ACKNOWLEDGEMENT

M/s. LAWN ENVIRO ASSOCIATES express sincere debt of gratitude to Bhavanipuram Limestone Mine - 3 of M/s. Deccan Cement Limited (DCL) for the opportunity given by assigning the preparation of Environmental Statement (Audit) Report for the financial year 2017-2018, for their captive limestone mine located near Palakeedu (M), Suryapet (District). The Environmental statement (Audit) Report is prepared for the financial year 2017-2018. Special mention needs to be made of Executives of Bhavnipuram Limestone Mine-3 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.

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FORM – V

(See Rule 14)

ENVIRONMENTAL STATEMENT (AUDIT) REPORT

FOR THE FINANCIAL YEAR ENDING 31st MARCH, 2018

PART – A

i) Name and address of the owner/ occupier of the industry operation or process.	:	M/s BHAVANIPURAM LIMESTONE MINE-3 (M/s. Deccan Cements Ltd.) Bhavanipuram, Ravipahad (V), Palakeedu (M), Suryapet (Dist)- 508 218.
ii) Date of the last environmental audit report submitted	:	September 2017
iii) Production Capacity (Units)	:	2.3 Million MTPA
iv) Year of Establishment	:	28-12-2013

PART – B

WATER AND RAW MATERIAL CONSUMPTION

i) Water consumption for limestone mine-3: 130 m^3/day

		Peak level Consumption m^3/day
1. Dust suppression	-	110.0 m^3/day
2. Greenbelt development	-	15.0 m^3/day
3. Domestic	-	5.0 m^3/day

	Water consumption per unit of product (KL/MT)	
Name of Product	During the previous financial year (2016-2017)	During the current financial year (2017-2018)
Limestone	-N.A-	-N.A-

ii) Raw material consumption:

Name of Raw materials	Name of product	Consumption of raw material per MT of output based on MT of Limestone	
		During the previous financial year (2016-2017)	During the current financial year (2017-2018)
Limestone		2,52,000	6,22,000

PART - C

POLLUTION DISCHARGED TO ENVIRONMENT

(Parameter's as specified in the consent issued)

Pollutants	Quantity of Pollutants Discharged (kg/day) 2017-2018	Concentrations Of Pollutants in Discharges (mg/L) 2017-2018	Percentage of variation from prescribed standards with reasons
a) Wastewater: There is no process wastewater generated. Only domestic sewage, waste water is sent to sewage treatment plant and the treated water is used for plantation purpose.			
Air: There is no source of emissions, only dust generation during mining operation is monitored by establishing ambient air quality sampling stations at various places in mine premises and surrounding areas. The generated data is shown in table 8.1. Analyzed data shows all the values are with in the prescribed standards of TSPCB.			

PART – D

HAZARDOUS WASTE

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

Hazardous wastes	Total Quantity	
	During the previous financial year (2016-2017)	During the current financial year (2017-2018)
a) From Process	Nil	Nil
b) From Pollution control facilities	Nil	Nil

PART – E

SOLID WASTES

Solids Waste	Total quantity MT per year	
	During the previous financial year (2016-2017)	During the current financial year (2017-2018)
a) From Process	Nil	Nil
b) From Pollution Control Facility	Nil	Nil
c) Quantity recycled or re-utilized	Nil	Nil

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.

–

PART – G

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

1. Air : There is no source of emissions in air pollution.
2. Water: consumption of fresh raw water is minimum. No process wastewater is generated. Water is utilised for dust suppression only. Domestic wastewater sewage treatment plant and the treated water is used for plantation purpose.
3. Solid waste: There is no generation of solid waste at Bhavanipuram Limestone Mine – 3.
4. There is no significant impact on environment, since air or water generates Nil pollutants.

PART – H

Additional investment for environmental protection including abatement of pollution.

The Management of DCL incurred an amount of Rs. 40.0 Lakhs (Rupees Forty lakhs only) during the financial year 2017–2018 for various heads like air quality monitoring, greenbelt development, occupational health checkup, social welfare, monitoring of water quality & measurement and solid waste monitoring.

PART – I

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

Dust generation is a major pollutant in mines which can be controlled by adopting pollution control measures in mining operation and water spraying system. The Management's objective is to achieve the production without affecting the physical, chemical and biological environments of the near by vicinity. Industry has taken lot of efforts to raise the plantation in and around the mine lease area.

