



Penna Cement Industries Limited.

Ref: PCIL/MoEF&CC/Boy-Plant/2017

Date: 18.12.2017

To
The Director
Government of India
Ministry of Environment, Forest and Climate Change
Indira Paryavaran Bhawan, Ali Ganj, Jor Bagh Road
New Delhi- 110003.

Sub: Submission of Revised Final EIA Report incorporating EAC Clarification points : for Environmental Clearance ; M/s. Penna Cement Industries Limited proposes for expansion of Cement Plant with increase production of Clinker from 1.5 to 4.0 MTPA and Cement from 2.0 to 4.6 MTPA at Boyareddypalli Village, Yadiki Mandal, Anantapur District, Andhra Pradesh - Reg.

**Ref: (1) Our online proposal no IA/AP/IND/59430/2016
(2) EAC Meeting dated 13-11-2017
(3) EAC Minutes of Meeting dated 13th to 15th Nov, 2017 and ADS raised vide 17-11-2017**

Dear Sir,

We thank you for giving us opportunity to present our case before EAC vide reference (2) cited above.

We are herewith submitting the Revised Final EIA Report incorporating the clarification points raised by EAC, MOEF & CC vide reference (3) cited above.

The submission of reply to the points raised by EAC, MOEF along with addressal reference in the Revised Final EIA Report is enclosed along with this letter.

We request the Ministry to process our application for grant of Environmental Clearance.

Thanking you

Yours faithfully,
For **Penna Cement Industries Limited**

D. Lakshmikantham
Director - Technical



Encl: as above

Client : Penna Cement Industries Ltd.,
Project : Expansion Of Cement Plant - Increase Of Production;
Clinker: 1.5 to 4.0 Million Tonnes per Annum;
Cement: 2.0 to 4.6 Million Tonnes per Annum &
Increase Of Waste Heat Recovery Power Plant: 10 MW to 20 MW
Location : Boyareddypalli Village, Yadiki Mandal, Anantapur District, Andhra Pradesh.
Subject : Submission of replies to the clarifications points raised by EAC, MOEF & CC vide EAC Minutes of Meeting dated 13th to 15th Nov, 2017 and ADS raised vide 17-11-2017

S. No	Points	Reply	Reference in the Revised EIA Report
1	Possibility of recovering more heat from the kiln and cooler	PCIL has carried out a detailed technical study for recovering more heat from the kiln and coolers. The details of the study are attached as Exhibit -1	Chapter - 2 Para - 2.9.3 Page - 32 to 35
2	No Use of Pet coke in power generation	PCIL has not installed any power plant which is based on solid fuel. The existing and proposed power plants are based on waste heat recovery system. No pet coke will be used in power generation.	Chapter - 2 Para - 2.9.3.2 Page - 35
3	The emission levels within 25 mg/Nm ³	PCIL will comply with the new norms issued by MoEF & CC vide Gazette Notification GSR 612 (E) dated 25 th August, 2014 where emission concentration permitted is 30 mg/Nm ³ for all the cement plants operating and proposed in the country.	Chapter - 4 Para - 4.1.6 Page - 117 to 120
4	The additional green belt of 4 Ha in addition to the existing 16 Ha with native and broad leaved tree species	PCIL will develop additional area of 4 Ha (own land) under greenbelt in addition to existing 16 Ha Fig - 1 Shows the layout of the plant with greenbelt	Chapter - 4 Para - 4.4.3 Page - 132 to 137

S. No	Points	Reply	Reference in the Revised EIA Report
		<p>development of 4.0 Ha</p> <p>The list of broad leaved species proposed for plantation is enclosed as Exhibit -2</p>	
5	Establishment of the environmental cell with qualified person as head-environment with requisite support staff;	<p>PCIL has established the Environmental Cell. The cell is headed by experienced Environmental Engineer and he is supported by an Environmental Scientist.</p> <p>Fig - 2 Shows the organisation structure of the plant and Environmental Cell.</p>	Chapter - 10 Para - 10.4 Page - 198 to 199
6	Revised Corporate Environment Policy including its approval in the Board of directors; SoPs for reporting of non-compliances to the board of directors; hierarchical system to deal with the environmental issues and for ensuring compliance with the environmental clearance conditions;	<p>Revised Corporate Environment Policy approved by Board of Director is Enclosed as Exhibit - 3.</p> <p>SoPs for reporting of non-compliances to the board of directors is enclosed as Exhibit - 4.</p> <p>Hierarchical system to deal with the environmental issues and for ensuring compliance with the environmental clearance conditions is shown in Organization Structure.</p>	<p>Chapter - 10 Para - 10.2 Page - 196</p> <p>Chapter - 10 Annexure - 10A</p> <p>Chapter - 10 Para - 10.4 Page - 199</p>
7	Soil quality representing the various land uses in the area;	<p>The various landuses in 10 km radius of the cement plant are given below</p> <ul style="list-style-type: none"> a. Barren Land - S1 b. Agriculture crop land - S2 c. Agriculture Fallow Land - S3 d. Forest Land - S4 e. Water Bodies f. Builtup Area 	Chapter - 3 Para - 3.4.1 Page - 55 to 57

S. No	Points	Reply	Reference in the Revised EIA Report
		<p>g. Other Mines/quarries</p> <p>Four soil samples from the above locations have been collected. Fig - 3 shows the sampling locations on the land use map</p> <p>Soil Quality of the samples collected at the above locations along with are enclosed as Exhibit - 5</p>	
8	Hazard identification and Risk Assessment (HIRA) along with proposed mitigation measures specific to the plant;	Hazard identification and Risk Assessment (HIRA) specific to the cement plant operations along with proposed mitigation measures are given in Table - 1 .	Chapter - 7 Para - 7.2.1 Page - 148 to 155
9	The hydrogeological report based on GEC methodology;	Hydro Geology report based on GEC methodology is enclosed as Exhibit - 6	Chapter - 3 Para - 3.4 Page - 55
10	Enterprise Social commitment shall be revised with addressing the issues raised during the public hearing and need based assessment for creation of facilities in CAPEX mode and implemented in concurrence with expansion proposal; and	Revised CSR plan under Enterprise Social commitment addressing the issues raised during the public hearing and need based assessment are enclosed as Exhibit - 7	Chapter - 8 Para - 8.3 Page - 185 to 193
11	Ground water withdrawal should not exceed 700 m ³ /day and maximize the use of rainwater harvested	Ground water withdrawal will not exceed 700 m ³ /day and balance water requirement of the plant will be met from harvested rainwater	Chapter - 2 Para - 2.6.3 Page - 22

FEASIBILITY STUDY
PROPOSED 2.5 MTPA CLINKER GRINDING UNIT - WASTE HEAT
RECOVERY SYSTEM

PCIL is operating 1.5 MTPA Clinkerisation plant. A 10 MW Waste heat Recovery based power plant was installed connected to the cement plant for generation of Power. At the design stage of 1.5 MTPA existing Cement Plant, it was estimated that the proposed heat recovery system will be capable of producing power to an extent of 10 MW. Accordingly PCIL has installed 10 MW capacity waste heat recovery plant capturing the hot gases from the Kiln and Cooler. However, the operating experience of PCIL has shown that the maximum power generation is 6.0 MW against the expected capacity of 10.0 MW.

Based on the operational experience of existing plant, PCIL has carried out a detailed technical feasibility to explore the possibility of more waste heat recovery to generate power of more than 10 MW from the proposed new line of 2.5 MTPA Clinker Capacity.

The project is based on waste heat recovery of the hot gases generated in the pre heater and cooler. The Waste Heat Recovery Boilers (2 Nos) will be designed to make use of waste heat of flue gases coming out from Kiln/Preheater and Cooler

Based on the operating experience of the existing plant, the estimated inlet flue gas parameters to the waste heat recovery boilers of the new proposed plant are estimated and given below

Kiln Clinkerisation capacity (5 stage PH)		6500 TPD (Performance)	
Parameter	Unit	AQC	Pre-heater
Source of Gases	-	Mid tap	Pre heater outlet
Flue gas flow rate at boiler inlet	Nm ³ /hr	185250	379,000
Flue gas Temperature at cooler mid tap incase if AQC boiler/ Preheater exit incase of PH of boiler	°C	400	310

Kiln Clinkerisation capacity (5 stage PH)		6500 TPD (Performance)	
Parameter	Unit	AQC	Pre-heater
Flue gas Pressure at cooler mid tap incase if AQC boiler/ Preheater exit incase of PH of boiler (assumed)	mmWC	-10	-600
Flue gas Dust Loading (assumed)	gm/Nm ³	40	60 to 65
Maximum flue gas pressure drop across boiler (including pre- duster in case of AQC boiler)	mmWC	~50	~60
Flue gas temperature at boiler outlet	°C	95±5	165±5

Following are the performance parameters during normal operation of the plant. Performance data is based zero blow –down and zero makeup and steady state condition.

S.No	Description	Unit	Performance Guarantee	Potential/ Indicative Data
1.1	AQC boiler –HP Steam including PH boiler steam			
1	Steam flow at Turbine inlet (note 6)	TPH	37.9	51.4
2	Steam Pressure at Turbine inlet (note 7)	Ata	18.0	18.0
3	Steam temperature at boiler Turbine inlet	Deg C	370±5	370±5
1.2	PH boiler –LP Steam			
1	Steam flow at Turbine inlet	TPH	14.2	18.0
2	Steam Pressure at Turbine inlet (note 7)	Ata	2.5	2.5
3	Steam temperature at Turbine inlet	Deg C	195±5	195±5

Note:

- Above steam generation is based on operating plant experience (Flue gas analysis, Flue gas flow, Flue gas pressure, Flue gas temperature

and dust loading) as detailed out in design basis for the proposed 2.5 MTPA new line.

- Above indicated all parameters subject to availability of inputs (flue gas analysis/composition, Flue gas flow, Flue gas pressure, Flue gas temperature) on continuous basis at inlet of boilers from Kiln simultaneously to guarantee the above said performance condition parameters.

Considering the steam availability potential and pressure drop across the values, with the low pressure, the maximum power generated is estimated to be about 10.0 MW.

PCIL also collected the data from operating experience of various Waste Heat Recovery Based Power Plants in operation by the Cement Plants based on Preheater and Cooler. Based on the data obtained, the maximum power generation is 30 kwh/t of clinker (after drying off nominal moisture in raw material and coal) and based on this, the new plant can generate maximum power of 10.40 MW. Hence WHRB power plant of 10 MW is considered.

