior environment clearance is prescribed with public consultation as follows:

STANDARD TERMS OF REFERENCE (TOR) FOR EIA/EMP REPORT FOR PROJECTS/ACTIVITIES REQUIRING ENVIRONMENT CLEARANCE

1(d):STANDARD TERMS OF REFERENCE FOR CONDUCTING ENVIRONMENT IMPACT ASSESSMENT STUDY FOR THERMAL POWER PLANTS PROJECTS AND INFORMATION TO BE INCLUDED IN EIA/EMP REPORT

- 1) The proposed project shall be given a unique name in consonance with the name submitted to other Government Departments etc. for its better identification and reference.
- 2) Vision document specifying prospective long term plan of the project shall be formulated and submitted.
- 3) Latest compliance report duly certified by the Regional Office of MoEF for the conditions stipulated in the environmental and CRZ clearances of the previous phase(s) for the expansion projects shall be submitted.
- 4) The project proponent needs to identify minimum three potential sites based on environmental, ecological and economic considerations, and choose one appropriate site having minimum impacts on ecology and environment. A detailed comparison of the sites in this regard shall be submitted.
- 5) Executive summary of the project indicating relevant details along with recent photographs of the proposed site (s) shall be provided. Response to the issues raised during Public Hearing and the written representations (if any), along with a time bound Action Plan and budgetary allocations to address the same, shall be provided in a tabular form, against each action proposed.
- 6) Harnessing solar power within the premises of the plant particularly on available roof tops and other available areas shall be formulated and for expansion projects, status of implementation shall also be submitted.
- 7) The geographical coordinates (WGS 84) of the proposed site (plant boundary), including location of ash pond along with topo sheet (1:50,000 scale) and IRS satellite map of the area, shall be submitted. Elevation of plant site and ash pond with respect to HFL of water body/Kallakur River and high tide level from the sea shall be specified, if the site is located in proximity to them.
- 8) Layout plan indicating break-up of plant area, ash pond, green belt, infrastructure, roads etc. shall be provided.
- 9) Land requirement for the project shall be optimized and in any case not more than what has been specified by CEA from time to time. Item wise break up of land requirement shall be provided.
- 10) Present land use (including land classification) as per the revenue records and State Govt. records of the proposed site shall be furnished. Information on land to be acquired including coal transportation system, laying of pipeline, ROW, transmission lines etc. shall be specifically submitted. Status of land acquisition and litigation, if any, should be provided.
- 11) If the project involves forest land, details of application, including date of application, area applied for, and application registration number, for diversion under PCA and its status should be provided along with copies of relevant documents.

STANDARD TERMS OF REFERENCE (TOR) FOR EIA/EMP REPORT FOR PROJECTS/ ACTIVITIES REQUIRING ENVIRONMENT CLEARANCE

- 12] The land acquisition and E&ER scheme with a time bound Action Plan should be formulated and addressed in the EIA report.
- 13] Satellite imagery and authenticated topo sheet indicating drainage, cropping pattern, water bodies (wetland, riversystem, stream, fallahs, ponds etc.), location of nearest habitations (villages), creeks, mangroves, rivers, reservoirs etc. in the study area shall be provided.
- 14] Location of any National Park, Sanctuary, Elephant/Tiger Reserve (existing as well as proposed), migratory routes / wildlife corridor, if any, within 10 km of the project site shall be specified and marked on the map duly authenticated by the Chief Wildlife Warden of the State or an officer authorized by him.
- 15] Topography of the study area supported by toposheet on 1:50,000 scale of Survey of India, along with a large scale map preferably of 1:25,000 scale and the specific information whether the site requires any filling shall be provided. In that case, details of filling, quantity of required fill material, its source, transportation etc. shall be submitted.
- 16] A detailed study on land use pattern in the study area shall be carried out including identification of common property resources (such as grazing and community land, water resources etc.) available and Action Plan for its protection and management shall be formulated. If acquisition of grazing land is involved, it shall be ensured that an equal area of grazing land be acquired and developed and detailed plan submitted.
- 17] A mineralogical map of the proposed site (including soil type) and information (if available) that the site is not located on potentially mineable mineral deposits shall be submitted.
- 18] Details of fly ash utilization plan as per the latest fly ash Utilization Notification of GOI along with firm agreements / MoU with contracting parties including other usages etc. shall be submitted. The plan shall also include disposal method / mechanism of bottom ash.
- 19] The water requirement shall be optimized (by adopting measures such as dry fly ash and dry bottom ash disposal system, air cooled condenser, concept of zero discharge) and in any case not more than that stipulated by C&A from time to time, to be submitted along with details of source of water and water balance diagram. Details of water balance calculated shall take into account reuse and re-circulation of effluents.
- 20] Water body/fallah (if any) passing across the site should not be disturbed as far as possible. In case any fallah / drain is proposed to be diverted, it shall be ensured that the diversion does not disturb the natural drainage pattern of the area. Details of proposed diversion shall be furnished duly approved by the concerned Department of the State.
- 21] It shall also be ensured that a minimum of 500m distance of plant boundary is kept from the HFL of river system / streams etc. and the boundary of site should also be located 500m away from railway track and National Highways.
- 22] Hydro-geological study of the area shall be carried out through an institute/ organization of repute to assess the impact on ground and surface water regimes. Specific mitigation measures shall be spelt out and time bound Action Plan for its implementation shall be submitted.

STANDARD TERMS OF REFERENCE (TOR) FOR EIA/EMP REPORT FOR PROJECTS/ACTIVITIES REQUIRING ENVIRONMENT CLEARANCE

- 23) Detailed Studies on the impacts of the ecology including fisheries of the River/Estuary/Sea due to the proposed withdrawal of water / discharge of treated wastewater into the River/Sea etc shall be carried out and submitted along with the EIA Report. In case of requirement of marine impact assessment study, the location of intake and outfall shall be clearly specified along with depth of water drawn and discharge into open sea.
- 24) Source of water and its sustainability even in lean season shall be provided along with details of ecological impacts arising out of withdrawal of water and taking into account inter-state shares (if any). Information on other competing sources downstream of the proposed project and commitment regarding availability of requisite quantity of water from the Competent Authority shall be provided along with letter / document stating firm allocation of water.
- 25) Detailed plan for rainwater harvesting and its proposed utilization in the plant shall be furnished.
- 26) Feasibility of near zero discharge concept shall be critically examined and its details submitted.
- 27) Optimization of Cycles of Concentration (COC) along with other water conservation measures in the project shall be specified.
- 28) Plan for recirculation of ash pond water and its implementation shall be submitted.
- 29) Detailed plan for conducting monitoring of water quality regularly with proper maintenance of records shall be formulated. Detail of methodology and identification of monitoring points (between the plant and drainage in the direction of flow of surface / ground water) shall be submitted. It shall be ensured that parameter to be monitored also include heavy metals. A provision for long-term monitoring of ground water table using Piezometer shall be incorporated in EIA, particularly from the study area.
- 30) Socio-economic study of the study area comprising of 10 km from the plant site shall be carried out through a reputed institute/agency which shall consist of detail assessment of the impact on livelihood of the local communities.
- 31) Action Plan for identification of local employable youth for training in skills, relevant to the project, for eventual employment in the project itself shall be formulated, and numbers specified during construction & operation phases of the Project.
- 32) If the area has tribal population it shall be ensured that the rights of tribals are well protected. The project proponent shall accordingly identify tribal issues under various provisions of the law of the land.
- 33) A detailed CSR plan along with activities wise break up of financial commitment shall be prepared. CSR component shall be identified considering need based assessment study and Public Hearing issues. Sustainable income generating measures which can help in upliftment of affected section of society, which is consistent with the traditional skills of the people shall be identified. Separate budget for community development activities and income generating programmes shall be specified.
- 34) While formulating CSR schemes it shall be ensured that an in-built monitoring mechanism for the schemes identified are in place and mechanism for conducting annual social audit from the nearest