1. INTRODUCTION

Bhavanipuram Limestone Mine-3, is producing limestone for the captive consumption of M/s. Deccan Cements Ltd., which is producing cement. Bhavanipuram Limestone Mine-3 is located Near Ravipahad (V), Palakeedu (M), Suryapet (Dist). of T.S. is presently producing 7,700 TPD of Limestone, The production capacity of Bhavanipuram Limestone Mine -3 is 2.30 MTPA and we got approval for Environmental Clearance from MoE & F for 2.30 MTPA as vide letter no J-11015/375/2015-IA.II (M) dated 05.01.2017. DCL has mining lease for limestone with an area extent of 183.11 Ha. The mining area can be approached from Nereducherla from Miryalaguda – Kodad state highway and also from Hyderabad – Guntur state highway i.e. well connected by road network.

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, this is a virgin mine from this year we are started to submitting the report.

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 audit are:

1. It helps in reduction of raw material consumption by way of waste minimization and adoption of recovery of waste and recycle the same.
2. Determines 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 prone 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 and 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.

BHAVANIPURAM LIMESTONE MINE-3, has entrusted the task of preparation of Environmental Statement (Audit) for their captive limestone mine 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

Bhavanipuram Limestone Mine-3 is located at Ravipahad (V), Palakeedu (M), Suryapet District. Confluence point of Musi and Krishna river is 4.5Km in NE direction, Mahankaligudem (V) is 2.3 Km away in NNE direction and Janpahad (V) is located at 4Km in SW direction. The site is located in the toposheet no.56 P/10 between latitude 16^0 43' 00" & 16^0 43' 30" and longitude 79^0 42' 30" & 79^0 43' 15". Location map is shown in Fig 1.0

5. PRODUCTION DETAILS:

The total quantity of Limestone taken out from mining lease during the financial year 2017-2018 is 6,22,000 M.T.

6. MINING PROCESS:

Open cast workings

Limestone is being mined, in the Bhavanipuram Limestone mine-3 of the company, by open cast mechanized method of working. The equipment deployment planning for various mining operations has been done keeping in view the following viz., no/very marginal removal of topsoil is required, breaking of limestone by drilling and blasting and loading of limestone and transport to crusher by Shovel-tipper combination.

The mine as on date has spread over an extent of 5.31 Ha out of 183.11 Ha. The mining operations and development is carried out as per the IBM approved plan. The present location has been chosen, to provide for certain amount of flexibility to control the required quality of limestone in the concentrated working to start with.