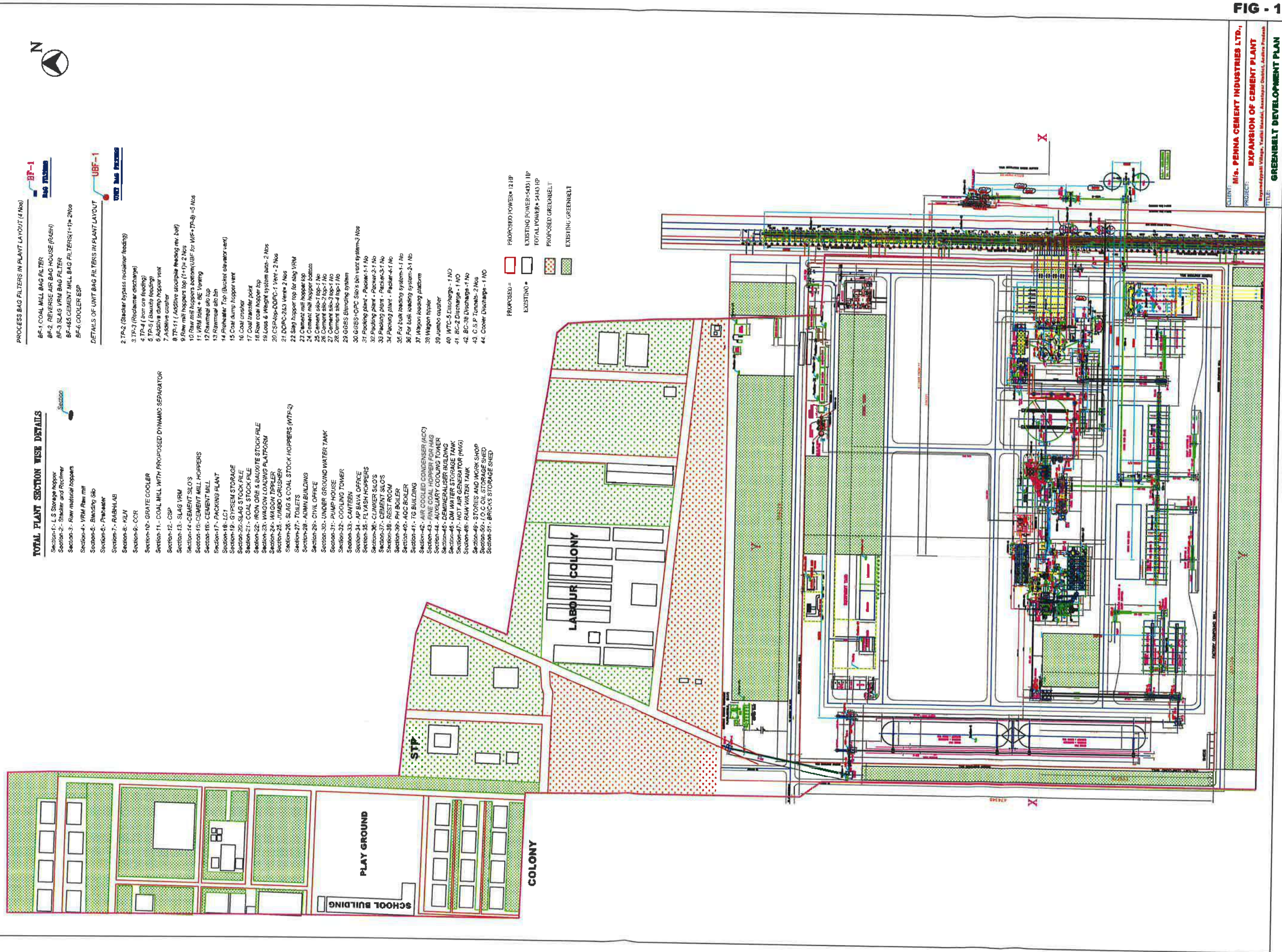


FIG - 1

EXHIBIT -2

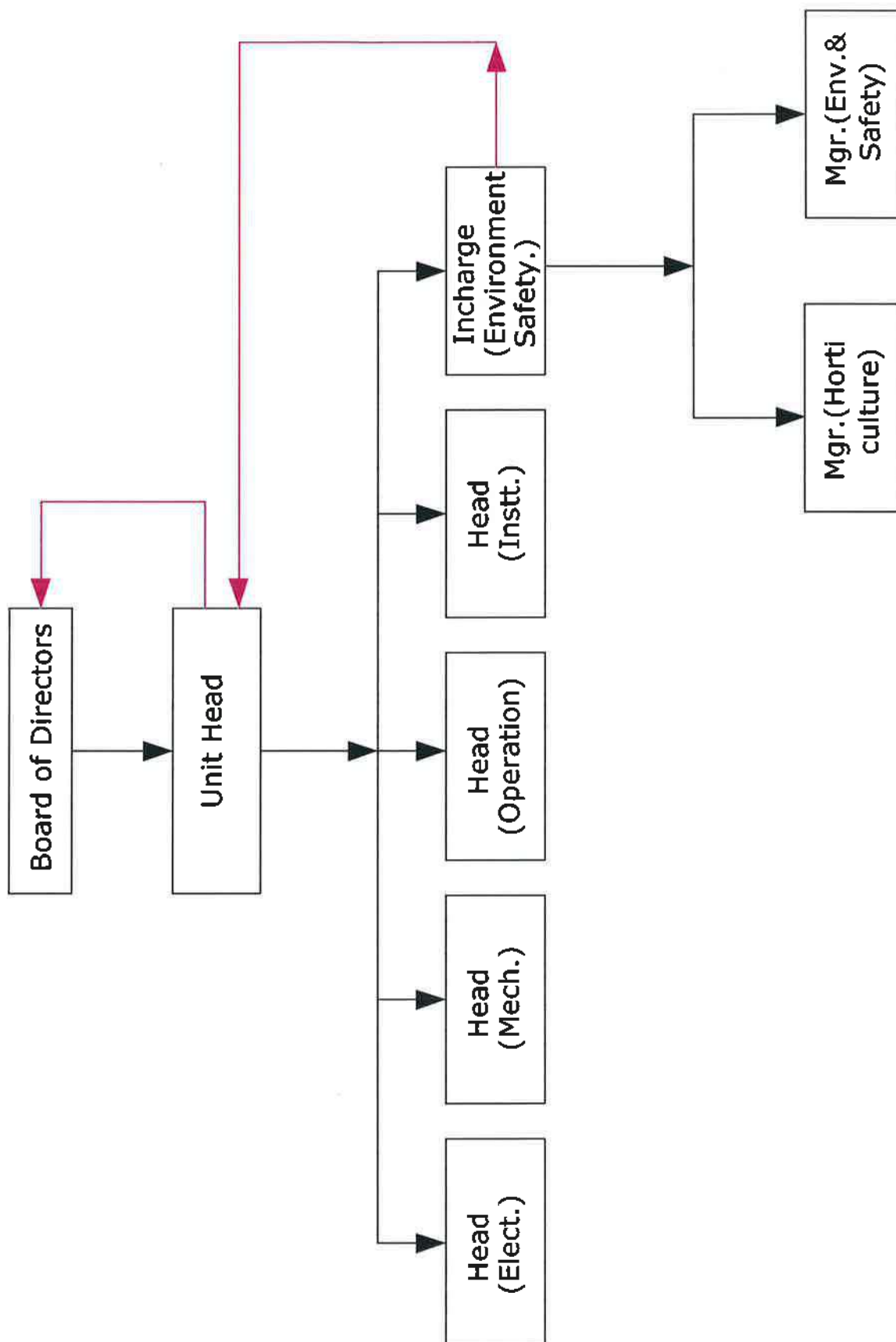
**LIST OF BROAD LEAVED NATIVE SPECIES PROPOSED FOR
PLANTATION IN 4 HA AND ALSO IN THE GAP FILLING OF EXISTING
GREENBELT**

	Scientific Name	Common Name
1	<i>Aegle marmelos</i>	Mareedu
2	<i>Ailanthus excels</i>	Peddamaanu
3	<i>Alangium chinense</i>	-
4	<i>Albizia procera Benth</i>	Tellachinduga
5	<i>Alnus nepalensis</i>	Indian or Nepalese
6	<i>Alstonia scholaris</i>	Devil tree
7	<i>Anogeissus latifolia</i>	Axle Wood Tree Chirumaanu
8	<i>Aphanamixis polystachya</i>	Chawamanu
9	<i>Artocarpus heterophyllus</i>	Jack fruit tree
10	<i>Artocarpus lacucha</i>	Kammaregu
11	<i>Barringtonia acutangula</i>	Kanapachettu
12	<i>Bauhinia Semla Wanderlin</i>	Nirpa
13	<i>Bischofia javanica</i>	Nalupumusti
14	<i>Broussonetia papyrifera</i>	Paper mulberrys
15	<i>Ceiba pentandra</i>	Kapok
16	<i>Citrus taitensis</i>	Indian Rough Lemon, Jambhiri orange
17	<i>Citrus aurantifolia</i>	Lime, Common lime, sour lime
18	<i>Cordia dichotoma</i>	Chinn - anakkeru
19	<i>Derris indica</i>	Gaanugachettu, Punguchettu
20	<i>Diospyros melanoxylon</i>	Tumki
21	<i>Ficus religiosa Linn</i>	Ashavatham
22	<i>Ficus virens Ait</i>	Badiju
23	<i>Ficus benghalensis Linn</i>	Peddamarri
24	<i>Ficus benjamina Linn</i>	
25	<i>Ficus elastic Roxb</i>	Indian Rubber tree
26	<i>Ficus gibbosa Blume</i>	Tella-barinika
27	<i>Ficus racemose</i>	Cluster fig
28	<i>Ficus hispida</i>	Vettiyati
29	<i>Ficus arnottiana</i>	Indian Rock Fig, rock pipal, waved- leaved fig tree, wild pipal
30	<i>Gardenia resinifera Roth</i>	Erubikki
31	<i>Madhuca longifolia var. latifolia</i>	Indian Butter Tree

32	<i>Madhuca longifolia</i> var. <i>longifolia</i>	South Indian Mahua, Indian Butter Tree
33	<i>Mallotus philippensis</i>	Sinduri
34	<i>Mangifera indica</i>	Maamidichettu
35	<i>Millingtonia hortensis</i>	Indian cork- tree, Buch
36	<i>Mimusops elengi</i> Linn	Vakulamu
37	<i>Mimusops hexandra</i> Roxb	Pala
38	<i>Murraya paniculata</i>	Nagagolunga
39	<i>Polyalthia longifolia</i>	Asokamu
40	<i>Populus nigra</i> Linn	Lombardy – poplar
41	<i>Salix tetrasperma</i>	Eetipaala
42	<i>Saraca asoka</i> Roxb	Asokamu
43	<i>Soymida febrifuga</i>	Sumi, Sonidamaanu
44	<i>Spathodea campanulata</i> Beauv	Indian Tulip tree
45	<i>Spondias pinnata</i>	Amratakamul
46	<i>Strychnos nux-vomica</i>	Mushti
47	<i>Syzygium cumini</i>	Neereedu
48	<i>Tectona grandis</i>	Adaviteeku
49	<i>Terminalia elliptica</i>	Asan, Indian Laurel, Silver grey wood, White chuglam
50	<i>Terminalia calamansanai</i>	Philippine Almond, Yellow Terminalia
51	<i>Terminalia arjuna</i>	Yerramaddi
52	<i>Terminalia chebula</i>	Karakkaaya
53	<i>Terminalia catappa</i>	Indian Almond

FIG - 2

ORGANISATION STRUCTURE





Penna Cement Industries Limited.