STANDARD TERMS OF REFERENCE (TOR) FOR EA/EMP REPORT FOR PROJECTS/ACTIVITIES REQUIRING ENVIRONMENT CLEARANCE

- government institute of repute in the region shall be prepared. The project proponent shall also provide Action Plan for the status of implementation of the scheme from time to time and dovetail the same with any Govt. scheme(s). CSR details done in the past should be clearly spelt out in case of expansion projects.
- 35) R&R plan, as applicable, shall be formulated wherein mechanism for protecting the rights and livelihood of the people in the region, who are likely to be impacted, is taken into consideration. R&R plan shall be formulated after a detailed census of population based on socio economic surveys who were dependant on land falling in the project, as well as, population who were dependant on land not owned by them.
 - 36) Assessment of occupational health and endemic diseases of environmental origin in the study area shall be carried out and Action Plan to mitigate the same shall be prepared.
 - 37) Occupational health and safety measures for the workers including identification of work related health hazards shall be formulated. The company shall engage full time qualified doctors who are trained in occupational health. Health monitoring of the workers shall be conducted at periodic intervals and health records maintained. Awareness programme for workers due to likely adverse impact on their health due to working in non-conducive environment shall be carried out and precautionary measures like use of personal equipments etc. shall be provided. Review of impact of various health measures undertaken at intervals of two to three years shall be conducted with an excellent follow up plan of action wherever required.
 - 38) One complete season site specific meteorological and AAQ data (except monsoon season) as per latest MoEF Notification shall be collected and the dates of monitoring shall be recorded. The parameters to be covered for AAQ shall include PM₁₀, PM_{2.5}, SO₂, NO_x, CO and Hg. The location of the monitoring stations should be so decided so as to take into consideration the upwind direction, pre-dominant downwind direction, other dominant directions, habitation and sensitive receptors. There should be at least one monitoring station each in the upwind and in the pre - dominant downwind direction at a location where maximum ground level concentration is likely to occur.
 - 39) In case of expansion project, air quality monitoring data of 104 observations a year for relevant parameters at air quality monitoring stations as identified/implicated shall be submitted to assess for compliance of AAQ Standards (annual average as well as 24 hrs).
 - 40) A list of industries existing and proposed in the study area shall be furnished.
 - 41) Cumulative impacts of all sources of emissions including handling and transportation of existing and proposed projects on the environment of the area shall be assessed in detail. Details of the Model used and the input data used for modeling shall also be provided. The air quality contours should be plotted on a location map showing the location of project site, habitation nearby, sensitive receptors, if any. The windrose and isopleths should also be shown on the location map. The cumulative study should also include impacts on water, soil and socio-economics.
 - 42) Radio activity and heavy metal contents of coal to be sourced shall be examined and submitted along with laboratory reports.

STANDARD TERMS OF REFERENCE (TOR) FOR EIA/EMP REPORT FOR PROJECTS/ACTIVITIES REQUIRING ENVIRONMENT CLEARANCE

- 43) Fuel analysis shall be provided. Details of auxiliary fuel, if any, including its quantity, quality, storage etc should also be furnished.
- 44) Quantity of fuel required, its source and characteristics and documentary evidence to substantiate confirmed fuel linkage shall be furnished. The Ministry's Notification dated 02.01.2014 regarding ash content in coal shall be complied. For the expansion projects, the compliance of the existing units to the said Notification shall also be submitted.
- 45) Details of transportation of fuel from the source (including port handling) to the proposed plant and its impact on ambient AAQ shall be suitably assessed and submitted. If transportation entails a long distance it shall be ensured that rail transportation to the site shall be first assessed. Wagon loading at source shall preferably be through silo/conveyor belt.
- 46) For proposals based on imported coal, inland transportation and port handling and rail movement shall be examined and details furnished. The approval of the Port and Rail Authorities shall be submitted.
- 47) Details regarding infrastructure facilities such as sanitation, fuel, restrooms, medical facilities, safety during construction phase etc. to be provided to the labour force during construction as well as to the casual workers including truck drivers during operation phase should be adequately catered for and details furnished.
- 48) EMMP to mitigate the adverse impacts due to the project along with item - wise cost of its implementation in a time bound manner shall be specified.
- 49) A Disaster Management Plan (DMP) along with risk assessment study including fire and explosion issues due to storage and use of fuel should be carried out. It should take into account the maximum inventory of storage at site at any point of time. The risk contours should be plotted on the plant layout map clearly showing which of the proposed activities would be affected in case of an accident taking place. Based on the same, proposed safeguard measures should be provided. Measures to guard against fire hazards should also be invariably provided. Mock drills shall be suitably carried out from time to time to check the efficiency of the plans drawn.
- 50) The DMP so formulated shall include measures against likely Fires/Tsunami/Cyclones/Storm Surges/ Earthquakes etc, as applicable. It shall be ensured that DMP consists of both On-site and Off-site plans, complete with details of containing likely disaster and shall specifically mention personnel identified for the task. Smaller version of the plan for different possible disasters shall be prepared both in English and local languages and circulated widely.
- 51) Detailed scheme for raising green belt of native species of appropriate width (50 to 100 m) and consisting of at least 3 tiers around plant boundary with tree density of 2000 to 2500 trees per ha with a good survival rate of around 80% shall be submitted. Photographic evidence must be created and submitted periodically including NRSR reports in case of expansion projects. A shrub layer beneath tree layer would serve as an effective sieve for dust and sink for CO₂ and other gaseous pollutants and hence a stratified green belt should be developed.

STANDARD TERMS OF REFERENCE (TOR) FOR EIA/EMP REPORT FOR PROJECTS/ ACTIVITIES REQUIRING ENVIRONMENT CLEARANCE

52) Over and above the green belt, as carbon sink, plan for additional plantation shall be drawn by identifying blocks of degraded forests, in close consultation with the District Forest Department. In pursuance to this the project proponent shall formulate time bound Action Plans along with financial allocation and shall submit status of implementation to the Ministry every six months.

53) Corporate Environment Policy

- Does the company has a well laid down Environment Policy approved by its Board of Directors? If so, it may be detailed in the EIA report.
- Does the Environment Policy prescribe for standard operating process / procedures to bring into focus any infringement / deviation / violation of the environmental or forest norms / conditions? If so, it may be detailed in the EIA.
- What is the hierarchical system or Administrative order of the company to deal with the environmental issues and for ensuring compliance with the environmental clearance conditions. Details of this system may be given.
- Does the company has compliance management system in place wherein compliance status along with compliances / violations of environmental norms are reported to the CMD and the Board of Directors of the company and / or shareholders or stakeholders at large? This reporting mechanism should be detailed in the EIA report.

All the above details should be adequately brought out in the EIA report and in the presentation to the Committee.

54) Details of litigation pending or otherwise with respect to project in any Court, Tribunal etc. shall invariably be furnished.

