

M/s. DECCAN CEMENTS LIMITED.,

(Waste Heat Recovery Based Power Plant)

Bhavanipuram, Mahankaligudem,

Ravipahad (V), Palakeedu (M),

Suryapet (Dist).

ENVIRONMENTAL STATEMENT (AUDIT) REPORT FOR THE FINANCIAL YEAR 2021-2022



LAWN ENVIRO ASSOCIATES [Engineers & Consultants in Pollution Control]

Recognised by Ministry of Environment Forest, & Climate Change (MoEF & CC), GOI, New Delhi
& Laboratory Accredited by NABL



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ACKNOWLEDGEMENT

M/s. LAWN ENVIRO ASSOCIATES express sincere debt of gratitude to M/s. DECCAN CEMENTS LTD., (Waste Heat Recovery Based Power Plant) for the opportunity given by assigning the preparation of Environmental Statement (Audit) Report for the financial year 2021–2022, for their Cement plant at Bhavanipuram, Mahankaligudem, Ravipahad (V), Palakeedu (M), Suryapet District of Telangana. The Environmental statement (Audit) Report is prepared for the financial year 2021–2022 Special mention needs to be made of Executives of M/s. DECCAN CEMENTS LIMITED., (Waste Heat Recovery Based Power Plant) Especially Mr. N. Srinivasa Raju, Chief General Manager (Works) & Mr. KVL Narasimha Rao (PQC) & Team for their co-operation and assistance during the preparation of this statement. We also wish to acknowledge our gratitude to all of them who helped during the data collection and report preparation.

CONTENTS

Acknowledgement	2
Contents	3
List of Tables	4
List of Figures	4
Form – V	5
1. INTRODUCTION	12
2. OBJECTIVE OF THE STUDY	12
3. BENEFITS OF ENVIRONMENTAL AUDIT	13
4. LOCATION	14
5. RAW MATERIALS AND PRODUCTS	16
5.1. Raw materials	16
5.2. Products	16
6. PROCESS DESCRIPTION (WHR Plant)	16
7. WATER REQUIREMENT	16
8. POLLUTION CONTROL IN THE PLANT	17
8.1 Waste Water Sources and Monitoring	17
8.2 Air Pollution Control	17
8.2.1 Stack Emission	17
8.2.2 Ambient Air Quality	18
8.2.3 Ambient Noise levels	20
9. GREENBELT DEVELOPMENT	20
10. PROPOSED BUDGET FOR POLLUTION CONTROL AND ENVIRONMENTAL PROTECTION.	20
11. HOUSEKEEPING	21
12. AUDITORS COMMENTS	21

APPENDIX

A.	National Ambient Air Quality Standards	22
B.	Standards for Stack Emissions	24
C.	Ambient Air Quality Standards In Respect of Noise	25
D.	General Standards for Discharge of Effluents	26
E.	Test Characteristics for Drinking Water IS 10500:2012	28
F.	Plant Species For Green Belt Development	30

LIST OF TABLES

8.1.	Average values of Stack Emissions Monitoring Data	18
8.2.	Average values of Ambient Air Quality	19
8.3.	Average values of Ambient Noise Levels	20

LIST OF FIGURES

Fig. 1	Location map of M/s. DECCAN CEMENTS LTD.	15
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FORM – V

(See Rule 14)

ENVIRONMENTAL STATEMENT (AUDIT) REPORT
FOR THE FINANCIAL YEAR ENDING 31st MARCH, 2022

PART – A

- i) Name and address of the owner/ Occupier of the industry operation or process. : M/s. DECCAN CEMENTS LTD.,
(Waste Heat Recovery Based Power Plant)
Bhavanipuram, Mahankaligudem,
Ravipahad (V), Palakeedu (M),
Suryapet (Dist).
- ii) Date of the last environmental Audit report submitted : September 2021.
- iii) Production Capacity (Units) : Electricity – 7.0 MW
(Based on Waste Heat Recovery)
- iv) Year of Establishment : 22.01.2019

PART – B

WATER AND RAW MATERIAL CONSUMPTION

i). Water consumption (m³ /day): **1,500.0 KLD**

Washings	:	7.0
Boiler Feed/Make Up	:	30.0
DM Plant/Regeneration	:	7.0
Cooling Water Make Up	:	1,192.0
Greenbelt	:	84.0
Domestic	:	150.0
Services water wash	:	30.0

Name of Products	Water consumption per unit of products (KL/MT)	
	During the previous Financial year (2020-2021)	During the current financial year (2021-2022)
Electricity	7.35 KI/MW	5.96 KI/MW

ii) Raw material consumption:

Name of raw materials	Name of product	Consumption of raw material per unit of output (Ton/Ton)	
		During the previous Financial year (2020-2021)	During the current financial year (2021-2022)

There is no usage of Raw materials in this process due to this there is no listed of raw materials.

PART - C

POLLUTION DISCHARGED TO ENVIRONMENT

(Parameter's as specified in the consent issued)

Pollutants	Quantity of Pollutants Discharged (kg/day) 2021-2022	Concentrations Of Pollutants in Discharges (mg/l) 2021-2022	Percentage of variation from prescribed standards with reasons
a) Wastewater :			
About 170 KLD of waste water will generate from washings, DM plant regeneration and boiler blow down and others. Wastewater will be treated in neutralized pit and used for greenbelt.			

b) Air					
Stack Attached to	Pollutants	Pollutants in Emissions discharged (2021-2022) kg/day	Concentrations Of Pollutants in Emissions (2021-2022) mg/Nm ³	prescribed standards mg/Nm ³	Percentage of variation from prescribed standards with reasons
Waste Heat Recovery Boiler 16.2 T/Hr (Kiln / Raw Mill With RABH - 2)	SPM	145.55	12.77	30	57.43 % Less
	SO ₂	17.55	1.54	100	98.41 % Less
	NO _x	4,707.58	413.00	800	48.37 % Less
Waste Heat Recovery Boiler 19.3 T/Hr (Cooler With ESP-II)	SPM	149.04	18.67	30	37.76 % Less

PART – D

HAZARDOUS WASTE

(As specified under Hazardous and other wastes Management and Transboundary Movement Rules, 2016)

Hazardous Wastes	Total Quantity per year	
	During the previous financial year (2020–2021)	During the current financial year (2021–2022)
a) From Process	Not Applicable	Not Applicable
b) From Pollution control facilities	Not Applicable	Not Applicable

Note: There is no Generation of Hazardous waste in this process.