ENVIRONMENT POLICY

At Penna Cement Industries Limited, we believe the environment, climate protection and sustainable resource conservation to be the foundation for our future development. Recognising the environmental implications of every action; we seek to minimize the consumption of natural resources, generation of waste and its adverse impact by incorporating sustainability at every stage of our business decisions.

OUR COMMITMENT

- Conduct our operations in full compliance with applicable national, state, and local laws and regulations.
- Promote the efficient use of energy, alternate fuels and raw materials
- Reduction of waste, thereby contributing to the conservation of natural resources
- Strive to prevent pollution at the source through continual improvement programmes.
- Implement Environment Management System (EMS) in all our operations to manage the overall responsibilities and performance.
- Employ safe technologies and operating procedures to reduce exposure of our employees and our communities to Environmental, Health and Safety risks.
- Communicate and disseminate this policy through induction, education and training to all stakeholders.
- Monitor the implementation of the policy by carrying out periodic audits , reporting to the Board of Directors, the findings, Non compliances , corrective and preventive actions and incorporate the remedial measures with the consent of the Management.
- Review this policy and re-issue, if required.

DIRECTOR (Technical)



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**STANDARD OPERATING PROCEDURE FOR REPORTING NON
COMPLIANCES TO BOARD OF DIRECTORS**

STANDARD OPERATING PROCEDURE (SOP)

This SOP describes the procedure for reporting Non-Compliances which effect operation of the plant and plant personnel.

This SOP applies to all Plants of Penna Cement Industries Limited (PCIL).

Definitions

- **Non-Compliance:** Any deviation or departure from the stipulated conditions of statutory bodies that does not have prior approval unless the change is necessary to remove an immediate hazard to plant and working personnel.
- **Corrective Action Plan (CAP):** A plan developed in response to a violation that outlines the steps to be taken to: (1) reduce the risk to plant affected by the violation and (2) prevent a recurrence of the violation.

Procedures

Reporting protocol on violations

Periodic review of the compliance to the conditions stipulated by statutory bodies will be done once in 6 months. The responsibility of conducting the Audit lies with the Unit Head. Audit shall be carried out by internal or external persons. The summary of violations that occurred during Audit will be recorded in report form. Violations will be reported within 48 hours to the Unit Head.

The violation recorded will be evaluated to study whether protocol change has been initiated to remove violation

The Content of the Violation Report.

Reports of violations will include the following elements:

- Date of report
- Department Name
- Description of the violation, including dates and other details;
- Description of the factors that led to the violation;
- Description of any compromises to workers safety or to the integrity of the plant
- A statement addressing whether the violation is likely to affect

- plant operations/personnel.
- As applicable, a description of corrective actions already taken, dates of implementation, and whether and how persons involved were informed of the violation and outcomes.
- A Corrective Action Plan (CAP). Corrective action plans shall be prepared to include one or more of the following:
- Drafting new or revised standard operating procedures,
 - Developing new or revised monitoring plan
 - Notifying Departments/workers of risks associated with the violation
 - Training personnel,
 - Hiring additional personnel or modifying roles and responsibilities
- Signature. The Auditor will sign the violation report.

Review of Findings of Non-Compliance

All reports of non-compliance are initially evaluated by the Incharge (Environment Safety). A report will either be designated as not requiring further action, or will be escalated for review by Unit Head.

Investigation

The Unit Head reviews the report and chooses one of the following courses of action in investigating the allegation:

- a. Conducts the review alone
- b. Conducts the initial review in co-ordination Incharge (Environment Safety)
- c. Requests that legal counsel provide advice and conduct the review

Serious or Continuing Non-Compliance Referred to the Board of Directors (BOD)

Non-compliance that is believed to be serious or continuing is referred for review to the BOD through Incharge (Environment Safety) after endorsement by Unit Head. The report, along with pertinent materials, will be made available to all BOD members of the reviewing prior to the convened meeting.

Upon convened BOD review, the following actions may be taken:

- i. The BOD determines that additional information is needed and requests that such information be obtained before further action is taken.
- ii. The BOD determines that non-compliance did not occur or that non-compliance occurred but was neither serious nor

- continuing, and either takes no action or requires or recommends an appropriate corrective action plan.
- iii. The BOD determines that non-compliance occurred and that it was serious or continuing. The BOD takes appropriate action
- ❖ Follows the required internal reporting procedure concerning determinations of serious or continuing non-compliance.
 - ❖ For concerns not within the BOD purview, the BOD refers the matter to the Unit Head.
 - ❖ BOD determinations and actions are recorded, and communicated to the relevant Incharge (Environment Safety) with Copy marked to Unit Head for necessary actions.

Post-Review Reporting Procedures

In considering actions for serious or continuing non-compliance, the BOD seeks to:

- a. Correct the non-compliance
- b. Discourage it from occurring again (e.g., hold the relevant individuals accountable for their actions and provide education on how to comply), and
- c. Attempt to mitigate any adverse effects on plant/workers.

FIG - 3

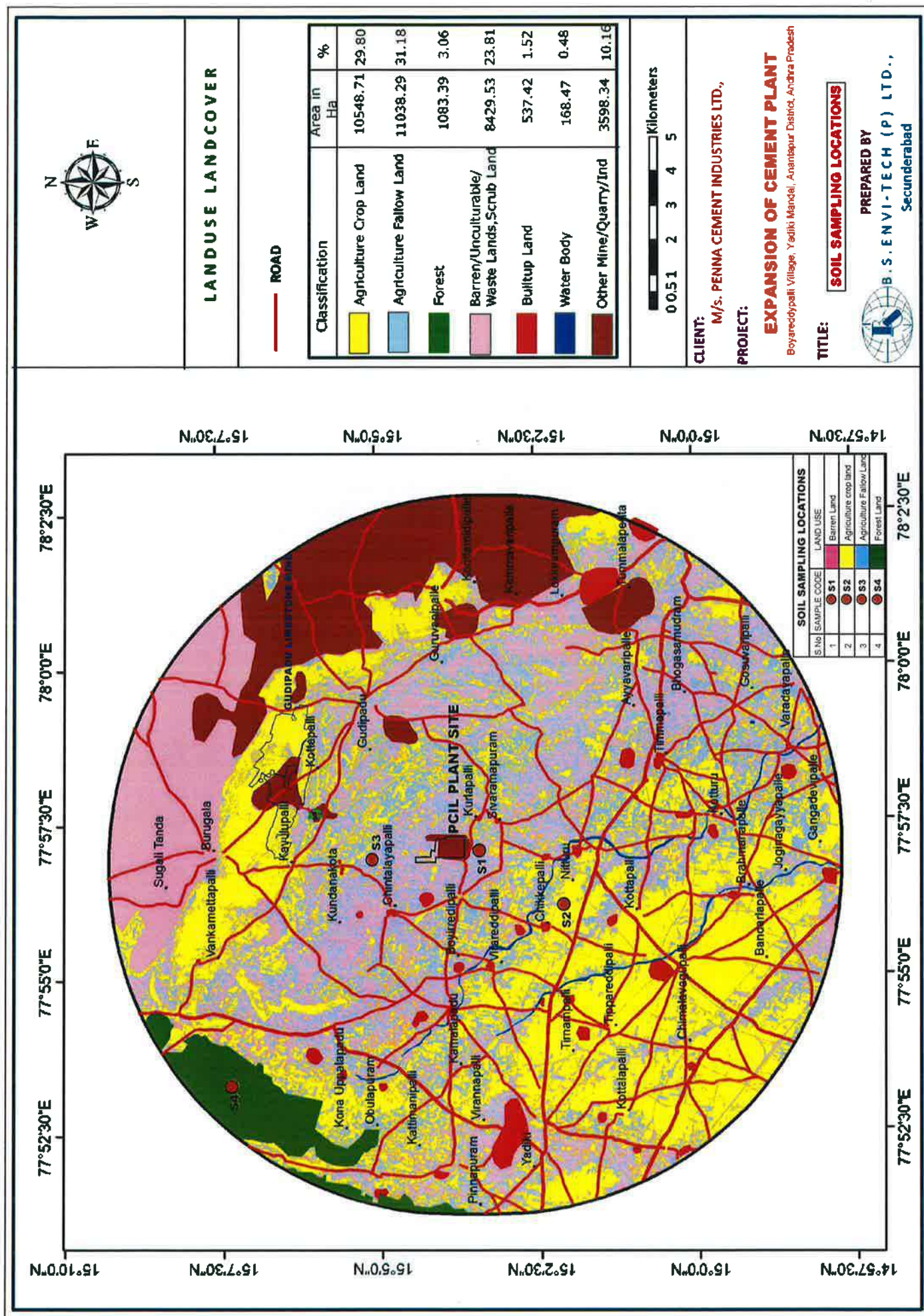


EXHIBIT - 5

CLIENT : Penna Cement Industries Limited
PROJECT : Expansion of Cement Plant
LOCATION : Boyareddypalli (V), Yadiki (M), Anantapur (D), A.P
SOIL SAMPLE CODE : S - 1
LANDUSE : Barren Land

SOIL TEST REPORT WITH INTERPRETATION

S. No	PARAMETERS	RESULTS	INTERPRETATION
		S1	
1	pH Value of 1:2 aqueous extract Solution	7.85	Moderately Alkaline, Alkaline
2	E.C, $\mu\text{S}/\text{cm}$ of 1:2 aqueous extract Solution	388	Low
3	Total Soluble Salts mg/kg	486	Suitable, Low
4	Mineralized Nitrogen (Available Nitrogen) , kg/ha	335	Sufficient
5	Available Phosphorous as P_2O_5 , kg/Ha	36	Medium
6	Available Potassium as K_2O , Kg/Ha	241	Average
7	Available Magnesium as Mg, mg/kg	108	Medium
8	Available Chlorides as Cl, mg/Kg (Water soluble)	109	Excessive
9	Total Organic Carbon, %	0.62	Average
10	Sodium Absorption Ratio (SAR)	0.08	Low
11	Texture:	Loamy Sand	-
	a) Sand %	83	-
	b) Silt %	8	-
	c) Clay %	9	-

CLIENT : Penna Cement Industries Limited
PROJECT : Expansion of Cement Plant
LOCATION : Boyareddypalli (V), Yadiki (M), Anantapur (D), A.P
SOIL SAMPLE CODE : S - 2
LANDUSE : Agriculture crop land

SOIL TEST REPORT WITH INTERPRETATION

S. No	PARAMETERS	RESULTS	INTERPRETATION
		S2	
1	pH Value of 1:2 aqueous extract Solution	7.72	Moderately Alkaline, Alkaline
2	E.C, $\mu\text{S}/\text{cm}$ of 1:2 aqueous extract Solution	318	Low
3	Total Soluble Salts mg/kg	405	Low, Suitable
4	Mineralized Nitrogen (Available Nitrogen) , kg/ha	392	Sufficient
5	Available Phosphorous as P_2O_5 , kg/Ha	144	More than sufficient
6	Available Potassium as K_2O , Kg/Ha	812	More than sufficient
7	Available Magnesium as Mg, mg/kg	371	High
8	Available Chlorides as Cl, mg/Kg (Water soluble)	94	Excessive
9	Total Organic Carbon, %	0.82	Better
10	Sodium Absorption Ratio (SAR)	0.16	Low
11	Texture:	Sandy Clay	-
	a) Sand %	43	-
	b) Silt %	24	-
	c) Clay %	33	-