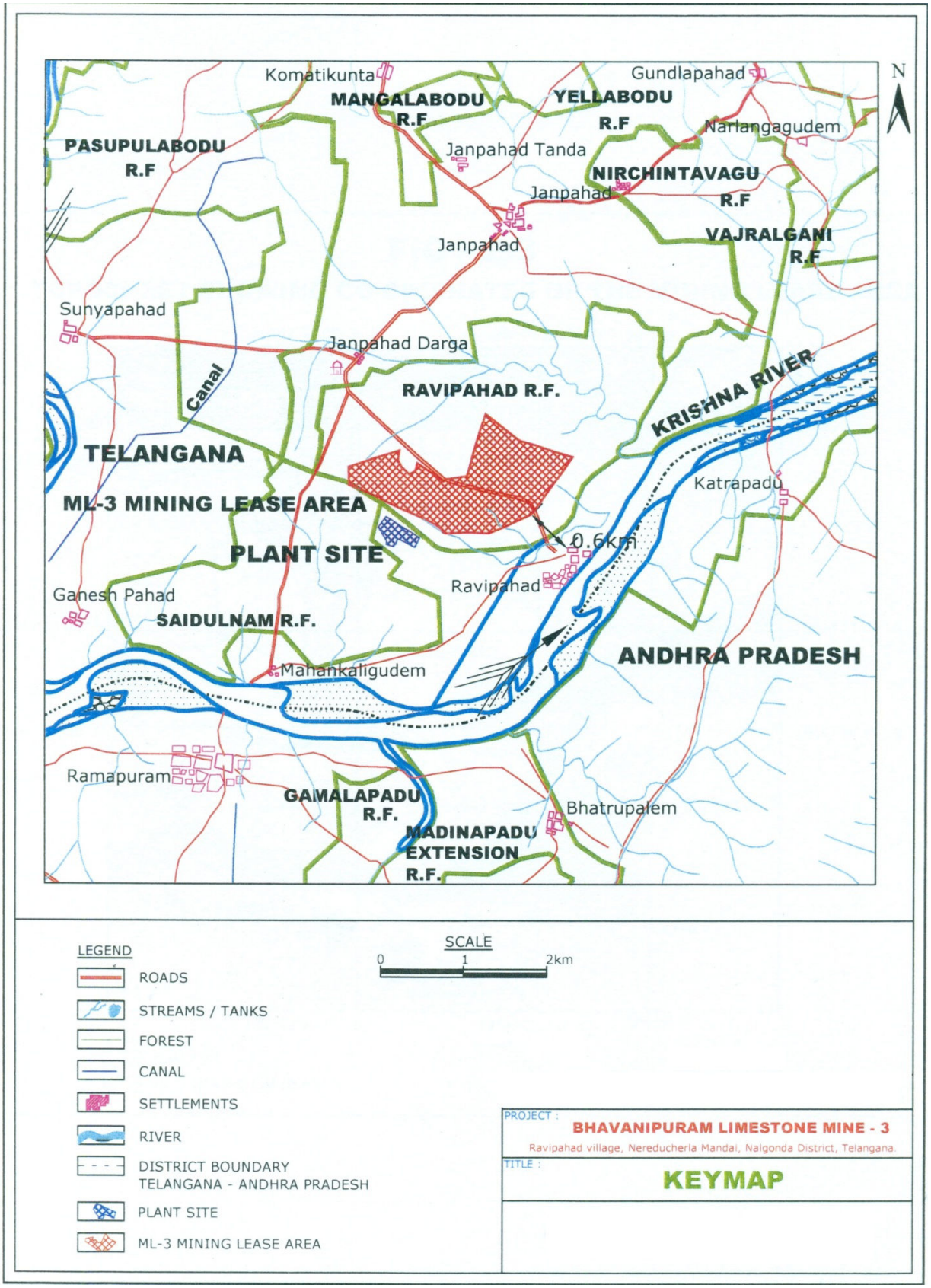

Fig.1. Location map of M/s. Bhavanipuram Limestone Mine-3

Transportation of limestone from the pit mouth to the crusher located in the plant is accomplished through 35-ton capacity dumps and 18-ton capacity tippers, which will be loaded by hydraulic excavator. The lead distance between the existing mine and crusher, one way, is around 1.0 Km (one side). There is an automobile garage to attend to the maintenance and repairs of the heavy earth moving equipment.

There is 1-ton magazine to store explosives located near to the lease area. Burden and spacing shall be kept around 3.0 m to 5.0 m and blastholes will be drilled with a 115-mm diameter wagon drill. Boosters of high explosives in conjunction with ammonium nitrate fuel oil (ANFO) is be used for charging the blastholes. Excel/Nonel non-electric delay initiators (in hole delay iniation system) in each hole shall be used. (Secondary blasting shall be required to break the projecting outcrops of limestone on the surface and over size boulders produced during the primary blast). Hydraulic Rock breaker is using for over size boulders, used for produced during the primary blasting to avoid Noise, Drilling.

List of Mining Machinery

Sl. No.	Type of Machinery	Capacity each unit	No. of Units	H.P. of each unit	Electrical/ Non-Elect.	Used in O.C./U. Ground (Specify)
1.	TATA Hitachi Hydraulic ZAXIS-470 H	3.1 Cum.	01	320	Non-Elect.	Open cast
2.	L&T Komatsu Hydraulic Excavator Model PC 300 LC-7	2.1 Cum.	01	242	Non-Elect.	Open cast
3.	TATA Hitachi Hydraulic Excavator Model EX-350	1.5 Cum.	01	230	,,	,,
4.	TATA Hitachi Hydraulic Excavator Model EX-350 with Atlas Copco Rock breaker Model: HB 2200	30 Tons	01	230	,,	,,
4.	BEML Dozer BD65-1	3.6 Cum.	01	165	,,	,,
5.	BEML Dumper BD 35 - 2	35 Tones	04	380	,,	,,
6.	TATA Tippers LPK 2518 TC	12 Cum.	01	160	,,	,,
7.	Atlas Copco Compressor Model XAH 210	445 cfm	03	180	,,	,,
8.	Atlas Wagon Drill Model BVB 25-10	115 MMΦ	03	-	,,	,,
9.	Explosive Van TATA 407 Turbo Ex	3310 Kgs.	01	75	,,	,,
10.	Water Tanker TATA LPK 2518 TC	12 KL	01	180	,,	,,
11.	Water Tanker TATA LPK 1615 TC	8 KL	01	180	,,	,,
12.	Mahindra Bolero Camper	1710 kg.	01	46	,,	,,
13.	Lighting Tower	5 KVA	01	11	,,	,,
14.	Solar Lighting Tower	600w	04	150w	,,	,,