Additional TOR for Coastal Based Thermal Power Plants Projects (TFPs):

Over and above the TOR mentioned in Thermal Power Plants Projects, the following shall be strictly followed (as applicable):

- Low lying areas fulfilling the definition wetland as per Ramsar Convention shall be identified and clearly demarcated with the proposed site.
- If the site includes or is located close to marshy areas and backwaters, these areas must be excluded from the site and the project boundary should be away from the CRZ line. Authenticated CRZ map from any of the authorized agencies shall be submitted.
- The soil leveling should be minimum with no or minimal disturbance to the natural drainage of the area. If the minor canals (if any) have to be diverted, the design for diversion should be such that the diverted canals not only drains the plant area but also collect the volume of flood water from the surrounding areas and discharge into marshy areas/major canals that enter into creek. Major canals should not be altered but their embankments should be strengthened and desilting.
- Additional soil required for leveling of the sites should as far as possible be generated within the site itself in such a manner that the natural drainage system of the area is protected and improved.

**STANDARD TERMS OF REFERENCE (TOR) FOR EIA/EMP REPORT FOR
PROJECTS/ACTIVITIES REQUIRING ENVIRONMENT CLEARANCE**

- e) Marshy areas which hold large quantities of flood water to be identified and shall not be disturbed.
- f) No waste should be discharged into Creek, Canal systems, Backwaters, Marshy areas and seas without appropriate treatment. Wherever feasible, the outfall should be first treated in a Guard Pond and then only discharged into deep sea (10 to 15 m depth). Similarly, the Intake should be from deep sea to avoid aggregation of fish and in no case shall be from the estuarine zone. The brine that comes out from Desalination Plants (if any) should not be discharged into sea without adequate dilution.
- g) Mangrove conservation and regeneration plan shall be formulated and Action Plan with details of time bound implementation shall be specified, if mangroves are present in Study Area.
- h) A common **Green Endowment Fund** should be created by the project proponents out of EMP budgets. The interest earned out of it should be used for the development and management of green cover of the area.
- i) Impact on fisheries at various socio economic level shall be assessed.
- j) An endowment **Fishermen Welfare Fund** should be created out of CSR grants not only to enhance their quality of life by creation of facilities for Fish Landing Platforms / Fishing Harbour / cold storage, but also to provide relief in case of emergency situations such as missing of fishermen on duty due to rough seas, tropical cyclones and storms etc.
- k) Tsunami Emergency Management Plan shall be prepared wherever applicable and Plan submitted prior to the commencement of construction work.
- l) There should not be any contamination of soil, ground and surface waters (canals & village pond) with sea water in and around the project sites. In other words necessary preventive measures for spillage from pipelines, such as lining of Guard Pond used for the treatment of outfall before discharging into the sea and surface RCC channels along the pipelines of outfall and intake should be adopted. This is just because the areas around the projects boundaries could be fertile agricultural land used for paddy cultivation.

YADADRI THERMAL POWER PLANT - VEERLAPALEM (V), DAMERACHERLA (M).

REHABILITATION & RESETTLEMENT COMMITTEE MEETING DATED. 18.02.2016

RESOLUTIONS

According to the Section 45 of Land Acquisition Rehabilitation and Resettlement Act, 2013 and as directed by the Director (R&R), Hyderabad, a meeting of the Rehabilitation and Resettlement Committee constituted by the District Collector, Nalgonda vide Proc. No. G1/R&R/4680/2015, dt. 13.02.2016 was held on 18.02.2016 in the Collectorate, Nalgonda under chairmanship of the District Collector, Nalgonda and Joint Collector, Nalgonda as a Member Convener. The following have attended the meeting.

Sl. No.	Members of the Committee	
1.	District Collector, Nalgonda	Chairman
2	Project Administrator & Joint Collector, Nalgonda	Member Convener
3	Sri. Gutta Sukhenda Reddy, Member of Parliament, Nalgonda	Member
4	Sri. N. Bhasker Rao, M.L.A, Miryalaguda	Member
5	Sri. N. Balu Nayak, Chairman, Zilla Parishad, Nalgonda	Member
6	Sri. Kotya Nayak, Sarpanch, Veerlapalem	Member
7	Smt. Gugulothu Saroja, W/o. Balu, Modugulakunta Tanda, Women Representative of Project Affected Area.	Member
8	Sri. Rupavath Shankar, S/o. Jagram, Kapura Tanda (V), Representative of SC/ST, Project Affected area.	Member
9.	Manager, State Bank of Hyderabad, Vajeerabad Branch	Member
10	Executive Engineer/Civil, TSGENCO	Member
11	Revenue Divisional Officer, Miryalaguda	Member

//TRUE EXTRACT FROM TELUGU //

"Attested "


Chief Engineer/Civil/Thermal
TSGENCO, Vidyut Soudha,
HYDERABAD - 500 082. 24/6/2016

In accordance with Section - 31 (2) and 2nd & 3rd Schedule of LA RR Act, 2013, Rehabilitation and Resettlement benefits of the Project Displaced Families (PDF) and Project Affected Families of Modugulakunta Tanda and Kapura Tanda villages who have lost their livelihood, were completely monitored by the Committee for the land acquisition of the proposed Yadadri Thermal Power Station to be established in Veerlapalem Village, Dameracherla Mandal.

Project Administrator and Joint Collector, Nalgonda has proposed the details of benefits to the PDFs and PAFs who lost their livelihood due to land acquisition as follows.

Details of Families.

S. No.	Village (Residential Houses)	Families	Major Sons	Unmarried Major Daughters	Senior Citizen	Total No. Families
Project Displaced Families						
1.	Modugulakunta Tanda (51)	55	24	06	02	87
2.	Kapura Tanda (35)	58	19	04	05	86
	Total (86)	113	43	10	07	173
Project Affected Families						
1.	Thimmapuram					23
2.	Thalla Veerappagudem					117
3.	Veerlapalem					226
4.	Kothapally					24
5.	Dubba Thanda					8
6.	Saath Thanda					13
	Total					411

//TRUE EXTRACT FROM TELUGU //

"Attested "


 Chief Engineer/Civil/Thermal
 TSGENCO, Vidyut Soudha,
 HYDERABAD - 500 082.

Benefits of Rehabilitation and Resettlement

1. Construction of Residential Houses for (173) Project Displaced Families under Indira Awas Yojana programme as per Schedule 2.1 of Act.
2. As per Schedule 2.1 of Act., for (173) Project Displaced Families and (411) Project Affected Families:
 - a) Providing employment to one person in the family not less than the minimum wages in the total employment of the project.
 - or
 - b) One time payment for Rs. 5.00 Lakhs per each family under Annuity. Total amount of Rs. 29.20 Crores.
- Or
- c) To implement annuity policies that shall pay not less than Rs. 2000/- per month per family for 20 years, with appropriate indexation to the consumer price index for agricultural labourers.
3. As per the Schedule 2.3 of Act, (173) Project Displaced families shall get livelihood allowance for Rs. 3000/- per each family i.e. Rs. 36000/- per Annum. Total Rs. 0.62 Crores
4. As per the Schedule 2.4 of Act, (173) Project Displaced families shall get payment of Rs. 50000/- per family towards transport expenses for shifting of family and their belongings. Total Rs. 0.87 Crores.
5. As per the Schedule 2.5 of Act, (26) Project Displaced families shall get payment of Rs. 25000/- per family towards grant for pinfold for cattle and (7) Project Displaced Families shall get payment of Rs. 25000/- per family towards grant for petty shops. Total Rs. 0.09 Crores.
6. As per the Schedule 2.9 of Act, (173) Project Displaced families shall get Rs. 50000/- per family as Rehabilitation allowance. Total Rs. 0.87 Crores

It is proposed to pay an amount of Rs. 40.37 Crores towards above benefits.

//TRUE EXTRACT FROM TELUGU //

"Attested"



Chief Engineer/Civil/Thermal
TSGENCO, Vidyut Soudha,
HYDERABAD - 500 082.
29/6/2016

As per Schedule 3 of the Act, for establishment of Rehabilitation Centre, total amount of Rs. 16.00 Crores is proposed for land acquisition, providing basic amenities, constructing Govt. Buildings, religious buildings and providing grave yard, etc.