PART – E

SOLID WASTE

	Total quantity MT per year	
	During the previous financial year (2020–2021)	During the current financial year (2021–2022)
a) From Process	Not Applicable	Not Applicable
b) From Pollution Control Facility	Not Applicable	Not Applicable
c) Quantity recycled or re-utilized	Not Applicable	Not Applicable

Note: There is no Generation of Solid waste in this process.

PART - F

Please specify the characteristics (in terms of concentration and quantum) of Hazardous as well as solid wastes and indicates disposal practice adopted for both these categories of wastes.

There is no generation of hazardous waste as well as solid waste in the process.

PART - G

Impact of the pollution control measures on conservation of natural resources and consequently on the cost of production.

This plant is a waste Heat recovery plant and no additional pollution control equipment added for this plant.

PART – H

Additional investment proposal for environmental protection including abatement of pollution.

This is one of the part in factory boundary and green belt is following as per the Plant CFO & EC conditions. Total Land will be same and no additional land procured for this plant.

PART – I

Any other particulars in respect of environment protection and abatement of pollution.

The Management's objective is to achieve the production without affecting the physical, chemical and biological environments of the nearby vicinity. Industry has taken lot of efforts to raise the plantation in and around the plant premises even though the land is unfavorable for plantation due to rocky nature of the soil.

1. INTRODUCTION

M/s. DECCAN CEMENTS LTD., (Waste Heat Recovery Based Power Plant) has setup Waste Heat recovery plant for Kiln -II(Pre Heater Exit gasses and Cooler vent hot air) at Bhavanipuram Mahankaligudem, Ravipahad (V), Palakeedu (M), Suryapet District of Telangana State. This Plant is established in the year of 2019 and capacity of the plant is 7.0 MW plant. This is one of the part in their factory boundary. Total Land will be same and no additional land procured for this plant (53.8 Ha of land, out of which 5 Ha is plant area, 18.50 Ha had been developed as greenbelt).

2. OBJECTIVE OF THE STUDY

The objective of the present study is to review the performance of pollution control systems installed by the industry so as to identify efficient pollution prevention and control systems, which could be beneficial to both environment and its components. And also Inserted by rule 2 of the Environment (Protection) second Amendment & Rules, 1992 vide G.S.R. 329 (E), dated:13-3-1992. 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 Environmental (Protection)Act 1986 (29 of 1986) shall submit an environmental audit report for the financial year ending 31st March in Form - V to the concerned state pollution control board on or before the 30th day of September every year beginning 1993.

3. BENEFITS OF ENVIRONMENTAL AUDIT

Environmental audit creates awareness in the conservation of natural resources and helps to improve production safety and health. The benefits of audits are:

1. It helps in reduction of raw material consumption by way of waste minimization and adoption of recovery of waste and recycles the same.
2. Determined the performance of process systems and helps to improve the systems.
3. Efficiency of pollution control systems can be calculated.
4. This gives the awareness of environmental organization in the industry.
5. Data available will help the management for use in the plant modification and adopting pollution control for different types of technology.
6. It helps to identify pollution creating systems and exposure to it by the employees for taking remedial measures.
7. The management will be assisted in complying with local, regional and national laws regulations by adopting standards.
8. It helps to identify hazardous wastes, handling measures taken and exposure to litigation can be reduced.
9. To determine the impact on the surrounding environment due to the disposal of its pollutants and identify suitable preventive measures.
10. Energy saving systems can be adopted by considering fuel consumption data.

M/s. DECCAN CEMENTS LIMITED., (Waste Heat Recovery Based Power Plant) has entrusted the task of preparation of Environmental Statement (Audit) to M/s. LAWN ENVIRO ASSOCIATES (LEA), Hyderabad. An in-depth study was conducted by LEA, to review the process efficiency, waste water generated and the present treatment systems, emissions generated and air pollution control equipment provided mode of solid waste collection and disposal and the other associated problems leading to the pollution and impact on environment.

4. LOCATION

M/s. DECCAN CEMENTS LIMITED., (Waste Heat Recovery Based Power Plant) is located at Bhavanipuram Mahankaligudem, Ravipahad (V), Palakeedu (M), Suryapet District of Telangana State. The site is 12 km from nearest State Highway which is connecting Narkatpally and Medarametla. The total requirement is Water from River Krishna water used for plant utilities. The location map is shown in Fig.1. The land is flat terrain sloping towards Southeast. No major hills or mountains are there in the area.