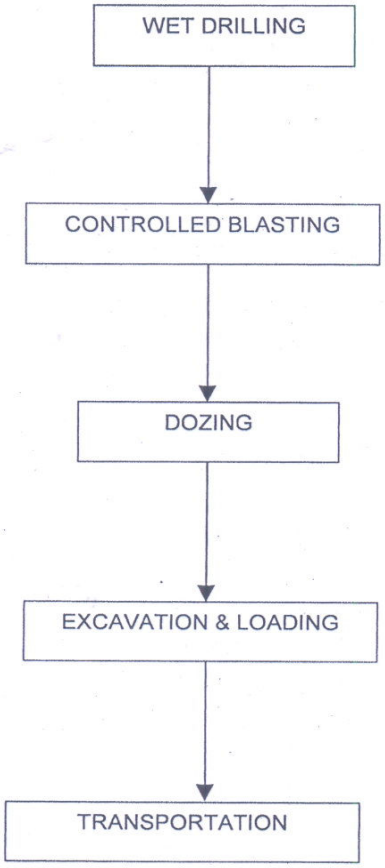

Fig.2 Process of Bhavanipuram Limestone Mine-3

Blasting

Blasting is being carried out by non-electric delay detonators (EXCEL/NONEL), which can keep noise, ground vibrations, fly rock within the safe limits.

Dozing

The blasting area is dozed to make floor even form blasting face to avoid heavy dust generation with Loader.

Loading

The water spraying on the blasted rock is being carried out for dust suppression before they load it in to the tippers. The operators have been provided with nose filters regularly. The operators cabin is of dust proof type.

Transportation

Dust suppression on haul roads is being carried out by water spraying with water tanker. The operators have been provided safety equipment like safety goggles, respirators and ear muffs for dust free and noise.

7. WATER REQUIREMENT

The average water consumption for mining is 130 m^3 /day the details are given below:

		Peak Consumption (m^3/day)
1. Dust suppression	-	110
2. Greenbelt development	-	15
3. Domestic	-	5

Water from the mines of is being used for dust suppression on haulage roads and green belt development. The drinking water is supply from the Krishna River. The analyzed values of water sample is given table 7.1

TABL E – 7.1

DRINKING WATER ANALYSIS DATA

S.No.	Parameter	
1.	PH	7.6-7.85
2.	E.C. (micro Siemens/cm)	120-145
3.	Dissolved solids	---
4.	Total Hardness as $CaCO_3$	70
5.	Alkalinity to Phenolphthalein as $CaCO_3$	12
6.	Alkalinity to Methylorange as $CaCO_3$	2.5
7.	Non-Carbonate Hardness as $CaCO_3$	1.4
8.	Calcium as Ca	2.7
9.	Magnesium as Mg	0.18
10.	Sodium as Na	15
11.	Potassium as K	4.5
12.	Chloride as Cl	1.6
13.	Sulphate as SO_4	36
14.	Silica as SiO_2	---
15.	Iron as Fe	36
16.	Nitrate as NO_3	0.07
17.	Fluorides as F	0.16

Note: All the values except pH & E.C are expressed in mg/L.

8. POLLUTION CONTROL MEASURES IN THE MINE:

8.1 Pollution control measures

The Industry has given top priority of pollution prevention and control. Adopting various pollution control measures controls the Air pollutants emitted into atmosphere. Stage wise operation as follows:

Blasting:

Blasting is being carried out as per guidelines of IBM by non-electric delay detonators (EXEL/NONEL) which can keep noise, ground vibrations, fly-rock within the safe limits. Explosives are being stock in a 1.0 ton capacity magazine. Blast vibrations are monitored monitored by Norm's seismograph and kept within limits.

Dozing:

The floor near blasting face is dozed evenly to avoid heavy dust generation with the movement of Dumpers/Tippers by wheel loader.

Loading:

The water spraying on the blasted rock is being carrying out for dust suppression before they load it into the Dumpers/Tippers. Operators have been provided with nose filters regularly. The operator's cabin is of dust proof type.