As per the LA RR Act, 2013, the following resolutions are made for the above proposals.

1. The draft Rehabilitation and Resettlement report proposed by the Project Administrator & Joint Collector, Nalgonda shall be accepted and submit to the Commissioner (R&R) for approval.
2. The total financial benefits of PDFs & PAFs proposed by the Project Administrator & Joint Collector, Nalgonda shall be paid to directly to the concerned bank accounts at a time after obtaining the approval from the Government.
3. The financial R&R benefits of the (411) Project Affected Families are deposited in the concerned Revenue Deposits till the settlement of disputes of land enjoyment rights for the land to an extent of Ac. 204-32 Gts with (86) cases. The above land is handed over to TSGENCO. After settlement of the above cases, the R&R benefits will be paid to the land enjoyers as PAFs as per the eligibility. Hence, the R&R benefits to be paid to PAFs will be enhanced due to increase of PAFs in addition to (411) PAFs.

//TRUE EXTRACT FROM TELUGU//

"Attested "



24/6/2016

Chief Engineer/Civil/Thermal
TSGENCO, Vidyut Soudha,
HYDERABAD - 500 082.



Environmental Policy of TSGENCO



G.O.O.No.181/CE/C/GS/13, Dated: 04-07-2013



Environment Protection
Training & Research Institute,
Hyderabad

Contents

S. No.	Description	Pg. No
1.0	Telangana State Power Generation Corporation Limited (TSGENCO)	1
1.1	TSGENCO – Power Plants	2
2.0	Need for Environmental Policy	5
2.1	Benefits of Environmental Policy	5
2.2	Development of Environmental Policy	6
2.3	Transparency in the implementation of Environmental Policy	6
3.0	Environmental Policy Statement of TSGENCO	9
4.0	Environmental Policy-Implementation Objectives	11
5.0	Institutional Arrangements	13
5.1	Environmental Group at Corporate Office	13
5.2	Environmental Management Group at Project Level	14
6.0	Environmental Management Initiatives of TSGENCO	15
6.1	Environmental Issues-Approach	15
6.1.1	Project Conceptualization	15
6.1.2	Special Studies	15
6.1.3	Technology Adoption	15
6.2	Environmental Management during operation stage	16
6.2.1	Environmental Control	16
6.2.2	Technical Scanning	16
6.2.3	Statutory Requirements	16
6.3	Environmental control by equipment up-gradation and retrofitting of existing pollution control facilities	16
6.3.1	ESP Retrofit	16
6.3.2	Ash water recycling system	17
6.3.3	Ash management projects	17
6.3.4	Liquid waste management system	17
6.3.5	Ash pond reclamation	17
7.0	Acts and Rules	19
8.0	Environmental Monitoring	21
8.1	Environmental Monitoring Parameters	21
8.2	Meteorological Data Monitoring	22
8.3	Environmental Laboratories	22
8.4	Environmental Audit	22
8.4.1	Audit Procedure	23
8.4.1.1	Pre-audit Activities	23
8.4.1.2	Activities at the site	23
8.4.1.3	Post-audit Activities	24
8.5	Management Reporting	24

Introduction

1.0 Telangana State Power Generation Corporation Limited (TSGENCO)

Telangana State Power Generation Corporation Limited (TSGENCO) is one of the pivotal organizations of Telangana State, engaged in the business of Power generation. Apart from operation & Maintenance of the power plants it has undertaken the execution of the ongoing & new power projects scheduled under capacity addition programme and is taking up renovation & modernization works of the old power stations.

Erstwhile Government of Andhra Pradesh considering the Government of India's Liberalized policy for attracting private investment into power sector set up a high level committee in January 1995 to look into present working of the APSEB and suggest remedies for improvement. Government of Andhra Pradesh considering the recommendations made by committee had embarked upon the AP Electricity REFORMS ACT in 1998. As a sequel the APSEB was unbundled into Andhra Pradesh Power Generation Corporation Limited (APGENCO) & Transmission Corporation of Andhra Pradesh Limited (APTRANSCO) on 01.02.99. APTRANSCO was further unbundled w.e.f. 01.04.2000 into "Transmission Corporation" and four "Distribution Companies" (DISCOMS). Further, as per the AP Reorganization Act, 2014, the following corporations came into force with effect from 02.06.2014 i.e TSGENCO, TSTRANSCO, TSSPDCL and TSNPDCL.

Thus TSGENCO has been incorporated as company under the provisions of Companies Act, 2013 on 19.05.2014 and commenced its operations from 02.06.2014.

The installed capacity of TSGENCO as on 31.12.2015 is 5045.26 MW comprising 2882.50 MW Thermal, 2161.76 MW Hydro, 1.0 MW Photo Voltaic Cell based Solar Power plant, thereby contributes about half the total energy requirement of Telangana State.

The achievements of TSGENCO include the following.

- TSGENCO (2282.5 MW) thermal stations achieved 80.31% PLF for the year 2014-15 against all India average PLF of 64.5%, Kakatiya TPP (500 MW) stood first with 93.75% PLF among all state sector power stations during FY 2014-15.
- TSGENCO provides reliable and quality power to the Telangana State having 48% of total Telangana State Capacity. TSGENCO is not only engaged in the business of generation of electricity from its own 4 Thermal Power Stations and 9 Hydro Stations but also executing operation and maintenance of 4X18 MW Alimineti Madhava Reddy Lift Irrigation Scheme.
- Srisailem Left Bank Power House, a unique complete underground powerhouse is successfully commissioned and being operated.
- Nagarjuna Sagar Left canal Power House is the first hydro station in the country to use SCADA for operation of the units from control room besides enhancing the Excitation and Governor systems with microprocessor controls

- Pochampad Hydro Electric Scheme is the first hydro power station to use microprocessor controls in the powerhouse
- AMRP LIFT IRRIGATION Scheme is taken up and completed well below the stipulated time & budget. In this scheme, the pumping station commissioned (18 MW) is first such one in India where water is lifted to an height of 100 m
- TSGENCO (2282.5 MW) stood Second among all State Sector Power Utilities with 80.31% PLF for the period April, 2014 to March, 2015.
- Kakatiya TPP (500 MW) of TSGENCO stood First with 93.75% PLF among all state sector power stations for the period April, 2014 to March, 2015.
- Solar PV unit established at Jurala has once again generated 1.7 MU during 2013-14 against guaranteed energy of 1.4 MU per annum.
- Highest Daily Hydel Generation 45.22 MU recorded on 15.09.2014 after formation of TSGENCO
- Highest Daily Generation 85.50 MU recorded on 16 09 2014 after formation of TSGENCO
- Kothagudem Thermal Station (O&M) has won the Meritorious Productivity Award for ten times and Incentive Award for nine times.
- Kothagudem Thermal Station V stage has won the Meritorious Productivity Award for five consecutive years - all are gold medals - and Incentive Award for five consecutive years.
- Kothagudem Stage-V, Unit- 9 & 10 (500MW) of TSGENCO received Consolation award for the year 2009-10 in the category of performance of Thermal Power Stations.

The organizational structure of TSGENCO is shown in Fig 1.1.