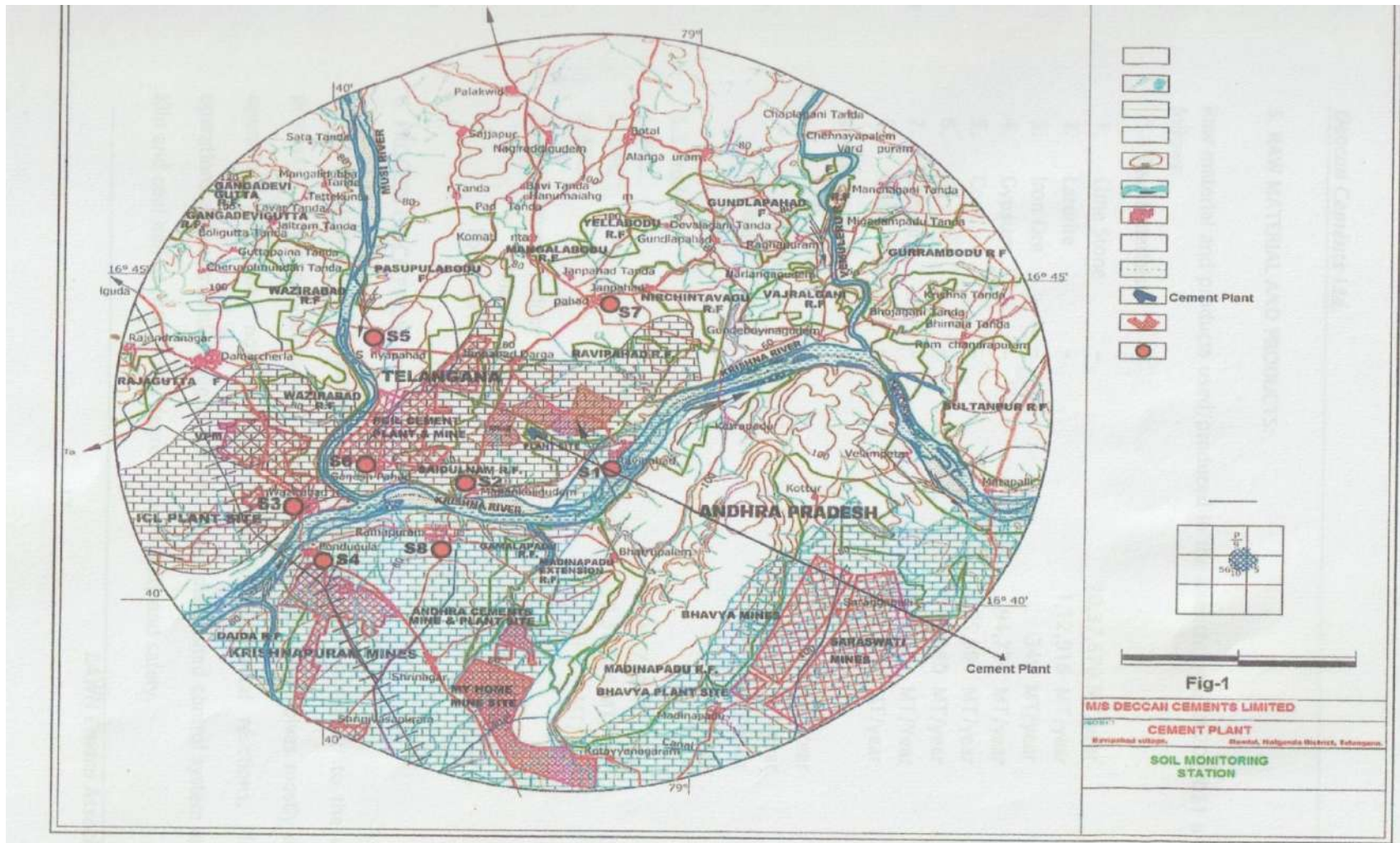


FIG. 1 LOCATION MAP OF M/s. DECAN CEMENTS LTD.,

5. RAW MATERIAL AND PRODUCTS

5.1 Raw Materials

There is no usage of Raw materials in this process due to this there is no listed of raw materials.

5.2. Products

Power – 130.50 MW

6. PROCESS DESCRIPTION

The purpose of the project activity is to utilize the heat available from clinker cooler and preheater to forms into the steam and them convert to electrical energy. The electrical energy generated with this utilization of waste heat is used for captive purposes and reduces electricity obtained from the grid electricity.

7. WATER REQUIREMENT

The total water consumption and the break up details are given below:

i). Water consumption (m³ /day): 1,500.0 KLD

Washings	:	7.0
Boiler Feed/Make Up	:	30.0
DM Plant/Regeneration	:	7.0
Cooling Water Make Up	:	1,192.0
Greenbelt	:	84.0
Domestic	:	150.0
Services water wash	:	30.0

Most of the process and cooling water will be evaporated/consumed. The domestic requirement includes requirements of colony, plantation, drinking as well as sanitation. The water requirement is being met by pumping water from the Krishna River.

8. POLLUTION CONTROL IN THE PLANT

This is a waste Heat recovery plant and no additional pollution control equipment added for this plant.

8.1 Waste water Sources and Monitoring

About 170 KLD of waste water will generate from washings, DM plant regeneration and boiler blow down and others. Wastewater will be treated in neutralized pit and used for greenbelt.

8.2 Air Pollution Control

This is a waste Heat recovery plant and no additional pollution control equipment added for this plant. It is noticed from the collected emissions data that the parameters monitored are within the limits prescribed by T.S. Pollution Control Board.

8.2.1 Stack Emissions

The emission from Preheater attached boiler and Cooler exit hot air passes through RABH and ESP which reduces the particulate matter to the minimum levels.

Table 8.1
Average values of Stack Emissions monitoring data

Source	Stack Height (m)	Stack Dia (m)	Velocity	Emissions passes through	SPM Concentration (mg/Nm ³)	SO ₂ Concentration (mg/Nm ³)	NO _x Concentration (mg/Nm ³)
Waste Heat Recovery Boiler 16.2 T/Hr (Kiln / Raw Mill With RABH)	128	4.2	14	RABH	12.77	1.54	413.00
Waste Heat Recovery Boiler 19.3 T/Hr (Cooler With ESP-II)	35	4.0	9.21	ESP	18.67	---	---

8.2.2 Ambient Air Quality

Ambient air quality monitoring is carried out once in a quarter at the following locations in the factory premises to know the status of the ambient air quality.

1. Near Main Gate
2. Near Commercial Gate
3. Near Temple.
4. CPP Main Gate

Ambient air quality is monitored for 8 hours at each station for the estimation of particulate matter-PM₁₀ and particulate matter PM_{2.5}. Estimated average values for the parameters monitored are represented in the Table 8.2 the analyzed values for PM₁₀, PM_{2.5}, SO₂ and NO_x are within the limits prescribed by T.S.P.C.B. for residential and rural area.

Table 8.2

Average values of Ambient air quality data

Location	MAIN GATE	COMMERCIAL GATE	Near Temple	CPP MAIN GATE
Particulate Matter-PM ₁₀ Concentration	73.50	65.75	51.75	60.50
Particulate Matter-PM _{2.5} Concentration	28.50	25.00	18.25	23.25
Sulfur dioxide Concentration	12.00	10.25	7.00	7.75
Oxides of Nitrogen Concentration	24.75	22.25	17.25	18.50

Note: All the values are expressed as ($\mu\text{g}/\text{m}^3$)

8.2.3 Ambient Noise Levels Monitoring:

Noise levels are measured at various places in the factory once in quarterly. High noise levels may have adverse impact on the workers and the surrounding environment. Noise levels are measured using sound level meter. The results are given in table 8.3 and the measured values are within the limits prescribed by Pollution Control Board.