CLIENT : Penna Cement Industries Limited
PROJECT : Expansion of Cement Plant
LOCATION : Boyareddypalli (V), Yadiki (M), Anantapur (D), A.P
SOIL SAMPLE CODE : S - 3
LANDUSE : Agriculture Fallow Land

SOIL TEST REPORT WITH INTERPRETATION

S. No	PARAMETERS	RESULTS	INTERPRETATION
		S3	
1	pH Value of 1:2 aqueous extract Solution	7.02	Neutral, Optimal
2	E.C, $\mu\text{S}/\text{cm}$ of 1:2 aqueous extract Solution	106	Low
3	Total Soluble Salts mg/kg	155	Suitable, Low
4	Mineralized Nitrogen (Available Nitrogen) , kg/ha	168	On average sufficient
5	Available Phosphorous as P_2O_5 , kg/Ha	180	More than sufficient
6	Available Potassium as K_2O , Kg/Ha	192	Medium
7	Available Magnesium as Mg, mg/kg	96	Medium
8	Available Chlorides as Cl, mg/Kg (Water soluble)	38	High
9	Total Organic Carbon, %	0.30	Less
10	Sodium Absorption Ratio (SAR)	0.10	Low
11	Texture:	Loamy Sand	-
	a) Sand %	82	-
	b) Silt %	8	-
	c) Clay %	10	-

CLIENT : Penna Cement Industries Limited
PROJECT : Expansion of Cement Plant
LOCATION : Boyareddypalli (V), Yadiki (M), Anantapur (D), A.P
SOIL SAMPLE CODE : S - 4
LANDUSE : Forest Land

SOIL TEST REPORT WITH INTERPRETATION

S. No	Parameters	RESULTS	INTERPRETATION
		S4	
1	pH Value of 1:2 aqueous extract Solution	7.68	Moderately Alkaline Alkaline
2	E.C, $\mu\text{S}/\text{cm}$ of 1:2 aqueous extract Solution	158	Low
3	Total Soluble Salts mg/kg	215	Suitable, Low
4	Mineralized Nitrogen (Available Nitrogen) , kg/ha	316	Sufficient
5	Available Phosphorous as P_2O_5 , kg/Ha	28	Less
6	Available Potassium as K_2O , Kg/Ha	180	Less
7	Available Magnesium as Mg, mg/kg	147	Medium
8	Available Chlorides as Cl, mg/Kg (Water soluble)	52	Excessive
9	Total Organic Carbon, %	0.68	Average
10	Sodium Absorption Ratio (SAR)	0.14	Low
11	Texture:	Loamy Sand	-
	a) Sand %	80	-
	b) Silt %	11	-
	c) Clay %	9	-

INTERPRETATION OF SOIL RESULTS

1	pH Value	<5.1	5.2-6.0	6.1-6.5	6.6-7.3	7.4-8.4	>8.5
		Strongly Acidic	Moderately Acidic	Slightly Acidic	Neutral	Moderately Alkaline	Strongly Alkaline
		Acid		Optimal		Alkaline	
2	Electrical Conductivity	<1.0		1.0-2.5		>2.5	
		Low		Medium		High	
3	Total Soluble Salts	<640		640-1600		>1600	
		Suitable		Marginal		Poor, unsuitable for many crops	
		Low		Medium		High	
4	Nitrogen	<50	51-100	101-150	151-300	>300	
		Very less	Less	Medium	On average sufficient	Sufficient	
5	Phosphorous	<15	16-30	31-50	51-65	66-80	>80
		Very less	Less	Medium	On average sufficient	Sufficient	More than sufficient
7	Potassium	0-120	120-180	181-240	241-300	301-360	>360
		Very less	Less	Medium	Average	Better	More than sufficient
9	Magnesium	<60		60-300		>300	
		Low		Medium		High	
10	Chlorides	0-5	5-10	10-20	20-50	>50	
		Very low	Low	Medium	High	Excessive	
11	Total Organic Carbon	<0.2	0.21-0.4	0.41-0.5	0.51-0.8	0.81-1.0	>1
		Very less	Less	Medium	Average	Better	More than sufficient
12	Sodium Absorption Ratio	1-10		10-18		18-26	
		Low		Medium		High	
13	Texture	Soil Textural Triangle					

TABLE - 1

**HAZARD IDENTIFICATION AND RISK ASSESSMENT (HIRA)
BOYIREDDIPALLI CEMENT PLANT, PCIL**

S. No.	Area	Section	Hazard Description	Frequency/ Likelihood	Consequence	Risk Class	Vulnerable Exposure No Of Persons	Preventive Measures
1	Crusher	Lime stone Crusher	Choking of crusher with boulders	5	3	High	1	<ul style="list-style-type: none"> Permit to work system between mines and crusher. Red light indication to stop feeding of stone from mines. Chain railing is provided to restrict the dumping of material in hopper.
		Conveyor Belts	Entrapment in belt conveyor	5	2	Moderate	2	All conveyors belt are provided with trip wire system.
2	Raw material Handling	Stacker & Reclaimer (Lime Stone, Additives & Raw Coal)	Stacker & Reclaimer can overrun, which overturn the equipment	1	1	Low	2	Red light indication to stop feeding of stone
	Raw Mill	Belt Conveyors	Entrapment in belt conveyor	2	2	Low	4	The area will be restricted
		Vertical Roll Mill	Personnel can come in contact with Rotating parts	2	4	Moderate	1	Safety guards will be provided
		Air Separator		2	4	Moderate	1	24 Volts D.C. hand lamps are used while working inside the separator. Appropriate work permits system taken prior to start the work.
		Compressor	Person can come in	2	4	moderate	1	Guards to be in place all

	house	contact with drives					the time .
3	Coal Handling	Silo Top	Person falling from top	2	5	moderate	3 Railing to be provided and Safety belts to be tied to the same.
		Coal Mill	Fire and explosion in the coal mill and Bag House. Bag house is used as pollution Control equipment and connected in hot gases path. The inlet temperature of bag house is not allowed to go beyond the safe limit otherwise fire or explosion may take place.	2	3	low	1 Red light indication to stop feeding of coal
		Coal Storage	Fire in coal storage	2	4	Moderate	2 Regular inspection, water spray, isolation from ignition sources
4	Kiln		Possibility of fire Burner Platform. Radiation in the vicinity	2	2	low	2 Continuous exposure to be avoided
				2	3	Low	2
5	Clinker cooler	Clinker cooler	Spill of hot clinker	2	4	Moderate	2 Wearing Safety shoes all the time
		Clinker Pan conveyors	Entrapment in pan conveyor – overflow of hot clinker	2	3	Low	2 Thermal protection aprons to wear
6	Cement Mill		Personnel can come in contact with Rotating parts	2	4	Moderate	2 Training, proper supervision, PPE's
7	Wagon loader		Trip of bag slider	2	4	Moderate	2
8	Waste Heat Recovery Based Power Plant		Explosion in boiler due to over pressure and temperature	2	5	Moderate	2 Continuous monitoring, safety valves proper maintenance

		Exposure to the hot surface of pipeline or machineries	2	4	Moderate	1	Regular maintenance inspection,
9	Generator & Turbine hazard	Explosion in turbine due to cooling system failure	2	4	Moderate	2	Regular maintenance inspection, Continuous Temperature monitoring
		Damage on generator due to lack of lubrication in coupling shaft	2	4	Moderate	2	
	Switch yard	Fire on transformer	2	4	Moderate	2	Regular maintenance inspection,
		Electric shock and electric burn routine work, maintenance or inspection of electrical panels in switch yard	2	5	Moderate	2	Training, PPE's should provided
10	Mines	Explosion hazard in explosive storage room. Outbreak of fire in oil storage room. Any accident due to explosives.	2	5	Moderate	2	Fire extinguisher, eliminate the possible ignition source

RATING CRITERIA CONSIDERED FOR HIRA

Frequency/likely hood

Frequency	Score	Definition
High	5	Failure that occur on monthly basis
Probable	4	Failure that occur on yearly basis
Occasional	3	Facility had previous experience of similar failure
Remote	2	Possible to occur and had occurred in similar facility elsewhere
Likely	1	Have not known to occur in the similar facility elsewhere

Consequence		Score	Definition
Frequency	Catastrophic	5	Failure results in occurrence that cause fatality
	Major	4	Failure results in occurrence that cause injury
	Moderate	3	Failure results in occurrence that cause damage to property
	Minor	2	Failure results in occurrence that cause minor damage to property
	Negligible	1	Failure results in occurrence cause damage to nearby property

HIRA equation: Risk = Frequency * Consequence

		Consequence/Severity				
Frequency		1	2	3	4	5
	5	5	10	15	20	25
	4	4	8	12	16	20
	3	3	6	9	12	15
	2	2	4	6	8	10
	1	1	2	3	4	5



HYDROGEOLOGY REPORT

M/s. **PENNA CEMENT INDUSTRIES LTD., (PCIL)**, is operating a cement plant located in Boyareddypalli in South-Western Andhra Pradesh, the unit was commissioned in Sep 2008 with a capacity of 2.0 MTPA. PCIL now proposes to increase production capacity of Boyareddypalli cement plant located at Boyareddypalli Village, Yadiki Mandal, Anantapur District, Andhra Pradesh.

In Cement Plant, water is required for cooling, dust suppression, sanitary facilities and gardening. The present water requirement of the plant is 930 m³/day and is sourced from bore wells within the plant site. Additional Water requirement for the expansion proposal is 500 m³/day. The source of water is bore well/mine pit.

Hydrological and hydrogeological study has been carried out as per GEC norms in the core zone (Cement Plant area) and buffer zone (10 km radius study area) for estimating availability of water and impact of Water drawl from bore wells on the water regime.

TOPOGRAPHY AND DRAINAGE

The Cement Plant area is a plateau type linear land. The general ground level has a very gentle southeasterly slope. Rest of the area is gently undulating with a relief of not more than 10 m. The higher elevations are in the northern part with altitude about 277 m above MSL and the lower ones with an average altitude of 273 m above MSL along the southern boundary. The maximum relief is 4 m.

The regional drainage is controlled by the River Pennar and its tributaries. The drainage pattern is of dendrite type. The drainage is towards NE and E, matching with the gentle gradient of the land. The area is a drought prone one, which is manifested in scanty vegetation cover. The study area is devoid of any significant vegetation.

Groundwater occurs under water table and semi-confined conditions. The groundwater level ranges from 30 to 35 m bgl in summer season. The average fluctuation of ground water table is 2-4 m during monsoon/ winter and summer seasons.