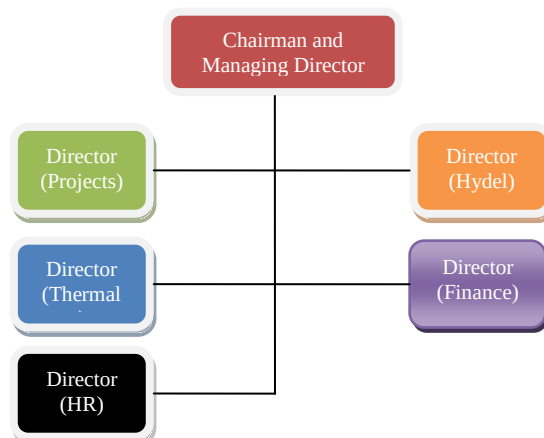


Fig 1.1 Organizational structure of TSGENCO

1.1 TSGENCO – Power Plants

The capacities of these power plants are given in Table 1.1.

Table 1.1 Power Plants of TSGENCO - Capacities

S. No.	Power Station	No. of Units	Capacity (MW)
1	Ramagundam 'B' Thermal Power Station	1	62.50
2	Kakatiya Thermal Power Project(stage-I&II)	2	1100.00
3	Kothagudem Thermal Power Station, Stages I to IV	8	720.00
4	Kothagudem Thermal Power Station V & VI Stages	3	1000.00

S. No.	Power Station	No. of Units	Capacity (MW)
5	Pochampad Hydro Electric Scheme	4	36.00
6	Nizamsagar Hydro Electric Scheme	2	10.00
7	Singur Hydro Electric Scheme	2	15.00
8	Nagarjuna Sagar Hydro Electric Scheme	8	815.60
9	Nagarjunasagar Left Canal Power House	2	60.00
10	Srisailem Left Bank Hydro Electric Scheme	6	900.00
11	Priyadarshini Jurala Hydro Electric Scheme	6	234.00
12	Lower Jurala Hydro Electric Scheme	2	80.00
13	Mini Hydro	25	11.16
14	Solar Power Plant at Jurala		1.00

Need for Environmental Policy

2.0 Need for Environmental Policy

An environmental Policy is a statement of an organization's commitment and road map to improving its environmental performance. Developing a policy will help in obtaining a better understanding of how an organization's activities impact on the environment and how to reduce those impacts. Improving the organization's environmental performance has numerous benefits including creating a healthier and safer workplace, and enhancing the corporate image in the community.

Environmental issues generally addressed by environmental policy include (but not limited to) air and water pollution, waste management, ecosystem management, biodiversity protection, and the protection of natural resources, wildlife and endangered species. Environmental Policy statement outlines environmental performance of the organization as well as its environmental objectives. It documents a commitment of the company to continuous improvement and complying with legal and other requirements. Organizations are becoming more aware of their environmental risks and performance requirements and are developing environment policies suitable for their organization in line with the ISO 14001 standard.

2.1 Benefits of Environmental Policy

There is widespread agreement that environmental policy can enhance productivity by increasing the efficiency with which we use resources and energy.

Resource efficiency is becoming increasingly critical for economic success in a world where many resources are becoming increasingly scarce and expensive.

Environmental policies can stimulate innovation and investment in innovation. By internalizing the external costs of pollution and natural resource use, policies change relative prices and stimulate research and development and uptake of alternative inputs, production methods and products. Similarly, restricting the use of certain processes and materials stimulates the commercialization and diffusion of cleaner alternatives. Environmental policies have led to innovations in conservation of energy and resources, pollution prevention and environmental clean-up.

Environment policies can improve the balance of trade by enhancing competitiveness, supporting export-oriented eco-innovation, and reducing material use and hence imports. Furthermore, progressive environmental policies require industries to innovate and adapt quickly. By influencing the use of resources, environmental policy affects the way in which economic activity develops. It encourages the more efficient use of energy and materials and development of new and cleaner products and services, while discouraging activities that are environmentally damaging.

The environmental aspects of an organization are those activities, products and services of an organization that have or can have an impact on the environment. An

Environmental management System enables an organization to identify its environmental aspects and determines which of them can have a significant impact on the environment. This helps an organization to understand how it reacts with the environment. This in turn guides an organization in determining where environmental controls or improvements are needed, and in the setting of priorities for action to improve environmental performance. An environmental policy sits at the top of an organization's environmental management systems and articulates the overall intentions and direction of an organization regarding its environmental performance. It provides a formal way for the organization's top management to express commitment to environmental management and improvement.

2.2 Development of Environmental Policy

Development of the policy requires top management to make critical decisions on what the organization aims to achieve in environmental management. The ISO: 14000 standard requires the policy to be suitable for the nature, scale and environmental impacts of the organization's activities, products and services. The standard also requires the policy to make three commitments:

- a. Compliance with all applicable legal requirements, and with other requirements to which the organization subscribes relating to its environmental aspects.
- b. Prevention of pollution
- c. Continual Improvement

Every organization has unique interactions with and impacts on the environment. An organization must be able to demonstrate that it is fully aware of all relevant environmental issues and their potential impact and importance. The organization will need to review the following issues:

- Its operation
- Pollutant emissions and releases
- Past environmental performance
- Location
- Land use activities
- Sensitive environmental areas
- Environmental impacts from other organizations nearby
- Environmental legislation and regulation
- Community stakeholder views
- Client and/or customer views

To be effective, the policy must be communicated to everyone working in and on behalf of the organization. The standard also requires an organization to publicize its environmental policy. Most organizations achieve this through their intranet and website, but display of the policy at head office and other locations through out the organization can also be effective. Development of a policy can be considered as an opportunity to inspire an organization's staff and other stakeholders.

2.3 Transparency in the implementation of Environmental Policy

Monitoring is crucial and needs to be conducted periodically. Monitoring helps those involved with implementation of Environmental Policy to assess whether the progress is being achieved in line with expectations or not. It serves to drive

accountability and transparency, and provides for learning to implement in future initiatives. Systematic and structured reporting process will facilitate

accountability and transparency between the organizations and their internal and external stakeholders.



Fig 2.1 Requirement of Environmental Policy

The organizations shall implement a monitoring mechanism by its defined organizational structure with clear roles and responsibilities for every project/activity comprising of the following steps:

1. Creating a legal register specifying all the regulatory compliance conditions along with the compliance conditions, clearance conditions that have been found by the Ministry or other public authorities. Conducting a baseline assessment in order to be able to monitor progress
2. Monitoring, collecting and documenting data on the environmental performance.

3. Preparing Annual Environmental Performance report and including it in its Annual Report

The organizations may communicate information on their environmental performance in a structured manner to all their stakeholders and the public at large. The management shall ensure that appropriate and necessary information that describes the organization's environmental performance is communicated throughout the company. This will allow the internal stakeholders to fulfill their responsibilities to help the organization reach the planned environmental performance.

Environmental Policy Statement of TSGENCO

3.0 Environmental Policy Statement of TSGENCO

1. TSGENCO is committed to build, operate and manage the Power Plants economically, efficiently and in an environmentally sound manner.
2. We will conduct all our operations and processes in a planned manner complying with the applicable statutory national and state environment related acts, notifications and rules, regulations and established good industry practices. We will provide the requisite resources and work environment, training and development of personnel to achieve continual improvement of environmental performance. We will ensure environmental requirements are complied by all our stakeholders, they act responsibly and are competent to carry out their jobs.
3. We will strive for continual improvement and regularly review performance and implement suitable measures to ensure compliance with the stated plans.