Table 8.3
Average values of Ambient Noise Levels

S. No.	Location	Noise Levels in dB(A)	
		Day Time	Night Time
1	Near MAIN GATE	64.00	57.90
2	Near GUEST HOUSE	57.00	51.10
3	Near KILN	77.50	68.20
4	Near COLONY	58.00	54.50
5	Near COAL MILL	74.00	65.10
6	Near CEMENT MILL	71.50	64.20
7	Near RAW MILL	70.40	65.40

Note: 1. Day time is reckoned in between 6 am and 10 pm – Limit 75 dB (A).

2. Night time is reckoned in between 10 pm and 6 am – Limit 70 dB (A).

9. GREENBELT DEVELOPMENT

Greenery / plantation recharges oxygen into environment. Greenbelt development may have the following benefits.

- a. Mitigation of fugitive emissions including odor
- b. Noise pollution control
- c. Improving the local echo-system
- d. Arresting the soil erosion
- e. Improving the landscape of the area
- f. Aesthetics

The greenbelt development program in this rocky strata area is as follows:

Trees are planted extensively; Lawns, avenue plantation, ornamental plantation are also developed in plant, mines, colony and surround area.

10. PROPOSED BUDGET FOR POLLUTION CONTROL & ENVIRONMENT PROTECTION.

Specifically there is no budgetary allocation for the financial year 2022–2023. It is part of the main Cement plant.

11. HOUSE KEEPING

Proper cleaning of the different sections is required to maintain healthy environment, to avoid unnecessary loss and a good quality product. Stores to be maintain property. Factory premises are to be clean and green to have good housekeeping. M/s. DECCAN CEMENTS LTD., (Waste Heat Recovery Based Power Plant) is keeping their plant and premises neat and tidy. Housekeeping has been found to be well.

12. AUDITORS COMMENTS

1. Emissions from the stack are within the prescribed limits of T.S.P.C.B.
2. The unit does not generate any hazardous waste.
3. Specifically there is no budgetary allocation for the financial year 2022-2023. It is part of the main Cement plant.
4. Safety Programmes which are being conducted regularly by M/s. DECCAN CEMENTS LIMITED, has helped in bringing awareness amongst the work force.
5. Under T.S.P.C.B Haritha Haram programme M/s. DECCAN CEMENTS LIMITED is maintaining 18.50 Ha land under greenbelt, Gap plantation is under taken to improve the green belts.
6. Implementation of Environmental Management Standards in Deccan Cements Limited is under process as per ISO 14000:2015 standards and accreditation body is DNV


Auditors Signatory



APPENDIX-A
MINISTRY OF ENVIRONMENT AND FORESTS
NOTIFICATION

New Delhi, the 16th November, 2009.

NATIONAL AMBIENT AIR QUALITY STANDARDS

G.S.R. 826 (E) In exercise of the powers conferred by section 6 and section 25 of the Environment (Protection) Act, 1986, (29 of 1986), the Central Government hereby makes the following rules further to amend the Environment (Protection) Rules, 1986, namely:-

1. (1) These rules may be called the Environment (Protection) seventh Amendment Rules, 2009.
 (2) They shall come into force on the date of their publication in the Official Gazette.

2. In the Environment (Protection) Rules, 1986, (hereinafter referred to as the said rules), In rule 3, in sub-rule (3B), for the words, brackets, figures and letters, "In columns (3) to (5) of Schedule VII" the words, brackets figures and letters "in columns (4) and (5) of Schedule VII" shall be substituted.

3. For Schedule VII to the said rules and entries relating thereto, the following Schedule and entries shall be substituted, namely:-

S. No.	Pollutant	Time weighted average	Concentration in Ambient Air		
			Industrial , Residential, Rural and Other area	Ecologically Sensitive Area (notified by Central Government)	Methods of Measurement
1.	Sulphur dioxide (SO ₂), µg/m ³	Annual Average*	50 µg/m ³	20 µg/m ³	1. Improved West and Gaeke Method 2. Ultraviolet Fluorescence
		24 hours**	80 µg/m ³	80 µg/m ³	
2.	Nitrogen Dioxide (NO ₂) µg/m ³	Annual Average*	40 µg/m ³	30 µg/m ³	1. Modified Jacob & Hochheiser (Na-Arsenite) Method 2. Chemiluminescence
		24 hours**	80 µg/m ³	80 µg/m ³	
3.	Particulate Matter (Size less than 10 µm) or PM ₁₀ µg/m ³	Annual Average*	60 µg/m ³	60 µg/m ³	1.Gravimetric 2. TOEM 3. Beta attenuation
		24 hours**	100 µg/m ³	100 µg/m ³	
4	Particulate Matter (size less than 2.5 µm) or PM _{2.5} µg/m ³	Annual Average*	40 µg/m ³	40 µg/m ³	1. Gravimetric 2. TOEM 3. Beta attenuation
		24 hours**	60 µg/m ³	60 µg/m ³	
5.	Ozone (O ₃) µg/m ³	8 hours	100 µg/m ³	100 µg/m ³	1. UV photometric 2. Chemiluminescence 3. Chemical Method
		1 hour	180 µg/m ³	180 µg/m ³	
6.	Lead (Pb) µg/m ³	Annual Average*	0.50 µg/m ³	0.50 µg/m ³	1. AAS/ICP Method after sampling on EPM 2000 or equivalent filter paper 2. ED-XRF using Teflon filter
		24 hours**	1.0 µg/m ³	1.0 µg/m ³	

:2:

7.	Carbon Monoxide (CO) mg/m ³	8 hours**	02 mg/m ³	02 mg/m ³	Non dispersive infra Red (NDIR) spectroscopy
		1 hour	04 mg/m ³	04 mg/m ³	
8.	Ammonia (NH ₃) µg/m ³	Annual Average*	100 µg/m ³	100 µg/m ³	1. Chemiluminescence 2. Indophenol blue method
		24 hours**	400 µg/m ³	400 µg/m ³	
9.	Benzene (C ₆ H ₆) µg/m ³	Annual Average	05 µg/m ³	05 µg/m ³	1. Gas chromatography based continuous analyzer 2. Adsorption and Desorption followed by GC analysis
10.	Benzo (a) Pyrene (BaP) particulate phase only, ng/m ³	Annual Average	01 ng/m ³	01 ng/m ³	Solvent extraction followed by HPLC/GC analysis
11.	Arsenic(As) ng/m ³	Annual Average	06 ng/m ³	06 ng/m ³	AAS/ICP method after sampling on EPM 2000 or equivalent filter paper
12.	Nickel (Ni), ng/m ³	Annual Average	20 ng/m ³	20 ng/m ³	AAS/ICP method after sampling on EPM 2000 or equivalent filter paper

- Annual Arithmetic mean of minimum 104 measurements in a year at particular site taken twice a week 24 hourly at uniform intervals.

•
** 24 hourly / 8 hourly or 01 hourly monitored values, as applicable, shall be complied with the 98% of the time in a year. 2 % of the time, they may exceed the limits but not on two consecutive days of monitoring.

Note: Whenever and wherever monitoring results on two consecutive days of monitoring exceed the limits Specified above for the respective category, it shall be considered adequate reason to institute regular or continuous monitoring and further investigation.

APPENDIX-B

Standards for Stack Emissions

PARAMETERS		(mg/Nm³)
1. Suspended particulate matter concentration	(SPM)	30
2. Sulphur dioxide concentration	(SO ₂)	100
3. Oxides of Nitrogen Concentration	(NO _x)	800

**APPENDIX-C
AMBIENT AIR QUALITY STANDARDS IN RESPECT OF NOISE**

G.S.R. 158 (E) dt. 09-3-2009

The Environment (Protection) Rules, 1986 (See rule 3)

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

- Note :
1. Day time is reckoned in between 6 am and 10 pm.
 2. Night time is reckoned in between 10 pm and 6 am.
 3. Silence Zone is defined as areas upto 100 m around such premises as hospitals, educational institutions and courts. The silence zones are to be declared by the competent authority. Use of vehicular horns, loud speakers and bursting of crackers shall be banned in these zones.
 4. Mixed categories of areas should be declared as one of the four above mentioned categories by the competent authority and the corresponding standards shall apply.

**APPENDIX-D
GENERAL STANDARDS FOR DISCHARGE OF EFFLUENTS
[Schedule II inserted vide G.S.R. 919 (E) dt. 12-9-1988 Published in the
Gazette No. 488 dt. 12-9-1988]
The Environment (Protection) Rules, 1986 (See rule 3)**

Sl. No.	Parameter	Standards			
		Inland Surface Water	Public Sewers	Onland for Irrigation	Marine Coastal areas
1	2	3			
		a.	b.	c.	d.
1	Colour and Odour	See Note 1	---	See Note 1	See Note 1
2	Suspended Solids, mg/L, max	100	600	200	a. For process waste water 100 b. For cooling water effluent- 10% above total suspended matter of influent cooling water
3	Particle size	Shall pass 850 micron IS sieve	---	---	a. Floatable solids max- 3 mm b. Settleable solids max-850 μ
4	Dissolved Solids (inorganic), mg/L, max	2100	2100	2100	---
5	p ^H value	5.5 – 9.0	5.5 – 9.0	5.5 – 9.0	5.5 – 9.0
6	Temperature °C, max	Shall not exceed 40 in any section of the stream within 15 m downstream from the effluent outlet	45 at the point of discharge	---	45 at the point of discharge
7	Oil & Grease, mg/L, max	10	20	10	20
8	Total Residual Chlorine, mg/L, max	1.0	---	---	1.0
9	Ammonical Nitrogen (as N), mg/L, max	50	50	---	50
10	Total Kjeldahl Nitrogen (as N), mg/L, max	100	---	---	100
11	Free Ammonia (as NH ₃) mg/L, max	5.0	---	---	5.0
12	Biochemical Oxygen Demand (5 day at 20 °C), mg/L, max	30	350	100	100
13	Chemical Oxygen Demand, mg/L, max	250	---	---	250
14	Arsenic (as As), mg/L, max	0.2	0.2	0.2	0.2
15	Mercury (as Hg), mg/L, max	0.01	0.01	---	0.01
16	Lead (as Pb), mg/L, max	0.1	1.0	---	1.0
17	Cadmium (as Cd), mg/L, max	2.0	1.0	---	2.0

:2:

Sl. No.	Parameter	Standards			
		Inland Surface Water	Public Sewers	Onland for Irrigation	Marine Coastal areas
1	2	3			
		a.	b.	c.	d.
18	Hexavalent Chromium (as Cr ⁺⁶), mg/L, max	0.1	2.0	---	1.0
19	Total Chromium (as Cr), mg/L, max	2.0	2.0	---	2.0
20	Copper (as Cu), mg/L, max	3.0	3.0	---	3.0
21	Zinc (as Zn), mg/L, max	5.0	15.0	---	15.0
22	Selenium (as Se), mg/L, max	0.05	0.05	---	0.05
23	Nickel (as Ni), mg/L, max	3.0	3.0	---	5.0
24	Boron (as B), mg/L, max	2.0	2.0	2.0	---
25	Percentage Sodium, max	---	60.0	60.0	---
26	Residual Sodium Carbonate, mg/L, max	---	---	5.0	---
27	Cyanide (as CN), mg/L, max	0.2	2.0	0.2	0.2
28	Chloride (as Cl), mg/L, max	1000	1000	600	---
29	Fluorides (as F), mg/L, max	2.0	15.0	---	15.0
30	Dissolved Phosphate (as P), mg/L, max	5.0	---	---	---
31	Sulphate (as SO ₄), mg/L, max	1000	1000	1000	---
32	Sulphide (as S), mg/L, max	2.0	---	---	5.0
33	Pesticides	Absent	Absent	Absent	Absent
34	Phenolic Compounds (as C ₆ H ₅ OH), mg/L, max	1.0	5.0	---	5.0
35	Radio Active Materials:	10 ⁻⁷	10 ⁻⁷	10 ⁻⁸	10 ⁻⁷
	a. Alfa Emitters µc/mL, max b. Beta Emitters µc/mL, max	10 ⁻⁶	10 ⁻⁶	10 ⁻⁷	10 ⁻⁶

- Note :
1. All efforts should be made to remove colour and unpleasant odour as far as practicable.
 2. The standards mentioned in this notification shall apply to all the effluents discharged, such as industrial mining and mineral processing activities, municipal sewage, etc.
 3. Omitted by Rule 2 of the Environment (Protection) Fourth Amendment Rules, 1992 vide Notification G.S.R. 797 (E) dated 01-10-1992, Gazette No. 396 dated 01-10-1992.