The temperatures may reach up to 45.6° C with minimum around 6.7° C. The annual average rainfall varies between 364 and 867 mm.

REGIONAL GEOLOGY

The study area forms a part of Cuddapah Super group which has two distinct sub basins (Kurnool and Palnad Sub basins). These sub basins are made up of sandstone, shale, and limestone which is included in the Kurnool Sub group of middle to upper Proterozoic age co-relatable with Vindhyan Super group of Northern India. In the Kurnool group the Narji Limestone formation has two distinct components viz the lower massive, limestone and the upper calcareous flaggy stone. The limestone is of cement grade and constitutes the main source of raw material to several cement plants in the region.

Local Geology

The surface is mostly covered by black-cotton soil of variable thickness ranging from 0.3 to about 0.5 m with an average of 0.4 m.

The area is underlain by Tadipatri shales of lower Cuddaph. The shales are brown, arid grey in colour and show fine to medium grained texture. They occur as shales and calcareous shales.

Groundwater occurs under water table and semi confined conditions in the weathered and fractured shales. The thickness of weathered zone varies from 13.00 to 18.00 m.

The Bore wells / open wells were inventoried village wise and in total 345 irrigation bore wells and 28 open wells are fitted with pump sets for raising crops.

Ground water irrigates 78% of the total irrigation in the study area and it plays a vital role in irrigation.

The irrigation by ground water accounts for 78% of the total area irrigated, out of which 76% account for bore well and filter point wells and remaining 2 % for dug well irrigation. The total area irrigated by ground water is 1228 ha. In all, there are 373 ground water abstraction structures in the study area.

The inventory data shows that the bore wells drilled for drinking within the premises of villages are deep seated. The inventory data reveals that the open

wells are having a range of depth from 6 m to 15 m bgl, with an average yield of 3000 liters per hour whereas the bore wells have been drilled up to a maximum depth of 100 m and the average depth is 75 m. The water first met in the area is about 25 m and the average water level in these bore wells is 35 m. Further the joints and fracture system extends up to a depth of 150 m. The average yield of the bore wells is \approx 1300 liters per hour.

There are totally 24 drinking water bore wells within the village limits and most of them are at a depth of 30 to 40 meters. Majority of them are fitted with Hand pumps and few of them are fitted with motors under piped water schemes.

CLIMATE & RAIN FALL DATA

The average annual rainfall is 535 mm, which ranges from Nil rainfall in February and March to 129 mm in September. September and October are the wettest months of the year. The mean seasonal rainfall distribution is 316 mm during southwest monsoon (June - September) 146 mm during northeast monsoon (Oct-Dec), 1 mm rainfall during winter (Jan-Feb) and 72 mm during summer (March-May). The percentage distribution of rainfall season wise is 58.7% in southwest monsoon, 27.6% in northeast monsoon, 0.21 percentages in winter and 13.5% in summer.

GROUND WATER DRAFT

The study area consists of 19 villages. Under the geohydrological survey the inventory of existing irrigation open / bore wells, drinking water bore wells fitted with hand pumps and piped water supply villages and the surface water structures like tanks, ponds etc., has been considered.

There are about 8 tanks in the study area with the mine pits of various industries which receive about 1.43 MCM of rainwater. Taking 10 % of Surface water as return recharge, it is 0.143 MCM.

The total irrigation bore wells in the study area are 345 and the total open wells are 28. Thus the ground water draft is worked out by taking 10 hrs of pumping with an average yield of 3000 liters / hour for bore well and 2000 liters / hour for open well. **The total ground water draft per annum works out to 3.98 MCM.**

The human consumption also contributes for the Ground water draft and it is worked out by taking the population as per the 2011 census in the study area

and the total population is 81,808. **Thus the draft from human consumption works out annually to 4.03 MCM.**

REQUIREMENT OF WATER

Water is required for cooling, dust suppression, Domestic use and gardening. The present water requirement of the plant is 930 m³/day. 700 m³/day for cement plant and colony is sourced from borewells within the plant site. Ground water withdrawal will not exceed 700 m³/day. 230 m³/day of water for existing waste heat recovery based power plant is met from mine pit.

Additional water requirement for expansion of cement plant and WHRB power plant is 500 m³/day and the same will be met from Mine pit.

There are 12 bore wells existing in the plant area. The total depth of the bore well ranges from 27.27 to 75.75 m and depth to water levels ranges from 6.91 to 9.85. The average yield of the bore wells is 1300 lph/borewell

Ground water withdrawal for Penna cement plant will not exceed 700 m³/day even after expansion.

Total ground water withdrawal per annum will be 0.231 MCM

GROUND WATER POTENTIAL

The main source of ground water is rain water. Based on the *National Resource Estimation Committee report*, the rainfall infiltration method is adopted. Since, this area falls in the Hard rock area category the rainfall infiltration factor is taken as 10 % of average rainfall. The ground water potential works out to 18.94 MCM.

The other sources of ground water recharges are the return irrigation from the surface water and ground water. (a) The return recharge from ground water structures irrigation is 10 % of the draft. This works out to 0.398 MCM and (b) from return irrigation from tanks, here also 10 % is taken out of the water used for irrigation, this works out to 0.143 MCM.

Hence, the total recharge from all these sources works out to 19.48 MCM.

GROUND WATER BALANCE

Ground Water Balance is worked out as follows:

	<i>In MCM</i>
a) Total water available from rainfall	189.4
b) Ground Water recharge from rain water	18.94
c) Return recharge from Tanks	0.143
d) Return irrigation recharge from Draft	0.398
e) Present annual draft i) Human	4.030
ii) Bore wells	3.98
f) Water Requirement for Plant and for greenbelt and residential etc	0.231
g) Total Ground Water Available (e+f)	19.48
h) Ground water balance (present)	11.24

The present utilization is 42.30 % and after the plant operations (after expansion) the utilization will not change as the additional water requirement of plant will be sourced from Mine pit.

Thus the ground water development computation at present is 42.30 % only and since it is well below the 70 % hence, categorized as safe.

However, since the area is likely to turn into exploited state, further ground water tapping is not recommended. On the other side, more water (rain) conservation shall be adopted.

GROUND WATER RECHARGING AND RAINWATER HARVESTING

PCIL is implementing rainwater harvesting measures in all the possible ways in the plant site and study area.

Rain water collected from Plant & Colony are routed to a common storm water drain which has an outlet into rain water harvesting pit located at the lower level in the colony area.

PCIL has constructed 18 no's of rain harvesting pits along the road from main gate to the colony for the storm water recharge in to the ground and also roof tops.

PCIL has taken up De-silting and renovation of old water reservoir which is in NE of plant with capacity of 0.2 TMC for rainwater harvesting.

- The water conserved will be used to meet the plant water requirement.
- Rain water harvesting and groundwater recharge structures have been constructed outside the plant premises at following villages
- Check dam near chintalayapalli for storing of rain water has been constructed and PCIL has initiated Checkdam construction at Kundanakota

CHINTALAYAPALLI – PERCOLATION TANK










WATER CONSERVATION AND RECHARGING OF THE GROUND WATER

The following water conservation measures are implemented in the plant.

- a. Treated waste water is used for greenbelt development.
- b. Greenbelt by drip irrigation covering an area of 85 acres within and outside the cement plant was developed by PCIL.
- c. Water meters have been installed at various location of the cement plant to optimize the usage and leakages.

WATER METERS INSTALLED IN CEMENT PLANT

			
PLANT WATER TANK INLET	COOLING TOWER MAKEUP WATER	COLONY WATER	RAW MILL
			
COOLER WATER SPRAY	CEMENT MILL WATER SPRAY	CEMENT MILL WATER SPRAY	VRM SLAG WATER SPRAY

- a. Roof top rain water is harvested, led into a tank and is recycled.
- b. Paved roads result in proper channeling of rain water in to storage ponds.

IMPACT OF MINING ON GROUND WATER

Ground water table occurs at a depth of 45m below ground level i.e. 405 m RL as observed and as per the gathered information in the nearby villages in summer and 35 m i.e. 415 m RL during the rainy season.

The workings are expected to reach 420 m RL as ultimate depth of mining, which is above the water table in the area. Hence there will not be any impact on ground water regime of the lease area and its surroundings.

No dewatering is proposed from the mine pit, only rainwater collected in the existing mine pits will be utilized for plant and mine water requirement to minimize ground water drawl.

However, the mined out pit is being converted into rain water storage source and ground water recharge also. As the pit area increases, the Rain water storage and recharging also goes up.

CONCLUSION

1. At present the usage is 42.30 % of available ground water and it is categorized as safe zone.
2. The average rain fall computed is 535 mm whereas the normal rain fall is 550 mm.
3. The ground water study reveals that the operations will not have much effect on the ground water utilization in the long run. With added 10 % ground water recharge by constructing recharge structures and rain water harvesting structures there will not be any additional burden on the aquifer.
4. Water quality is good at present, and remains to be the same even after expansion operations by taking precautionary measures.
5. The impact on water quality due to plant operation will be negligible on the water used at plant as it is in closed circuit and no water effluent will be discharged from the plant.

Exhibit – 7

ESR BUDGET PROPOSAL (Worked Out Based On Need Based Study)

PROPOSED ACTION PLAN FOR CSR - 2017- 22 (Amount in Rs. In Lakhs)						
ACTIVITY	2017-2018	2018-2019	2019-2020	2020-2021	2021-2022	Total
Education						
Promotion of Higher educational facilities to all the boys & girls	3	3	3	3	3	12
Contribution to colleges and hostels outside (10 years)	20	20	20	20	20	200
Renovation, scholarship, books infrastructural facilities for all the schools	5	2	2	2	1	12
Skill development Centre for the villagers	100	200	100	0	0	400
Skill centre Hostel for the students And maintenance (10 years)	40	60	50	50	50	500
Technical training for employability	5	5	5	5	5	25
Infrastructure & Society Demands						
Construction of check dams and Rainwater harvesting structures	100	100	100	100	0	400
Internal Roads at Burugula, Kovalapalli, Chintalayapalli, and other two villages	10	10	10	10	10	50
Development of Road facility	10	10	10	10	10	0.5
Individual Toilet Facilities	5	5	5	5	5	25
Boundary wall & Burial grounds in three village and renovation of roads to burial ground.	2	2	2	2	2	10
Laying of pipeline to villages for drinking water supply	50	50	20	0	0	120
Drinking water RO Plant	10	10	10	10	10	0.5
Improvement in the Drainage (Side Drains)	3	3	3	3	3	15
Social causes	3	2	2	2	3	12
Renovation of temples and Masjids	3	2	2	2	2	11
Contribution for performing Peddamma Jathara at Boyareddypalli village	2	2	2	2	2	10
Contribution for Sri Ganeswara swamy temple development works at Kundanakota	5	5	0	0	0	10
Contribution to Govt. on behalf of Village for arranging 10 Nos. Solar Street lights in in each and every village	5	5	0	0	0	10
Sri Kothavenkata Ramana swamy temple renovation works at Chintalayapalli village	5	5	0	0	0	10
Construction of culvert on drainage in Veerareddypalli, and road work upto main road village(10 years)	20	20	20	20	20	200
Health						
Health / Medical Camps	15	10	10	10	5	50
Medical camps every year (10 years)	10	10	10	10	10	100
Veterinary camps	2	2	2	2	1	9
Unforeseen expenditure from the villages	10	10	10	10	10	50
Total	443	553	330	278	172	2000

As per TOR issued by MOEF & CC, PCIL earmarked an amount of Rs 20 crores i.e., 2.5 % of the project cost towards the Enterprise Social Commitment.