Environmental Policy - Implementation Objectives

4.0 Objectives for Implementation of Environmental Policy

- To function in a sustainable manner duly protecting the environment.
- To facilitate periodic review and to put in place appropriate institutional arrangements to ensure environmental safeguards.
- To ensure that all the pollution control systems/ devices/ equipment are operational and well maintained to achieve the designed efficiency.
- To review and evaluate the existing pollution control systems/ devices to carry out the up-gradation wherever essential and feasible.
- To conduct environmental audit by in-house technical group, environmental monitoring to assess statutory compliance and to bring in exceptions to a minimal level.
- To utilize resources in optimal manner, reduce waste and to adopt waste utilization to the extent feasible considering the existing operational machinery.
- To review periodically the best industrial practices in the world and to identify the technical and financial requirements to adopt them.
- To interact with Financial Institutions as needed.
- To bring in best available technologies while planning and designing the future units.
- To impart training for skill development and orientation to various work groups in the organization and with specific reference to environmental aspects.
- To conduct outreach programs on environmental aspects through awareness programs, in-plant visits from time to time and organizing special programs during World Environment Day and Earth Day.

Institutional Arrangements

To meet the strong commitment to environment and considering the requirement of environmental issues, the institutional framework in TSGENCO provides for dedicated Environmental Management Group (EMG) at station level as well as at the corporate level.

5.1 Environmental Group at Corporate Office

The Role of the Concerned Director includes participation in management review, reviewing action plans of the respective stations designed for achieving environmental policy goals, approving allocation of resources for implementing the action plans in the respective stations. The Environmental Management Group at Headquarters level will be led by Chief Engineer.

The main responsibility of the Chief Engineer is as follows:

- Organize the Management Reviews
- Review of implementation of Environmental Policy at headquarters level
- Review and support for implementation of programs designed for respective project (station level) & headquarters level
- Review of Monitoring and measurement of environmental performance of all Projects
- Implementation of environmental Committee decisions

The Environmental management Group will have an Environmental Management

Committee. The Environmental Management Committee meetings will be convened by the Chief Engineer/Civil/Thermal as the Convener once in every quarter and as and when necessity arises with Concerned Director, Director (Thermal), Director (Hydel), Director (Projects) and Director (Finance), Director (HR) as members. The Chairman and Managing Director will be the Chairman of the Committee.

The Role of the Environmental Management Committee:

- The Committee will review all environmental legal requirements applicable to the stations and their compliance.
- The station level action plans prepared for achieving the environmental policy will be reviewed in the light of the technical and legal requirements and the achievability in the identified time frame and allocation of funds for implementation.
- Update any changes in the standards or Legal requirements and structuring guidelines at the stations for bringing them into operational level.
- Review of Compliance reports and Audit reports and suggest the plan for implementation to reach compliance status

EMS Coordinator (Executive Engineer), works in the corporate office. The EMS Coordinator (EE) works under the control of Superintending Engineer (SE). Under the direction of EMS Coordinator, the components covering Environmental Clearance and Consent for Establishment

for new projects will be executed by AEE and AE whereas Ash Management will be executed by another group constituting AEE and AE. Further, all the station level monitoring reports and legal compliances (Pollution Control Coordinators work) will be collected and monitored by Senior Chemist and Chemist. The organization structure of the Environmental Management Group at Corporate Office is presented in Fig 5.1.

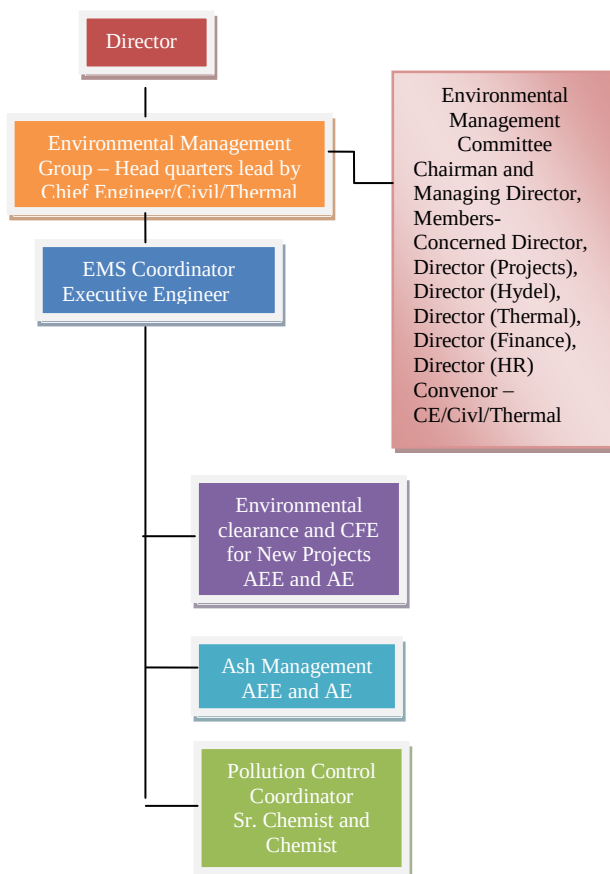


Fig 5.1 Organizational Setup for Environmental Management at Corporate Office

5.2 Environmental Management Group at Project Level

The organizational setup for Environmental Management is presented in fig 5.2. The responsibilities of Station Head are as follows:

- Review the legal registry
- Attending the CFO meetings and obtaining consents
- Attending legal hearings
- Review the status of Environmental compliances/ non-compliances frequently and at least once in monthly and initiate appropriate action plans
- Appraisal with Corporate office about the sanction of action plans submitted and ensure support for technical and financial clearances for executing the same
- Submission of reports to the concerned authorities time to time
- Any other issues relating to the environmental aspects

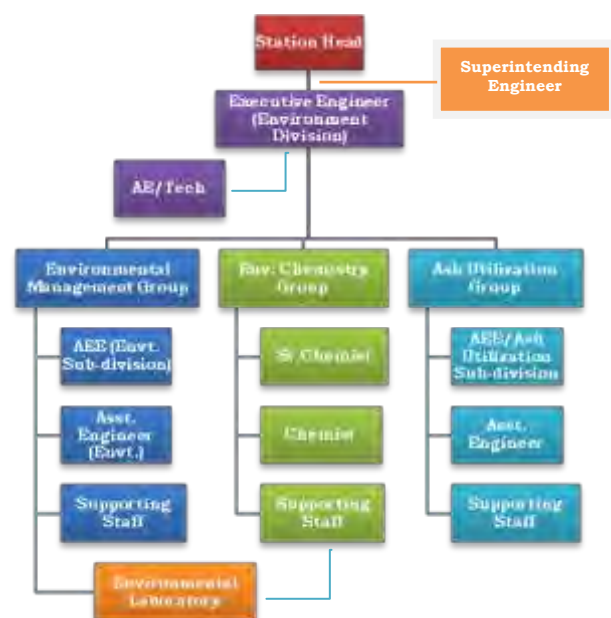


Fig 5.2 Organizational Setup for Environment Management at Project level

Environmental Management Initiatives of TSGENCO

Considering the various power generation options adopted by TSGENCO, Coal based thermal power stations have number of environmental concerns due to air emissions, effluents and solid wastes. The Indian coal with low sulphur content and high ash content is boon and bane for the industry. TSGENCO being the biggest power utility in Telangana State consciously takes lead in adopting and implementation of Environmental Management systems in the power generation.

6.1 Environmental Issues – Approach

TSGENCO, as a leading utility company in Telnagana State, has always been proactive and dovetail the environmental aspects from concept to operation. This covers siting the new projects, design, construction and operation of the plants. Not only identifying the best available technologies at the concept stage, the company is ensuring the efficiency of operations duly acknowledging the environmental setting where the plants are located.

6.1.1 Project Conceptualization

For all the new projects Environmental Impact Assessment (EIA) studies are carried out covering base line status of all environmental attributes viz., meteorology, Air, Surface water, Ground water, Noise, Soil, Land-use, along with Biological Environment, Socio-economic, hydro-geological studies, marine (if necessary) spread over a year. Considering the technology selected a detailed review is envisaged to ensure in identifying

appropriate, suitable, proven pollution control equipment and adhering to the environmental statutory requirements.