**APPENDIX-E
TEST CHARACTERISTICS FOR DRINKING WATER (IS:10500-2012)**

Sl. No.	Substance of Characteristic	Require-ment (Acceptable Limit)	Permissible Limit in the Absence of Alternative Source	Methods of Test (Ref. To IS)	Remarks
1	2	3	4	5	6
i.	Colour, Hazen units, max	5	15	3025 (Part 4)	Extended to 15 only if toxic substances are not suspected, in absence of alternative sources.
ii.	Odour	Agreeable	Agreeable	3025 (Part 5)	a. Test cold and when heated b. Test at several dilutions
iii.	Taste	Agreeable	Agreeable	3025 (Part 7 & 8)	Test to be conducted only after safety has been established
iv.	Turbidity, NTU, max	1	5	3025 (Part 10)	---
v.	p ^H value	6.5 – 8.5	No relaxation	3025 (Part 11)	---
vi.	Total Hardness (as CaCO ₃) mg/L, max	200	600	3025 (Part 21)	---
vii.	Iron (as Fe), mg/L, max	0.3	No relaxation	3025 (Part 53)	Total concentration of manganese (as Mn) and iron (as Fe) shall not exceed 0.3 mg/l
viii.	Chlorides (as Cl), mg/L, max	250	1000	3025 (Part 32)	---
ix.	Residual, free Chlorine, mg/L, min	0.2	1	3025 (Part 26)	To be applicable only when water is chlorinated. Tested at consumer end. When protection against viral infection is required, it should be min. 0.5 mg/L
x.	Dissolved Solids, mg/L, max	500	2000	3025 (Part 16)	---
xi.	Calcium (as Ca), mg/L, max	75	200	3025 (Part 40)	---
xii.	Copper (as Cu), mg/L, max	0.05	1.5	3025: 1964 (Part 42)	---
xiii.	Manganese (as Mn), mg/L, max	0.1	0.3	3025:(Part 59)	Total concentration of manganese (as Mn) and iron (as Fe) shall not exceed 0.3 mg/l
xiv.	Sulphate (as SO ₄), mg/L, max	200	400	3025 (Part 24)	May be extended to 400 provided that magnesium does not exceed 30
xv.	Nitrate (as NO ₃), mg/L, max	45	No relaxation	3025 (Part 34)	---
xvi.	Fluoride (as F), mg/L, max	1.0	1.5	3025: (Part 60)	---

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Sl. No.	Substance of Characteristic	Requirement (Acceptable Limit)	Permissible Limit in the Absence of Alternative Source	Methods of Test (Ref. to IS)	Remarks
1	2	3	4	5	9
xvii.	Phenolic compounds (as C ₆ H ₅ OH), mg/L, max	0.001	0.002	3025: (Part 43)	---
xviii.	Mercury (as Hg), mg/L, max	0.001	No relaxation	IS 3025 (Part 48)/ Mercury Analyser	---
xix.	Cadmium (as Cd), mg/L, max	0.003	No relaxation	IS 3025 (Part 41)	---
xx.	Selenium (as Se), mg/L, max	0.01	No relaxation	IS 3025 (Part 56) or IS 15303*	---
xxi.	Arsenic (as As), mg/L, max	0.01	0.05	3025 (Part 37): 1988	---
xxii.	Cyanide (as CN), mg/L, max	0.05	No relaxation	3025 (Part 27)	---
xxiii.	Lead (as Pb), mg/L, max	0.01	No relaxation	IS 3025 Part 47	---
xxiv.	Zinc (as Zn), mg/L, max	5	15	39 of 3025: 1964 (Part 49)	---
xxv.	Anionic detergents (as MBAS), mg/L, max	0.2	1.0	Annex K of IS 13428	---
xxvi.	Chromium (as Cr ⁺⁶), mg/L, max	0.05	No relaxation	IS 3025 (Part 52)	---
xxvii.	Polynuclear aromatic hydrocarbons (as PAH), g/L, max	0.0001	No relaxation	APHA 6440	---
xxviii.	Mineral Oil, mg/L, max	0.05	No relaxation	Clause 6 of IS 3025 (Part 39) infrared Partition Method	---
xxix.	Pesticides, mg/L, max	Absent	0.001	---	---
xxx.	Radioactive materials: a. Alpha emitters, Bq/L, max b. Beta emitters, pci/L, max	0.1 1.0	No relaxation No relaxation	Part - 2 Part - 1	--- ---
xxxi.	Alkalinity, mg/L, max	200	600	13 of 3025: 1964 (Part - 23)	---
xxxii.	Aluminum (as Al), mg/L, max	0.03	0.2	31 of 3025: 1964 (Part - 55)	---
xxxiii.	Boron, mg/L, max	0.5	1.0	29 of 3025: 1964 (Part - 57)	---

Note: Atomic Absorption Spectrophotometer method, may be used.