**REVISED FINAL
ENVIRONMENTAL IMPACT ASSESSMENT
REPORT
Of
EXPANSION OF CEMENT PLANT
INCREASE OF PRODUCTION
CLINKER: 1.5 to 4.0 Million Tonnes per Annum
CEMENT: 2.0 to 4.6 Million Tonnes per Annum
&
INCREASE OF WASTE HEAT RECOVERY POWER PLANT
From 10 MW to 20 MW**



**At
Boyareddypalli Village, Yadiki Mandal,
Anantapur District, Andhra Pradesh**

By



Penna Cement

PENNA CEMENT INDUSTRIES LTD.,

DECEMBER - 2017

Prepared By



B.S. ENVI-TECH (P) LTD.,

Secunderabad – 500 017

NABET Accreditation No: NABET/EIA/1316/RA002

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EXECUTIVE SUMMARY



EXECUTIVE SUMMARY

1.0 PROJECT DESCRIPTION

PENNA CEMENT INDUSTRIES LTD., (PCIL), is operating a Cement Plant at Boyareddypalli Village, Yadiki Mandal, Anantapur District, Andhra Pradesh with the following production capacities

- 1.5 MTPA Clinker production capacity
- 2.0 MTPA Cement production and
- 10 MW Waste Heat Recovery based captive Power Plant

The plant area is part of the Survey of India Topo sheet No. 57/E/16. The plant site is located between 15° 3'35.20" - 15° 3'52.10"N latitude and 77°56'52.03 - 77°57'12.55 E longitude with an average altitude of 276m above MSL.

PCIL now proposes to increase the production capacity of the cement plant by implementing the following

- a) Increase of Clinker production capacity from 1.5 to 4.0 MTPA.
- b) Increase of Cement production capacity from 2.0 to 4.6 MTPA and
- c) Increase of Power generation capacity of Waste Heat Recovery based Power Plant from 10 to 20 MW.

The limestone requirement of the cement plant is met from captive limestone mine i.e., **GUDIPADU LIMESTONE MINE** spread over an area of 392.62 Ha with present limestone production capacity of 2.3 MTPA. Limestone mine is located at 4.1 km at Gudipadu and Kundanakota villages, Yadiki Mandal, Ananthapur District, Andhra Pradesh

Limestone from the captive mine is transported from Crusher to the cement plant through a 4.5 km length closed conveyor.

As per the requirement of EIA notification, PCIL had submitted the necessary application to MoEF for approval of Terms of Reference (TOR). The Terms of Reference approved by MoEF for carrying out the Environmental Impact Assessment study vide F. No. J-11011/351/2016-IA.II (I) dated 27.03.2017.

Public Hearing was conducted on 02-08-2017.

PROJECT COST AND ESTIMATED TIME OF COMPLETION

The Project cost of the expansion is about Rs 800 Crores.

The proposal was appraised by Expert Appraisal Committee (EAC), MoEF & CC on 13.11.2017. EAC has advised to submit Revised EIA Report incorporating the clarifications points raised by EAC for further consideration of the Proposal. The subject report is revised EIA Report prepared incorporating the clarification points raised by EAC.

2.0 PRODUCTION AND CAPACITY

Present production capacity of the plant is given below

- 1.5 MTPA Clinker production capacity
- 2.0 MTPA Cement production and
- 10 MW Waste Heat Recovery based captive Power Plant

PCIL now proposes to increase production capacity of Boyareddypalli cement plant located at Boyareddypalli Village, Yadiki Mandal, Anantapur District, Andhra Pradesh by implementing the following

- ❖ Increase of Clinker production capacity from : 1.50 MTPA to 4.0 MTPA
 - a) increase of clinker production from 1.5 MTPA to 1.65 MTPA by upgradation of existing Unit - I
 - b) Installation of a new line i.e., Unit - II with clinker production capacity of 2.35 MTPA.
- ❖ Increase of Cement production capacity from : 2.00 to 4.6 MTPA
- ❖ Power generation from Waste Heat Recovery Power Plant: 10 to 20 MW.

The following table shows the production capacity of various units of plant before and after expansion.

PRODUCTION CAPACITY (MTPA)

Cement Plant	Present Consented Capacity as per MoEF (EC Obtained)			Capacity after proposed enhancement (EC Requested)		
	Clinker	Cement	WHRB Power (MW)	Clinker	Cement	Power (MW)
	(MTPA)			(MTPA)		
Unit –I	1.5	2.0	10	1.65	2.00 (OPC/PSC/PPC)	20
Unit –II (new line)	-	-		2.35	2.60 (OPC/PSC/PPC)	
Total	1.5	2.0		4.00	4.60	

Based on the market demand, PCIL proposes to transport additional clinker produced to PCIL cement grinding units at Pune and Krishnapatnam for cement production.

3.0 REQUIREMENTS OF PROJECT

Land

The Cement Plant complex is located in an area of 60 Ha owned by PCIL. Keeping in view of utilizing the existing infrastructure, proposes to locate New Line adjacent to the existing kiln. No additional land will be acquired.

Raw Material

The major raw material for manufacture of Cement is Limestone and is sourced from the Captive Limestone Mine.

Water

Water is required for cooling, dust suppression, Domestic use and gardening. The present water requirement of the plant is 930 m³/day. 700 m³/day for cement plant and colony is sourced from borewells within the plant site. Ground water withdrawal will not exceed 700 m³/day. 230 m³/day of water for existing waste heat recovery based power plant is met from mine pit.

Additional water requirement for expansion of cement plant and WHRB power plant is 500 m³/day and the same will be met from Mine pit.

Power

The peak power consumption of the Cement plant at present is 25 MW. This requirement is met from Grid and WHRB Power Plant. Additional power required is about 35 MW and the same will be sourced from Grid and proposed WHRB Power plant.

4.0 PROCESS DESCRIPTION

The following are the steps involved in manufacturing of cement:

- Limestone excavation and crushing
- Raw material preparation and blending operations
- Calcination in the kiln
- Clinker cooling and stocking
- Cement grinding and packing
- Quality and process control

5.0 DESCRIPTION OF ENVIRONMENT

To study the impacts arising out of proposed cement production, EIA study was carried out in the study area of 10 km radius. Summary of the same is given below:

- Meteorology: The predominant wind directions during this period were from ENE-E-ESE-SE-SSE sector accounting to about 62.6% of the total time. Average wind speeds during this period were varying between 1.01-15 kmph and during most of the time the winds were more than 15 kmph. The wind of less than 1.01 kmph was treated as calm, about 6.67% of the time the winds were under calm condition.
- Ambient air quality monitored at eight locations showed all values well within the limits of NAAQ standards specified for Industrial, Rural, Residential & Other areas.
- Noise levels were monitored at eight locations at villages and were found to be well within the limits.
- Water samples collected from eight locations within the study area. All the samples showed compliance of all parameters with the drinking water standard of IS 10500. No surface water body exists within 10 km of the Study area.
- Soil samples collected showed low to medium fertility.

- Socio economic status of the study area is found to be moderate.
- There are no endangered species of Schedule -1 category reported in 10 km radius.

There are no wild life sanctuaries, national parks, elephant/tiger reserves within 10-km radius of the study area. There are no endangered, threatened, rare plants species observed or recorded during study period.

Yadiki RF is the Nearest Forest at 8.4 km in WNW direction.

Nearest Industries to the plant site are

- Captive Limestone Mine of PCIL – Gudipadu Limestone Mine – 4.1 NNE
- BMM Cements Limited – 3.0 km – ENE
- Ultratech Cement – 7.5 km – SE

6.0 ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

6.1 AIR ENVIRONMENT

Predicted maximum ground level concentrations obtained for 24-hour mean meteorological data of Winter Season 2016-17 are superimposed on the following existing baseline concentrations to project the overall post expansion scenario in the study area.

The Overall Scenario with predicted concentrations over the baseline are shown below.

PREDICTED GROUND LEVEL CONCENTRATIONS AND OVERALL SCENARIO, $\mu\text{g}/\text{m}^3$

24-HOURLY CONCENTRATIONS	Particulate Matter - 10 (PM₁₀)	Particulate Matter – 2.5 (PM_{2.5})	Sulphur Dioxide (SO₂)	Oxides Of Nitrogen (NO_x)
Baseline Concentration (Max)	56.5	26	13	14.4
Predicted Ground Level Concentration (Max)	8.02	2.41	1.92	11.50
Overall Scenario	64.52 (100)	28.41 (60)	14.92 (80)	25.90 (80)

NOTE: Values in parenthesis are National Ambient Air Quality (NAAQ) standard limits specified for Industrial, Residential, Rural and other areas.

6.2 AIR ENVIRONMENT – ENVIRONMENTAL MANAGEMENT PLAN

A) CEMENT PLANT

PCIL will provide one Bag House, one Bag filters and one ESP for main process units as given below:

POLLUTION CONTROL EQUIPMENT-MAIN EQUIPMENT OF NEW LINE

Process Unit	Pollution Control Equipment
Kiln	Bag house
Cooler	ESP
Coal mill	Bag filter
Cement Mill	Bag filter

A total of 48 bag filters will be provided at various locations in the process unit of new line apart from installation of above Bag house, Bag filters and ESP to control the dust emissions from dropping/transfer points of the belt and bucket conveyors.

The new line will be designed to firing hazardous waste in the Kiln.

6.3 NOISE ENVIRONMENT

Noise levels generated in the cement plant are confined within the PCIL complex and are further reduced due to attenuation of greenbelt. Noise level at the plant boundary, calculated from the above equation, is expected to be less than 75 dB (A) without considering any attenuation factors.

PCIL has developed an area of 16 ha within the cement plant complex including colony. Boundary plantation already developed will act as a barrier and further reduces the noise levels. Additionally 4.0 ha of greenbelt will be developed for the proposed expansion.

6.4 WATER ENVIRONMENT

Water is required for cooling, dust suppression, Domestic use and gardening. The present water requirement of the plant is 930 m³/day. 700 m³/day for cement plant and colony is sourced from borewells within the plant site. Ground water withdrawal will not exceed 700

m³/day. 230 m³/day of water for existing waste heat recovery based power plant is met from mine pit.

Additional water requirement for expansion of cement plant and WHRB power plant is 500 m³/day and the same will be met from Mine pit.

No wastewater is generated from cement plant process. The wastewater generation from the cement plant is mainly from domestic consumption.