6.1.2 Technology Adoption

In order to keep emissions and effluents within acceptable limits, TSGENCO provides best available control equipment, devices for pollution abatement such as –

- Electrostatic Precipitators (ESPs)
- Low NO_x Burners
- Dust Suppression systems
- Tall Stacks
- Ash Pond effluent utilization system
- Cooling Towers
- Sewage Treatment Plants
- Sedimentation Tanks
- Effluent Treatment Plants

Apart from the above some equipment are integrated in the process for optimum utilization of recourses / energy which is benign to environment.

6.2 Environmental Management during Operation Stage

Planning and management of various aspects of environmental issues require an integrated and multifunctional approach. Commitment has to start at the planning and design stage and continue with the effective operation of systems/equipment provided. TSGENCO takes care of environmental problems during operation stage by various ways as described below

6.2.1 Environmental Control

- National Standards and guidelines for monitoring methods, frequency, analysis, and data reporting will be adopted.
- Trend analysis and exceptions reporting
- Corrective measures
- Equipment selection
- Co-ordination with external and internal agencies,
- Appraisals and audits

6.2.2 Technical Scanning

Each of the departments entrusted with equipment selection, plant operation and maintenance, and more specifically the Environmental Group are required to scan various technical publications, journals etc. and maintain an up-to-date information base. Similarly participation in conferences, seminars and courses helps them in acquiring information as well as details of these developments and advancements.

6.2.3 Statutory Requirements

There are a number of Legislative obligations which industries have to comply with. The Regulations such as the Factories Act, Electricity Act, Indian Electricity Supply Act, Air Act, Water Act, Environmental Protection Act etc. govern various aspects of pollution control. In TSGENCO, steps are taken to see that all those who deal with this subject are kept fully familiarized on the requirements of various Acts, Rules, Guidelines, Notifications and programmes are conducted to disseminate this information. In accordance with requirements of the relevant Acts,

APGENCO stations strive to maintain valid Consent Orders.

6.3 Environmental control by equipment upgradation and retrofitting of existing pollution control facilities

In order to keep pace with changing norms and ensure compliance with Statutory Requirements in the field of pollution control, TSGENCO keeps an open mind in relation to Renovation and Modernization (R&M), Retrofitting, and installation of pollution control facilities. TSGENCO has taken up R&M and Retrofitting programmes for its various stations as “**Environmental Projects**”. The details of such “Environmental Projects” are given as under.

6.3.1 ESP Retrofit

Remedial measures have already been taken up to improve the efficiency of the existing Electrostatic precipitators at various TSGENCO stations. These facilities were built prior to the promulgation of current and more stringent emission control standards. The ESP upgradation / retrofitting programme is already initiated and accordingly design modification feasibility studies have been made by TSGENCO.

6.3.2 Ash Water Recycling System

TSGENCO is aiming at adopting the concept of “zero effluent discharge”. Huge quantity of water is used at the power plants for ash disposal via pipeline to the ash ponds. TSGENCO has drawn a programme for changing ash disposal systems at some

power plants from once-through systems to recycling system where ash slurry water is recycled. The ash slurry recycling system would also conserve fresh water supplies.

6.3.3 Ash Management Projects

Ash management projects include ash extraction system for dry ash collection to facilitate ash utilization in manufacturing ash bricks \ blocks and pozzolana cement etc. These facilities are already provided at all the thermal power projects of TSGENCO.

6.3.4 Liquid Waste Management System

The objective of industrial liquid effluent treatment plant (ETP) is designed to treat all liquid effluents viz. Water Treatment Plant (WTP) effluents, Ash pond effluents, Floor washings, Boiler blow down, etc. The

scheme involves collection, treatment, and recirculation / disposal of various effluents emanating from the power plant.

6.3.5 Ash Pond Reclamation

In abandoned ash ponds, massive plantation programmes have been initiated. Several commercially valuable species have been successfully grown using the coal ash as growth media.

Acts and Rules

There are a number of Acts related with Environment and guiding rules about pollution. These Acts & Rules vary depending upon the construction phase and operation phase of the project. A comprehensive list of all the legal instruments applicable to Power plants is given below:-

1. The Water (P&CP) Act, 1974 amended 1988
2. The Water (P&CP) Rules, 1975
3. The Water (P&CP) Cess Act, 1977
4. The Water (P&CP) Cess (Amendment) Act, 2003
5. The Air (P&CP) Act, 1981 amended 1987
6. The Air (P&CP) Rules, 1982
7. The EIA Notification, 2006
8. The CRZ Notification, 2011
9. The Hazardous Waste (MH&TM) Rules, 2008
10. Hazardous Waste (Management & Handling) rules, 1989 amended 2000 & 2003
11. The Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989
12. The Manufacture, Storage and Import of Hazardous Chemicals (Amendment) Rules, 2000
13. The Chemical Accidents (Emergency Planning, Preparedness and Response) Rules, 1996
14. Fly Ash Notification, 2009
15. Disposal of Fly Ash Notification, 1999
16. Ash Content Notification, 1997
17. Fly Ash in Construction Activities and Responsibilities of Thermal Power Plants and specifications for use of ash based products/responsibilities of other agencies, Notification, dated 03 April, 2007
18. The Environment (Protection) Act, 1986, amended 1991
19. The Environment (Protection) Rules, 1986 (Amendments in 1999, 2001, 2002, 2002, 2002, 2003, 2004)
20. Forest (Conservation) Act, 1980 amended 1988
21. The Public Liability Insurance Act, 1991 amended 1992
22. The Public Liability Insurance Rules, 1991 amended 1993
23. The Wild Life (Protection) Act, 1972
24. Wildlife (Protection) Amendment Act, 2002
25. National Green Tribunal Act, 2010
26. The Biological Diversity Act, 2002
27. The Batteries (Management and Handling) Rules, 2001
28. The Batteries (Management and Handling), Amendments Rules, 2012
29. The Petroleum Act, 1934
30. The Petroleum Rules, 1976
31. Petroleum (Amendment) Rules, 2011
32. The Static and Mobile Pressure Vessels (Unfired) Rules, 1981
33. The Gas Cylinder Rules, 2004
34. The Mines Act, 1952
35. The Explosives Act, 1884
36. The Explosive Rules, 1983 & 2008
37. The Factories Act, 1948
38. The Motor Vehicle Act, 1988
39. The Central Motor Vehicle Rules, 1989

The above acts and rules will be subjected to amendment and these amendments are to be tracked and followed.

Environmental Monitoring

8.0 Environmental Monitoring

Introduction

Apart from reviewing the statutory compliances based on the environmental monitoring results, TSGENCO considers the data as an opportunity in carrying the assessment and in identifying the technology gaps and to review the up-gradation necessities of pollution control equipment.

In line with environmental policy, environmental action plans shall be prepared with a time line to implement the pollution control strategies and augment necessary equipment. Environmental management instruments viz., environmental auditing, non-confirmative reports to bring in new strategies based on review of existing strategies in stations of TSGENCO.