**APPENDIX-F
PLANT SPECIES FOR GREEN BELT DEVELOPMENT**

SI. No.	BOTANICAL NAME	COMMON NAME	SIZE AND TYPE	SUITABLE SIZE
1.	Acia auriculaeformis (Mimosaceae)	H: Vilaiti	M: Semi evergreen	fragrant white flowers. Suitable in green belts on road sides.
2.	Adina cordifolia (Rubiaceae)	T: Pasupukadamba H: Haldu	L: Deciduous	a light demander, suitable on open areas & near flares.
3.	Aequle marmelos (Rutaceae)	T: Bilavamu H: Bael	M: Deciduous,	good for green belts for green belts near temples.
4.	Anogeissus latifolia (Combretaceae)	T: Chirimanu H: Dhaura	M: Deciduous,	good for green belts near temples
5.	Artabotrys hexapetius (Annonaceae)	T: Monaranjani H: Hara Champa	S: Evergreen shrub	with fragrant flowers good for gardens & inside boundary wall and long canals.
6.	Averrhoa carambola (averrhoaceae, Oxalidaceae)	T: Kamaarakkarmel H: Kamrak	S: Semi evergreen	good in narrow belts (green belts <50m width) along channels
7.	Azadirachta indica (Meliaceae)	T: Vepachettu H: Nim	L: Evergreen,	suitable in green belts and out side office & hospital buildings
8.	Bauhinia Variiegata (Caesalpinhiaceae)	T: Devakanchanamu H: Rachanaram	M: Deciduous,	good in green belts, garden and as a second row avenue tree.
9.	Borassus flabellifer (Arecaceae; Palmae)	T: Taadi H: Tad	L: A tall deciduous,	palm, can be used as wind break when of different age.
10.	Bosellia serrata (Burseraceae)	T: Phirangi saambraani H: Kunder	M: Deciduous	suitable on green shallow soils.
11.	Burera serrata (Bureraceae)	T: Chitreka	M: Deciduous	suitable on shallow soils as a green belt or avenue tree.
12.	Butea monosperma (Fabaceae)	T: Mlduga H: Palas	M: Deciduous	for green belt and as a second row avenue tree.
13.	Caesalpinia pulcherrima (Leguminosae)	T: Pamiditangedu H: Gulutura	M: A large shrub	suitable for gardens outside office and along channels
14.	Callistemon lanceolatus (Myrtaceae)	T: Bottle Brush	M: Deciduous	for some time, ornamental plant in garden
15.	Careva arobora (Lecythidaceae)	T: Araya H: Kumbi	L: Deciduous,	good in green belts.
16.	Carrisa carandas (Apocynaceae)	T: Vaka H: Karaunda	S: semi evergreen,	large bushy shrub, good as a hedge to protect against noise.
17.	Caryota urenus (Palmae)	T: Jilugujattu H: Mari	M: A lofty palm,	good as a wind break.
18.	Cassia fistula (Leguminosae)	T: Rela H: Amaltas	M: Deciduous	good ornamental tree in green belt.
19.	C. Siamea	T: Sima Tangedu	L: Evergreen	good as avenue tree
20.	Casuarina equisetifolia	T: Sarugudu H: Jungli s aru	M: Evergreen,	suitable for covering low-lying areas and in green belt.
21.	Cadrela toons	T: Nandichettu H: Mahanim	L: Deciduous,	good in open spaces, in green belts and along ponds.
22.	Cestrum diurnum	H: Din-ka-maja	S: A shrub	with white fragrant flowers, suitable (solanaceae) around boilers and waste disposal sites.

(Contd..)

PLANT SPECIES FOR GREEN BELT DEVELOPMENT

Sl.No.	BOTANICAL NAME	COMMON NAME	SIZE AND TYPE SUITABLE SIZE
23.	Cleistanthus collinus (Euphorbiaceae)	T: Kadishe H: Garari	S: Deciduous tree suitable in green belts.
24.	Cocus nucifera (palmae)	T: Kobbarichettu H: Nariyal	L: A tall stately palm suitable on sea shore river banks and hill slopes.
25.	Clestanthus collimus (Leguminosae)	T: Errasissu H: Shisham	M: Deciduous, suitable on areas around flare sites and in green belts.
26.	Delomix reqia (Leguminosae)	T: Shimasankesual H: Gulmohar	M: Deciduous ornamental, suitable on road sides.
27.	Dillenia inidica	T: Peddakalinga H: Chalta	L: Evergreen, white fragrant flowers, goon in green belts and around waste disposal sites.
28.	D. pentagyna	T: Chinnakalinga H: Aggai	L: Deciduous, good in green belts and onsite around flare.
29.	Emblica officianallis (Euphorbiaceae)	T: Amalakamu H: Amla	M: Deciduous, good as isolated trees in garden
30.	Erythrina suberosa (Leguminosae)	T: Barijama H: Dauldhak	M: Deciduous, good in green belts
31.	E. variegata	T: Badisa H: Dadap	M: Deciduous, good in gardens outside office buildings.
32.	Ficus bengalensis (Moraceae)	T: Marri H: Bargad	L: Deciduous, widely spread avenue tree (15 m apart)
33.	F. religiosa	T: Bodhi H: Pipal	L: Deciduous, widely spaced avenue tree also a single tree in isolated sites.
34.	Emelina arborea (Verbenaceae)	T: Gumartek H: Sewan	M: Deciduous, good in green belts around flare sites.
35.	Grewia tilioifolia (Tiliaceae)	T: Charachi H: Dhamim	M: Deciduous, good in green belts for use as timber
36.	Hamelen patens		S: Evergreen shrub with dense attractive foliage of greenish bronze leaves; good in gardens.
37.	Hardwickia binata (Leguminosae)	T: Yepi H: Anjan	M: Deciduous, good for green belts on shallow soils.
38.	Hibiscus mutabilis (Malvaceae)	H: Sthal Kamal	S: Large bushy shrub, semi evergreen good in green belts & in gardens, along channels.
39.	H.Rosa sinensis	T: Java Pusphamu	S: Evergreen woody showy shrub good for gardens.
40.	Lxora arborea	T: Korivipala H: Navari	S: Much branched evergreen, good in green belts and in gardens.
41.	Lxora coccinea	T: Mankana H: Rangan	S: Much branched evergreen, good in garden and in green belts.
42.	Jasminum sambur (Oleaceae)	T: Boddumalle H: Moghra	s: Much branched evergreen, good in garden and in green belts.
43.	Kydia calycina (Malvaceae)	T: Potri H: Pula	S: Deciduous, good along canals and in green belts.
44.	Lagersteoemia speciosa (Lythaceae)	T: Varagogu H: Jarul	M: Deciduous, good along road sides and in garden

(Contd..)