Transportation:

Dust suppression on haul roads is being carried out by water spraying with water tanker. The cabins of dump trucks are well-constructed and conditioned to control dust and noise effect on the operator.

8.2 Ambient Air Quality

Ambient air quality monitoring is carriedout every month at the following locations in the Core Zone & Buffer Zone to know the status of the ambient air quality

I. CORE ZONE

1. Mines lighting tower
2. Approach road at mines
3. Factory gate
4. Magazine building

II. BUFFER ZONE

1. Mahankaligudem Village
2. Ravipahad Village
3. Janpahad Darga
4. Sunya Pahad Village

Ambient air quality is monitored for 8 hours each sample for PM_{10}, $PM_{2.5}$, SO_2 and NO_x the values are listed out in Table. 8.1. The analyzed values for PM_{10}, $PM_{2.5}$, SO_2 and NO_x are within the limits prescribed by T.S.P.C.B.

Table 8.1

AVERAGE VALUES OF AMBIENT AIR QUALITY DATA

Location	AVG. Flow Rate	Parameters				
		PM_{10}	$PM_{2.5}$	SO_2	NOx	CO (ppm)
Core zone						
1. Mines lighting tower	1.05	78	29	12	23	<1.0
2. Approach road at Mines	1.07	75	28	9	21	<1.0
3. Factory gate	1.06	73	28	9	22	<1.0
4. Magazine building	1.04	70	31	10	20	<1.0
Buffer zone						
1. Mahankaligudem Village	1.06	67	32	8	22	<1.0
2. Ravipahad Village	1.05	70	28	8	21	<1.0
3. Janpahad Darga	1.07	69	29	10	20	<1.0
4. Sunya Pahad Village	1.06	71	28	9	22	<1.0

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

8.3 Waste water Sources and Monitoring

Waste water from toilets is sent to sewage treatment plant and treated water is used for the plantation and dust suppression system. No waste water is being generated.

8.4 Noise Pollution

Noise pollution levels kept within the permissible limits.

Crushing

Crushing process is being carried out in confined area, which is fully closed. Two nos. of efficient dust collectors are installed at the crushers for controlling the dust generation. The noise level depends on the material hardness, which is fed to the crusher.

Noise Levels are measured at various places in the mines by using a sound level meter the results are given in the table 8.2

Table 8.2

Average values of Ambient Noise Levels

S.No.	Location	Noise Levels Leq dB(A)	
		Day Time	Night Time
1	Near Shovel Working	59	--
2	Near Drill Working	60	--
3	Near Inside Dumper Cabin	56	--
4	Near Crusher Hopper	52	--
5	Near Haulage Road	54	--

9. GREENBELT DEVELOPMENT

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

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

During this financial year (i.e. 2017-18) 2,750 saplings were planted in mining lease.

10. EXPENDITURE INCURRED FOR ENVIRONMENT PROTECTION MEASURES IN THE FINANCIAL YEAR 2017-2018:

Total expenditure incurred for various pollution control measures, Occupation health services, solid waste management, monitoring, greenbelt development and social and welfare activities by the Management of DCL is Rs. 40.0 Lakhs (Rupees Forty lakhs only) during the financial year 2017-2018.

11. HOUSE KEEPING

To avoid unnecessary loss of product in the form of dust emission and polluting surrounding environment. Water spraying is done in mining area including haul road to control fugitive emissions. Mine premises is to be clean and green to have good house keeping. M/s. BHAVANIPURAM LIMESTONE MINE-3 is keeping their mine and premises clean and green. House keeping has been found to be well.

Bhavanipuram Limestone Mine - 3

12. AUDITOR'S COMMENTS

1. The audited figures show that peak consumption of water is varying by up to 27.83 m^3/Day for mining lease.

2. The fugitive emissions in mine area are within the prescribed limits of TSPCB.

3. The audit activities have enabled the mine authorities to control fugitive emissions and water consumption efficiently.

4. During the financial year 2017-2018, **Rs. 40.0 Lakhs (Rupees Forty lakhs only)** were spent on environmental protection and social welfare activities by the management of DCL.

Auditors Signature

LAWN ENVIRO ASSOCIATES Hyderabad

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.