8.1 Environmental Monitoring Parameters

Parameters to be monitored:

- SPM (suspended Particulate Matter) in flue gas
- SO_x, NO_x in flue gas
- PM₁₀ of Ambient Air Quality
- PM_{2.5} of Ambient Air Quality
- SO₂ of Ambient Air
- NO_x of Ambient Air
- pH of effluents from Outlets, ETP, STP, Condenser Cooling Water, Ash pond and ground water samples
- Conductivity of effluents from ETP, STP and ground water samples
- TSS (Total Suspended Solids) of effluents from Outlets, ETP, STP, Ash pond, Boiler Blow Down and ground water samples
- TDS (Total Dissolved Solids) of effluents from Outlets, ETP, STP and ground water samples
- Total Hardness of effluents from ETP, STP and ground water samples
- Chlorides of effluents from ETP, STP, and ground water samples
- Free Available Chlorine of effluents from Outlets, Condenser Cooling Water and Cooling tower Blow Down
- Chemical Oxygen Demand (COD) of effluents from Outlets, ETP, STP and ground water samples
- Bio-chemical Oxygen Demand (BOD) of effluents from Outlets, ETP, STP and ground water samples
- Copper of effluents from Outlets, ETP, STP, Boiler Blow Down and ground water samples
- Iron of effluents from ETP, STP, Boiler Blow Down and ground water samples
- Zinc of effluents from Outlets, ETP, STP, Cooling Tower Blow Down and ground water samples
- Chromium of effluents from Outlets, ETP, STP, Cooling tower Blow Down and ground water samples
- Phosphate of effluents from Outlets, ETP, STP, Cooling tower Blow Down and ground water samples
- Temperature of effluents from Outlets, ETP, STP, Condenser Cooling Water and ground water samples
- Oil & Grease of effluents from Outlets, ETP, STP, Boiler Blow Down, Ash pond and ground water samples

- Noise levels in decibels in the plant and ambient air

8.2 Meteorological Data Monitoring

Air pollution is one of the major pollutants in the thermal power plant. TSGENCO has set up automatic weather stations in all of its power stations for continuous monitoring of meteorological parameters in respect of:

- Temperature
- Relative Humidity
- Solar Radiation
- Wind Velocity and Direction
- Atmospheric Pressure
- Rain Fall

8.3 Environmental Laboratories

TSGENCO has set up laboratory at all operation stations to monitor all the environmental parameters at regular intervals. These laboratory facilities are provided in order to attain self-sufficiency in environmental monitoring and to achieve the environmental goals as specified in Environmental Policy of TSGENCO.

Environmental Laboratories at TSGENCO Stations

All environmental parameters, which are to be monitored at regular intervals at each of the station with respect to air emissions, effluent discharges etc., are measured and analysed through well-equipped laboratories at TSGENCO stations. The required test facilities at each station are as under:-

1. Atomic Absorption Spectrophotometer
2. Spectrophotometer (UV / Visible)

3. Dissolved Oxygen Analyser
4. pH Meter
5. Conductivity Meter
6. BOD Incubator
7. Nephelometer
8. Centrifuge
9. Stack Monitoring Kit
10. High Volume Sampler
11. Bomb Calorimeter
12. Oven
13. Furnaces
14. Meteorological Instruments
15. Flame Photometer

8.4 Environmental Audit

A system of legal registry has been introduced to understand and review the compliance status of various environmental statutory clearances.

The environmental audit helps the power station management in meeting their responsibilities towards better environment. The audit program helps to identify and correct, as early as possible, any existing or potential environmental compliance problems or environmental liability risks present in an operation. It is a process whereby an organization's environmental performance is tested against its environmental policies and objectives.

The environmental audit helps in pollution control, improved production, safety and health and conservation of natural resources and hence its overall objective can be stated as achieving sustainable development.

According to The Environment (Protection) Rules, 1986, Rule 14: Submission of Environmental Statement, every person

carrying on an industry, operation or process requiring consent under Section 25 of the Water (Prevention and Control of Pollution) Act, 1974 (6 of 1974) or under section 21 of the Air (Prevention and Control of Pollution) Act, 1981 (14 of 1981) or both or authorization under the Hazardous Wastes (Management and Handling) Rules, 1989 issued under the Environment (Protection) Act, 1986 (29 of 1986) shall submit an environmental audit report for the financial year ending the 31st March in Form V to the concerned State Pollution Control Board on or before the thirtieth day of September every year, beginning 1993.

8.4.1 Audit Procedure

In general, Environmental Audit includes broadly the following activities:

- Pre-audit activities
- Activities at the site
- Post-audit activities

8.4.1.1 Pre-audit Activities

Pre-audit activities include various preparatory works. The preliminary information on the power plant will be obtained through a questionnaire. The information include location of the industry with surrounding land uses, climatic conditions, raw materials used, details on water utilization, wastewater generation and disposal, gaseous emissions, solid waste/hazardous waste, and organizational set-up and policies of the company for environmental management.

The preliminary information received will be reviewed to identify main areas of concern. Audit team will be organized and special

tasks will be allocated to the team members. The team will include employees from production, laboratory, pollution control operations, technical staff for monitoring and analysis of waste samples and an environmental specialist. The number of people may vary from 4 to 8. Resources such as the sampling and monitoring equipment and laboratory facilities for analysis will be checked if available at site or else arrangements will be made for their availability through external sources such as private/government laboratories, loan from other industries, etc. The visit programme will then be intimated to the plant or industry.

8.4.1.2 Activities at the Site

The activities at site include deriving material balance, identifying waste flow lines, monitoring of characteristics, evaluating performance of pollution control equipment or system, assessing environmental quality, holding discussions with the management and finally preparing the draft report. Interviews will be carried out with various cross sections of the staff engaged in production, laboratory, environment management, etc, so as to understand different operational mechanisms.

The entire plant will be inspected thoroughly. The aspects of site layout, material handling and storage, drainage system, safety aspects, lapses/negligence in operations and attitude of operators in process and waste treatment facilities, handling of scrap and wastes, usage of signboards, colour codes etc will be observed.

After completing the above-mentioned activities including determining material balance, identifying waste flow, monitoring and analysis of various samples and field observations, a draft report will be prepared with findings and possible recommendations.

The draft report will be presented before the senior management and various points will be thoroughly discussed. The Management will put forward their views.

8.4.1.3 Post-audit Activities

Various aspects like the optimum usage of raw material, efficiency of waste water treatment facilities, etc., will be evaluated and compiled. Based on the above, final report will be prepared along with the recommendations. The final report, if necessary may be sent to the Corporate Centre for comments so as to make further modifications.

The recommendations include measures for best practicable environmental management. If the annual burden, i.e. the annualized capital cost of the pollution control measures and their operating cost, for the implementation of all the recommendations, is high and the investment not feasible, then these recommendations will be implemented in phases. Priorities will be fixed and action plans with time-frame will be formulated.

Follow-up actions will be taken to check the progress of implementation of recommendations. The Environmental Division of the plant will meet the other Divisional heads periodically to review the progress.

8.5 Management Reporting

Having defined the various functions dealing with environmental related aspects, an extensive system of management reporting and exception reporting of all environmental related parameters, deviations and constraints has been established. Each APGENCO station carries out checks at identified points within the plant and outside with respect to emissions in air, effluent discharge, and ash pond effluents etc. at appropriate frequencies and then report the results to the Station Head at Project Level and Corporate EMG. Exception reports are put up to the management. Based on the nature of deviations and the trend, identification of gaps, audit reports etc. decisions are taken to control the deviating parameters. These decisions are classified as:

- (a) **Short Term** i.e. through which problems can be resolved within a week or so and include such issues which generally reflect operational corrections, improvements and generally do not involve capital modifications.
- (b) **Medium Term** which involve a deviation of a few months, say up to 12 months and include minor capital modifications etc.
- (c) **Long Term** decisions, which basically involve retrofitting and major capital modifications of the existing plant and equipment.

Based on the decisions, the implementation of remedial actions is monitored periodically. This process of **auditing and exception reporting** to the management helps evolve appropriate response and actions