In order to treat the sewage generated from the colony a full-fledged sewage treatment plant (STP) is in operation. The STP is designed for a maximum load of 250 m³/day with an average BOD of 150 - 200 mg/L for raw sewage and after treatment less than 20 mg/L.

From power plant, the waste water generation is 80 m³/day. About 184 m³/day of treated sewage is generated from Plant & Colony in post expansion scheme. The treated sewage and the power plant effluent are mixed to attain the Discharge water standards and used for green belt development.

6.5 SOLID WASTE MANAGEMENT

No solid waste is generated from proposed Line.

6.6 GREENBELT DEVELOPMENT

The cement plant is located in an area of 60 Ha. The required greenbelt as per norms is 33 % of the plant area. PCIL has already developed greenbelt in an area of 16 Ha and now proposes to develop the greenbelt in additional area of 4.0 Ha with broad leaved native species.

7.0 IDENTIFICATION OF HAZARDS IN HANDLING, PROCESSING AND STORAGE OF HAZARDOUS MATERIAL AND SAFETY SYSTEM PROVIDED TO MITIGATE THE RISK.

Most major hazard accidents come within the following categories:

Events pertaining to the manufacturing process of cement

The following areas are identified as hazard prone in case of cement plant where Disaster management plan is required.

- Handling of coal
- Handling of fine dust
- Handling of hot clinker
- Handling of cement
- Packing areas

Considering each of the emergency, an action plan is developed assigning various duties to key personnel under OSEP. The plan provides for establishing an Emergency Control Centre (ECC), Alternate Emergency Control Centre (AECC), Shift Emergency Control Centre (SECC) with necessary equipments, facilities etc. Training of the personnel and rehabilitation is also included in the plan. Emergency facilities like emergency alarm/siren, public address system etc is considered. The details are elaborated in Chapter – 7.

HAZARDOUS WASTE MANAGEMENT

PCIL is storing Spent Oil from the gear boxes and automobile batteries and disposing to the authorized vendors as per the Hazardous Wastes (Management and Handling) Amendment Rules in a designated area which is isolated from the other utility areas.

Authorization for collection, treatment, storage, and disposal of hazardous wastes has been obtained for present operating units from APPCB.

PCIL has made provision for consuming high calorific liquid fuels. PCIL has consumed slag more than 1.12 lakhs tones in the year of 2016-17 and fly ash 1.235 Lakh tons. The sludge which is generated from STP is using as manure for plants. The dust collected from bag filters is recycling in process and it is continuous and inbuilt process system. Spent oil and waste grease is fired in the kiln along with coal. Automotive batteries are keeping separately in designated area in stores and are disposed on buyback basis only.

Necessary provision for use of the high calorific value hazardous wastes in the Kiln of New Line will be made and application for grant of authorization will be submitted to APPCB, Hyderabad.

8.0 EMERGENCY PREPAREDNESS PLAN

Details are furnished in chapter – 7. Summary of emergency preparedness is given below

EMERGENCY PREPAREDNESS INFRASTRUCTURE

A room annexed to CGM's chamber, located in CCR, is designated as Emergency Control Centre. The Security room near main gate is designated as Shift Emergency Control Centre (SECC), which is manned round the clock. CGM's chamber in admin block is designated as Alternate Emergency Control Centre (AECC). The first information report is received in SECC, which is passed on to various Emergency Co-ordinators who will assemble in ECC. Until such time Security room will be ECC. The considerations included in identifying these rooms as ECC/SECC/AECC are

- Away from any of the hazardous zones
- Easy communication facility available
- Availability of persons to receive emergency calls round the clock.
- Being in the first floor, over all visibility of nearby areas, as well as of
- Inmates' protection from contamination.
- Shift Emergency Control Centre is manned 24 hours by Assistant
- Security Officer and Security guard.

TRAINING & REHEARSALS

After restoration of normalcy after an Emergency, the Incident Controller/Emergency Coordinators of the sections concerned and the Site Controller would furnish a report of the account of working of On Site Emergency Plan chronologically. This would be helpful information when the On Site Emergency Plan is taken up for review.

In spite of detailing objectives and scope of On Site Emergency Plan, Types and nature of emergencies that can arise, subjecting the persons to mock or (notional) simulated conditions would help in conditioning the concerned to gear up to situation. The objectives of such an Exercise is

- To Evaluate the understanding of roles and responsibilities by the Concerned
- To identify any inadequacies/difficulties in executing On Site Emergency Plan.
- To see the effectiveness of On Site Emergency Plan.
- To estimate the responses.
- To assess the capability of OSEP in situations like Public holiday, shift change, night shift, festival day etc.
- To acquaint the personnel with respective roles.

All the employees will be educated about the likely emergencies in the factory and emergency actions to be taken by various persons and how to proceed for Safety etc.

The effectiveness of emergency communication would be tested during mock drills to be organized.

Training and mock drills are conducted for employees, supervisory staff and management staff. Those who are not connected with execution of On Site Emergency Plan also will be given an orientation about their role in an emergency to infuse organized intended behavior in such situations. Mock drills are proposed to be conducted quarterly until everyone is familiarised and subsequently periodicity will be reviewed.

9.0 ISSUES RAISED DURING PUBLIC HEARING (IF APPLICABLE) AND RESPONSE GIVEN

Public consultation was completed by Andhra Pradesh State Pollution Control Board on 02-08-2017. Minutes of Public Hearing along with response statement is enclosed as **Annexure – 7 A**.

10.0 CSR PLAN WITH PROPOSED EXPENDITURE

PCIL believes that the responsibility of PCIL is to positively impact the society and make it a better place to live in. PCIL believes that even small improvements add up in building a better world.

PCIL endeavors towards imparting the basics of livelihood to surrounding villages and the community – food, water, shelter and education. PCIL is proud of the fact that it is able to significantly increase quality of lives in all the villages surrounding the plant.

PCIL continuously undertake health camps to improve the lives of the villagers and is actively involved in the improvement of roads and other infrastructure. PCIL has provided free education and vocational training to hundreds of kids since inception.

As responsible corporate citizens PCIL have always given top most priority for Corporate Social Responsibility in PCIL vision and philosophy. Today, taking its iconic shape, PCIL became a formidable brand and this mission is accomplished with the support of great people and their values.

Boyareddypalli Cement Plant has become operational in the year 2008. Since inception of Boyaredipalli Cement Plant, PCIL has taken up various community Development Measures. PCIL has incurred an amount of Rs. 2.00 crores till date since 2008 for implementing various community developmental measures.

PROPOSED CSR BUDGET

The capital cost of proposed expansion is Rs. 800 Crores. PCIL has budgeted an amount of Rs 20.0 crores for implementation of various measures listed based in Chapter – 8.

BUDGET ALLOCATION FOR WELFARE & INFRASTRUCTURE DEVELOPMENT IN NEARBY VILLAGES UNDER CSR

Year	Total (in Lakh Rs)
2017-18	443
2018-19	553
2019-20	330
2020-21	278
2021-22	172
2022-2027	224
Total	2000

Activity wise details are furnished in Chapter – 8

11.0 OCCUPATIONAL HEALTH MEASURES

All workers are being evaluated for health status. The parameters which are monitored as per Occupational Health Checkup are Blood, Urine, Sputum, Stool, ECG, X-Ray (Tuberculosis & Silicosis), Eye Test, Audiometry and Lung Function Test (PFT) etc.

PCIL is carrying out the Occupational Health survey for the all the workers including the contract and sub-contract workers. The fund allocation is part of the occupational health budget which is about 40 Lakhs per year.

12.0 ENVIRONMENTAL MONITORING PROGRAMME

PCIL is accredited with ISO: 9001- 2008, IS: 18001:2007 and ISO: 14001:2004. It is a professionally managed and well established cement manufacturing company enjoying the confidence of consumers because of its superior quality product and excellent customer service. PCIL is running cement plants and mine with latest eco-friendly technology.

PCIL has established a dedicated Environmental cell to monitor and analyze the various environmental components of the cement plant.

Post project monitoring of various environmental components is being carried out as per the norms of APPCB, MoEF & CC and CPCB.

13.0 ENVIRONMENTAL MANAGEMENT PLAN

PCIL has budgeted an amount of Rs. 120 crores for implementation of environmental management plan for expansion.

Recurring expenditure of Rs. 4.5 crores is being spent for operation and maintenance for pollution control equipment in the existing unit.

CHAPTER - 1

INTRODUCTION



CHAPTER - 1 : INTRODUCTION

1.1 PURPOSE OF THE REPORT

PENNA CEMENT INDUSTRIES LTD., (PCIL), is operating a Cement Plant at Boyareddypalli Village, Yadiki Mandal, Anantapur District, Andhra Pradesh with the following production capacities

- 1.5 MTPA Clinker production capacity
- 2.0 MTPA Cement production and
- 10 MW Waste Heat Recovery based captive Power Plant

The limestone requirement of the cement plant is met from captive limestone mine i.e., **GUDIPADU LIMESTONE MINE** spread over an area of 392.62 Ha with present limestone production capacity of 2.3 MTPA. Limestone mine is located at 4.1 km at Gudipadu and Kundanakota villages, Yadiki Mandal, Ananthapur District, Andhra Pradesh.

PCIL now proposes to increase the production capacity of the cement plant by implementing the following

- a) Increase of Clinker production capacity from 1.5 to 4.0 MTPA.
- b) Increase of Cement production capacity from 2.0 to 4.6 MTPA and
- c) Increase of Power generation capacity of Waste Heat Recovery based Power Plant from 10 to 20 MW.

The proposed expansion falls under Category - A project as per Environmental Impact Assessment (EIA) Notification SO 1533, of 14-09-2006 which needs the Environmental Clearance from Ministry of Environment and Forests (MoEF).

PCIL had submitted the necessary application to Ministry of Environment, Forests and Climate Change (MoEF&CC) for approval of Terms of Reference (TOR). The Terms of Reference approved by MoEF&CC for carrying out the Environmental Impact



Assessment study vide Letter no. J-11011/351/2016-IA.II (I) dated 27.03.2017 is enclosed as **Annexure - 1A**.

Final EIA report incorporating the Terms of Reference was submitted online vide proposal no. IA/AP/IND/59430/2016 dated 23rd October 2017 alongwith the copies of EIA/EMP seeking Environmental Clearance.

The proposal was appraised by Expert Appraisal Committee (EAC), MOEF & CC on 13.11.2017. EAC has advised to submit Revised EIA Report incorporating the clarifications points raised by EAC for further consideration of the Proposal.

The subject report is revised EIA Report prepared incorporating the clarification points raised by EAC. **Annexure - 1 A1** gives the details of the clarification points raised alongwith replies and reference of the points in the subject revised EIA Report.

1.2 IDENTIFICATION OF PROJECT & PROJECT PROPONENT

PCIL is one of the largest privately held cement companies in India, with an installed cement capacity of 7 Million Tonnes Per Annum.

Founded in 1991, Penna Cement has established itself as one of the most trusted cement brands, with significant footprints in southern and western India. Its clientele ranges from small house owners to established real estate developers and from various state governments to global construction majors.