2. For Schedule VII to the said rules and entries relating thereto, the following Schedule and entries
3. 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. Ultravoilet Fluorescence
		24 hours**	80 µg/m^3	80 µg/m^3	
2.	Nitrogen Dixodie (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.Gravemetric 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. Gravemetric 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. Chemilminescence 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) $\mu g/m^3$	Annual Average*	100 $\mu g/m^3$	100 $\mu g/m^3$	1. Chemiluminescence 2. Indophenol blue method
		24 hours**	400 $\mu g/m^3$	400 $\mu g/m^3$	
9.	Benzene (C_6H_6 $\mu g/m^3$)	Annual Average	05 $\mu g/m^3$)	05 $\mu g/m^3$)	1. Gas chromatography based continuous analyzer 2. Adorption 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

AIR QUALITY STANDARDS FOR LIME STONE AND DOLOMITE MINES

(Air Quality Standards as per Indian Bureau of Mines, Department of Mines, Ministry of Coal & Mines, Govt. of India)

S.No.	Parameters/Pollutants	Time weighted average (TWA)	Concentration at work zone monitoring station
1	Suspended Particulate Matter (SPM)	8 hours	700 µg/cu m
2	Resperable Particulate Matter (RPM) size less than 10 microns)	8 hours	350 µg/cu m
3	Sulphur Dioxide (SO_2)	8 hours	5 mg/cu m
4	Oxides of Nitrogen (NO_2)	8 hours	6 mg/cu m
5	Carbon Monoxide	8 hours	40 mg/cu m

Note: The distance of monitoring stations from the dust generating source should not exceed 300 m and it should be located in the down wind direction, considering the prominent wind direction.

MINE EFFLUENT STANDARDS FOR LIME STONE AND DOLOMITE MINES

(Mine effluent standards as per Indian Bureau of Mines, Department of Mines, Ministry of Coal & Mines, Govt. of India)

S.No.	Parameters/Pollutants	Concentration not to be exceeded in mg/L except pH
1	pH	5.5 – 9.0
2	Total Suspended Solids (TSS)	100.0
3	Oil & Grease	10.0
4	Iron	3.0
5	Fluoride	1.5

Note: The monitoring stations should be at the place as far as possible close to the source of generation or the discharge from effluent treatment plant, as applicable.

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	40
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 ^OC, max	Shall not exceed 40 in any section of the stream within 15 m downstream from the effluent outlet	45 at the point of discharg e	---	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 ^OC), 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

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_6H_5OH), mg/L, max	1.0	5.0	---	5.0
35	Radio Active Materials: a. Alfa Emitters µc/mL, max b. Beta Emitters µc/mL, max	10^{-7} 10^{-6}	10^{-7} 10^{-6}	10^{-8} 10^{-7}	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 requierd, 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	Require-ment (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_6H_5OH), 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 (Partc39) 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

Sl. 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 Variegata (Caesalphiniaceae)	T: Devakanchanamu H: Rachanaram	M: Deciduous, good in green belts, garden and as a second row avenue tree.
9.	Borassus flabellifer (Arecacese; 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: Gulutora	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 (Leguminosaae)	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 tiloifolia (Tiliaceae)	T: Charachi H: Dhamim	M: Deciduous, good in green belts for use as timber
36.	Hamelen patens		S: Evergreen shrub with dense atractive foliage of greenish bronze leaves; good in gardens.
37.	Hardwicka 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 woodly 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

Sl.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 (Apocyenaceae)	T: Bilaganuueru H: Sadabahar	S: An erect perennial herb; good in garden and along small channels.
48.	Madhuca indica (Sapotaceae)	T: lppa 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 (Leguuminosae, Caesalphiniaceae)	T: Kondachinta	M: Semi evergreen, suitable on road sides, in in gardens & outside buildings.
58.	Plumeria acuuminata (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, Paplionaceae)	T: Vegi H: Bija	M: Deciduous, good on open areas with adequate light
62.	Pogamia pinnata (Leguminosae, Paplionaceae)	T: Ganuuga H: Karanj	M: Deciduous, good along roads & canals.
63.	Rauvolfa 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

Sl.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 (Myyrtaceae)	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 (Bignomiaceae)		M: Deciduous, good in gardens
71.	Tamarindus indica (Leguminosae,Caesalphiniaceae)	T: Chintachettu H: Imli	L: Semi evergreen tree along state & national highways suitable site.
72.	Ticoma stans (Bignomiaceae)	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: Badamchettud 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 (Verbenanceae)	T: Vaavili H: Sambhaluu	S: A large shrub suitable on areas along channels and streams and on waste lands.
81.	Xylia xyicarpa (Eguminosae, Minosaceae)	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