PLANT SPECIES FOR GREEN BELT DEVELOPMENT

SI.No.	BOTANICAL NAME	COMMON NAME	SIZE AND TYPE SUITABLE SIZE
45.	Lannea coramandelica (Anacardiaceae)	T: Appriyada H: Jhingan	L: Deciduous, good on well drained green belts and around flares.
46.	Lawsonia alba (Lythraceae)	T: Goranti H: Mehndi	S: Glabrous much branched shrub, good along canal sides.
47.	Locbnera rosea (Apocynaceae)	T: Bilaganuueru H: Sadabahar	S: An erect perennial herb; good in garden and along small channels.
48.	Madhuca indica (Sapotaceae)	T: Ippa H: Mahua	M: Deciduous, good in green belts
49.	Mallotus philippensis (Euphorbiaceae)	T: Kunkuma H: Sidur	S: small evergreen good along channels
50.	Melia azedarach (Meliaceae)	T: Turaka Vepa H: Bakain	M: Deciduous good along small roads, and canals.
51.	Millingtonia hortensis (Bignoniaceae)	T: Kavuki H: Akas Nim	L: Semi evergreen flowers fragrant, good along roadsides.
52.	Mimusops elengi (Sapotaceae)	T: Pogada H: Maulsari	M: Evergreen, good for avenues
53.	Moringa oleifera (Moringaceae)	T: Muluga H: Sainjna	M: Deciduous, with fragrant flowers, good in green belts.
54.	Murrava koenigi (Rutaceae)	T: Karepaku H: Mitha neem	S: Semi evergreen good in green belts and along small channels
55.	Oreodoxa reqia (Palmae)	Royal palm	L: Semi evergreen good medium and small road sides as an ornamental plant.
56.	Pandanus odoratissimus (Pandanaceae)	T: Mugali H: Kewada	S: A densely branched shrub good in gardens near seashore
57.	Peltophorum inerme (Leguminosae, Caesalpinhiaceae)	T: Kondachinta	M: Semi evergreen, suitable on road sides, in in gardens & outside buildings.
58.	Plumeria acuminata (Apocynaceae)	T: Vaala Ganneru H: Golainchi	M: Semi evergreen, fragrant white flowers, good in green belts.
59.	Plumeria alba	T: Veyui Varahaalu	S: Semi evergreen good for gardens
60.	Plumeria rubra	T: Nurruvarahalu H: Golainchi	S: semi evergreen good for gardens
61.	Pterocarpus marsupium (Leguminosae, Papilionaceae)	T: Vegi H: Bija	M: Deciduous, good on open areas with adequate light
62.	Pogamia pinnata (Leguminosae, Papilionaceae)	T: Ganuuga H: Karanj	M: Deciduous, good along roads & canals.
63.	Rauvolfia serpentina (Apocynaceae)	T: Paataalagani H: Chandrabhaga	S: An erect evergreen perennial shrub good along canal.
64.	Salmalia malabarica	T: Booruga H: Semul	M: Deciduous, Good for avenues
65.	Samanea saman (Leguminosae)	T: Nidraganneru	L: Deciduous, good tree along road sides for shade.
66.	Saraca indica (Leguminosae, Caesalpinaceae)	T: Ashoka H: Asok	M: Evergreen tree good on road sides within campus

(Contd..)

PLANT SPECIES FOR GREEN BELT DEVELOPMENT

SI.No.	BOTANICAL NAME	COMMON NAME	SIZE AND TYPE SUITABLE SIZE
67.	Spathodia campanulata (Bignoniaceae)	T: Patadiya H: Runugtora	L: In gardens and avenues and in green belts, it is deciduous.
68.	Sykzygium cumini (Myrtaceae)	T: Neeredu H: Jaman	L: Evergreen tree, good in green belts and within campus and road sides.
69.	Tabernamontana coronaria (Apocynaceae)	T: Gandhitagarapu H: Chandni	S: An evergreen shrub good in gardens and along canals.
70.	Tabebuia pentaphylla (Bignoniaceae)		M: Deciduous, good in gardens
71.	Tamarindus indica (Leguminosae, Caesalphiaceae)	T: Chintachettu H: Imli	L: Semi evergreen tree along state & national highways suitable site.
72.	Ticoma stans (Bignoniaceae)	T: Pachgotla	L: Evergreen tree, good in garden and along canals.
73.	Tectona grandis (Verbenaceae)	T: Adviteeku H: Sagwan	M: Deciduous, good in green belts and on inner sides of roads.
74.	Terminalia alata (Combretaceae)	T: Tani H: Sain	L: Deciduous, good in green belts near flare site
75.	Terminalia arjuna	T: Yerramadi H: Arjuna	L: Evergreen tree for road sides and in green belts.
76.	Terminalia bellirica	T: Tani H: Bahora	L: Deciduous, good in green belts.
77.	Terminalia bellirica	T: Badamchettu H: Deshi Badam	L: Deciduous tree good near sea shore.
78.	Thespesia populanea (Malvaceae)	T: Gangaraavi H: Paras Pipal	M: Compact quick growing evergreen tree good along road sides.
79.	Thevetia peruviana (Apocynaceae)	T: Pachaganneru H: Pile, Kaner	S: An evergreen large shrub, has shady yellow, flowers, good around the waste treatment.
80.	Vitex negundo (Verbenaceae)	T: Vaavili H: Sambhaluu	S: A large shrub suitable on areas along channels and streams and on waste lands.
81.	Xylia xylicarpa (Eguminosae, Mimosaceae)	T: Eravalu H: Jambu	L: Deciduous is green belts and on waste lands
82.	Zanthoxyium (Rutaceae)	T: Rhetsamaramu H: Badrang	M: Deciduous in green belts and on waste lands

NOTE: H Denotes Name in Hindi
T “ Name in Telugu
S “ Small size
L “ Large size
M “ Medium size