Over the last two decades, we have grown organically by developing in-house expertise and capabilities, across the entire value chain in the cement industry. All our cement plants are equipped with state-of-the-art technology, enabling the company to deliver the superior quality products.

On August 10th 1994, PCIL commissioned first plant in Talaricheruvu, Ananthapur with an initial capacity of 0.2 MTPA. Over the last two decades, PCIL have installed 4 cement plants



and one captive power plant and increased our capacity to more than seven million tonnes. Four cement plants are strategically located, to cater to customers all across Southern India.

PCIL is accredited with ISO: 9001- 2008, ISO: 18001:2007 and ISO:14001:2004. It is a professionally managed and well established cement manufacturing company enjoying the confidence of consumers because of its superior quality product and excellent customer service. PCIL is running cement plants and mine with latest eco-friendly technology.

1.3 BRIEF DESCRIPTION OF PROJECT

1.3.1 NATURE AND SIZE

PCIL is operating a cement plant located in Boyareddypalli in South-western Andhra Pradesh, the unit was commissioned in Sep 2008 with a capacity of 2.0 MTPA.

No litigation is pending against the project.

PCIL now proposes to increase production capacity of Boyareddypalli cement plant located at Boyareddypalli Village, Yadiki Mandal, Anantapur District, Andhra Pradesh by implementing the following

- ❖ Increase of Clinker production capacity from : 1.50 MTPA to 4.0 MTPA
 - a) increase of clinker production from 1.5 MTPA to 1.65 MTPA by upgradation of existing Unit – I
 - b) Installation of a new line i.e., Unit – II with clinker production capacity of 2.35 MTPA.
- ❖ Increase of Cement production capacity from : 2.00 to 4.6 MTPA
- ❖ Power generation from Waste Heat Recovery Power Plant: 10 to 20 MW.

The following table shows the production capacity of various units of plant before and after expansion.



PRODUCTION CAPACITY (MTPA)

Cement Plant	Present Consented Capacity as per MoEF (EC Obtained)			Capacity after proposed enhancement (EC Requested)		
	Clinker	Cement	WHRB Power (MW)	Clinker	Cement	Power (MW)
	(MTPA)			(MTPA)		
Unit -I	1.5	2.0	10	1.65	2.00 (OPC/PSC/PPC)	20
Unit -II (new line)	-	-		2.35	2.60 (OPC/PSC/PPC)	
Total	1.5	2.0		4.00	4.60	

Based on the market demand, PCIL proposes to transport additional clinker produced to PCIL cement grinding units at Pune and Krishnapatnam for cement production.

1.3.2 PROJECT COST

The cost of the proposed expansion is estimated to be about Rs. 800 Crores and the Capital Cost of Environmental measures (EMP) is about Rs. 120 Crores.

1.3.3 COMPLIANCE STATUS

PCIL received Environmental Clearance for 1.5 MTPA Clinker production from MoEF & CC vide letter no. J-11011/351/2006-IA-II(1) dated 18-05-2007 (**Annexure-1B**). Certified Compliance Statement of earlier EC by Regional Office, MOEF & CC is enclosed as **Annexure - 1C**. Compliance to Consent for Operation issued by State PCB for the existing operation of the project is enclosed as **Annexure - 1D**.

1.4 LOCATION DETAILS

The Cement Plant is located at Boyareddypalli Village, Yadiki Mandal, Anantapur District, Andhra Pradesh

The salient locational features of the cement plant are given in **Table - 1.1**.



TABLE - 1.1
SALIENT FEATURES OF THE CEMENT PLANT

Feature	Details
Village, Tehsil, District, State	Boyirredipalli Village, Yadiki Mandal, Ananthapur District of Andhra Pradesh.
Temp. °C	6.7 - 45.6
Relative Humidity %	25-77
Annual rainfall	550 mm
Topography	Undulating terrain
Nearest water bodies	Penneru River - 11.4 km - S Maruna Vagu - 8.9 km - WSW
Nearest Highway	National Highway (NH-7) Dhone - Gooty - 29.5 km in WNW direction. State Highway (SH-57) connecting Bellary- Nellore - 3.0 km - Southern direction.
Nearest Railway station	Tadipatri RS - 17.7 km - SSE
Inter State Boundary	Andhra Pradesh - Karnataka - 85.5km - W
Nearest Industries	<ul style="list-style-type: none"> • Captive Limestone Mine of PCIL - Gudipadu Limestone Mine - 4.1 NNE • BMM Cements Limited - 3.0 km - ENE • Ultratech Cement - 7.5 km - SE
Nearest Village	Boyareddypalli - 1.1 km - WNW
Nearest Town	Tadipatri - 17.8 km - SSE direction.
Nearest Air port	Kadapa Airport - 106 km - SE
Nearest Forest	Yadiki RF - 8.4 km - WNW
Nearest Wild life Sanctuaries	None within 10 km Radius
Historical places	None within 10 km Radius

*** All distances mentioned in the above table are aerial distances.**

1.5 IMPORTANCE TO THE COUNTRY, REGION

The cement market has growth potential due to the central government liberalization policies and new schemes for housing, road projects. Cement demand growth is anticipated to be about 9 to 10% increase mainly through road projects (Golden Quadrilateral), Housing Projects (1.3 million houses in rural & 0.7 million in urban areas). Continuous demand for exports to China and other South-East Asian countries along with the increased requirement of the domestic sector have led all the cement manufacturers in the country to plan for increased capacities.

So with a view to capture growing opportunity demand, the management PCIL wants to take up the section wise capacity balancing and optimization. The proposed expansion will enable the company to maximize its profitability by optimum utilization of technology, manpower, present infrastructure and capital.

The cost of production will substantially reduce due to power efficient equipment, fuel, financial charges and other fixed overheads on account of large scale economics due to higher volume of production and sales.

It would also enable the company to withstand against the considerable competitive pressure from large-scale units in the country and also to create wider brand loyalty for the product.

The increase of production within the existing plant is based on the following considerations

- Proximity of the site to captive limestone mines and abundant availability of reserves.
- Market demand
- Availability of land – no further land is proposed to be acquired
- Availability of existing infrastructure.

1.5.1 BENEFITS OF THE PROJECT:

The expansion project by PCIL will have the following benefits:

- The plant is in operation since 2008 and all operations are stabilized which will facilitate the expansion without interventions.
- The existing infrastructure will be utilized for expansion unit which otherwise for greenfield project of expansion capacity will require large area.
- The mine with adequate limestone reserves having conveyor of 4.5 km length will eliminate the dust due to transportation of limestone required for expansion.
- Plant already established and is operating 10 MW waste heat recovery based power plant which has eliminated coal firing of about 150 t/day.
- Utilization of waste heat to generate 10 MW from expansion will eliminate usage of about 150 t/day of coal there by total saving of 300 t/day of coal from 20 MW waste heat recovery based power plant after expansion.
- The plant after expansion will have 20 MW waste heat recovery based power plant which saves 300 t/day of coal compared to convention coal based power plant. Coal transport to this extend will reduce.
- Due to 20 MW waste heat recovery based power plant after expansion, generation of about 858 t/day of CO₂ is eliminated which normally is generated from coal based power plant of same capacity.
- Use of ash and slag in production of cement will save clinker consumption.
- CSR activities will be enhanced which will improve the living conditions of the nearby villages.

1.6 SCOPE OF THE STUDY

Environmental Impact Assessment study has been carried out in and around the 10 km radius of Plant area as per the Terms of Reference issued by Ministry of Environment & Forests. The



various steps involved in Environmental Impact Assessment study of the proposed expansion are divided into the following phases.

- Identification of significant environmental parameters are identified and assessed to study the existing status within the impact zone with respect to air, water, noise, soil and socio-economic components of environment.
- Study of various activities of the proposed expansion to identify the areas leading to impact / change in environmental quality.
- Identification/Prediction of impacts for the identified activities and to study level of impact on various environmental components.
- Evaluation of impacts by superimposing the predicted / quantified scenario over the baseline scenario.
- Formulation of Environmental Management Plan for implementation in the cement plant in the post expansion phase.

Baseline data collected for the EIA study was collected during winter 2016-17 covering the months of December'16 to February'17 to assess the existing environmental status of various environmental parameters within the 10 km radius study area of the project. The report presents the baseline scenario, prediction of impacts due to enhancement of production as per the guidelines of MoEF&CC/CPCB along with a detailed Environmental Management Plan, which will be implemented in the expansion phase.

Final EIA report with the above scope incorporating the TORs issued by MoEF & CC is presented in subsequent chapters. Compliance to the Conditions of TOR is enclosed as **Annexure - 1E**.

CHAPTER - 2

PROJECT DESCRIPTION



CHAPTER - 2: PROJECT DESCRIPTION

2.1 TYPE OF PROJECT

PCIL at present is producing 1.5 MTPA of Clinker & 2.0 MTPA of Cement and Waste Heat Recovery Power generation of 10 MW. PCIL now proposes to increase production by implementing the following

- Increase of Clinker production capacity from : 1.50 MTPA to 4.0 MTPA
 - Increase of clinker production from 1.5 MTPA to 1.65 MTPA by upgradation of existing Unit - I
 - Installation of a new line i.e Unit - II with clinker production capacity of 2.35 MTPA.
- Increase of Cement production capacity from : 2.00 to 4.6 MTPA
- Power generation from Waste Heat Recovery Power Plant: 10 to 20 MW.

The Cement plant is based on the following design parameters

DESIGN CONSIDERATION

BEFORE EXPANSION	AFTER EXPANSION
➤ Clinkerisation factor: 1.50 (Raw meal to clinker)	➤ Clinkerisation factor: 1.50 (Raw meal to clinker)
➤ Specific heat consumption: 740 kcal/ kg clinker	➤ Specific heat consumption: 710 kcal/ kg clinker
➤ Kiln operation: 330 days/year	➤ Kiln operation: 330 days/year

2.2 NEED FOR THE PROJECT

Cement demand in India is expected to increase due to government's push for large infrastructure projects, leading to 45 million tonnes (MT) of cement needed in the next three to four years.

India's cement demand is expected to reach 550-600 Million Tonnes Per Annum (MTPA) by 2025. The housing sector is the biggest demand driver of cement, accounting for about 67 per cent of the total consumption in India. The other major consumers of cement include infrastructure at 13 per cent, commercial construction at 11 per cent and industrial construction at 9 per cent.

To meet the rise in demand, cement companies are expected to add 56 MT capacity over the next three years. The cement capacity in India may register a growth of eight per cent by next year end to 395 MT from the current level of 366 MT. It may increase further to 421 MT by the end of 2017. The country's per capita consumption stands at around 190 kg.

The Indian cement industry is dominated by a few companies. The top 20 cement companies account for almost 70 per cent of the total cement production of the country. A total of 188 large cement plants together account for 97 per cent of the total installed capacity in the country, with 365 small plants account for the rest. Of these large cement plants, 77 are located in the states of Andhra Pradesh, Rajasthan and Tamil Nadu.

Considering the above, PCIL proposes to enhance cement production capacity of the cement plant.

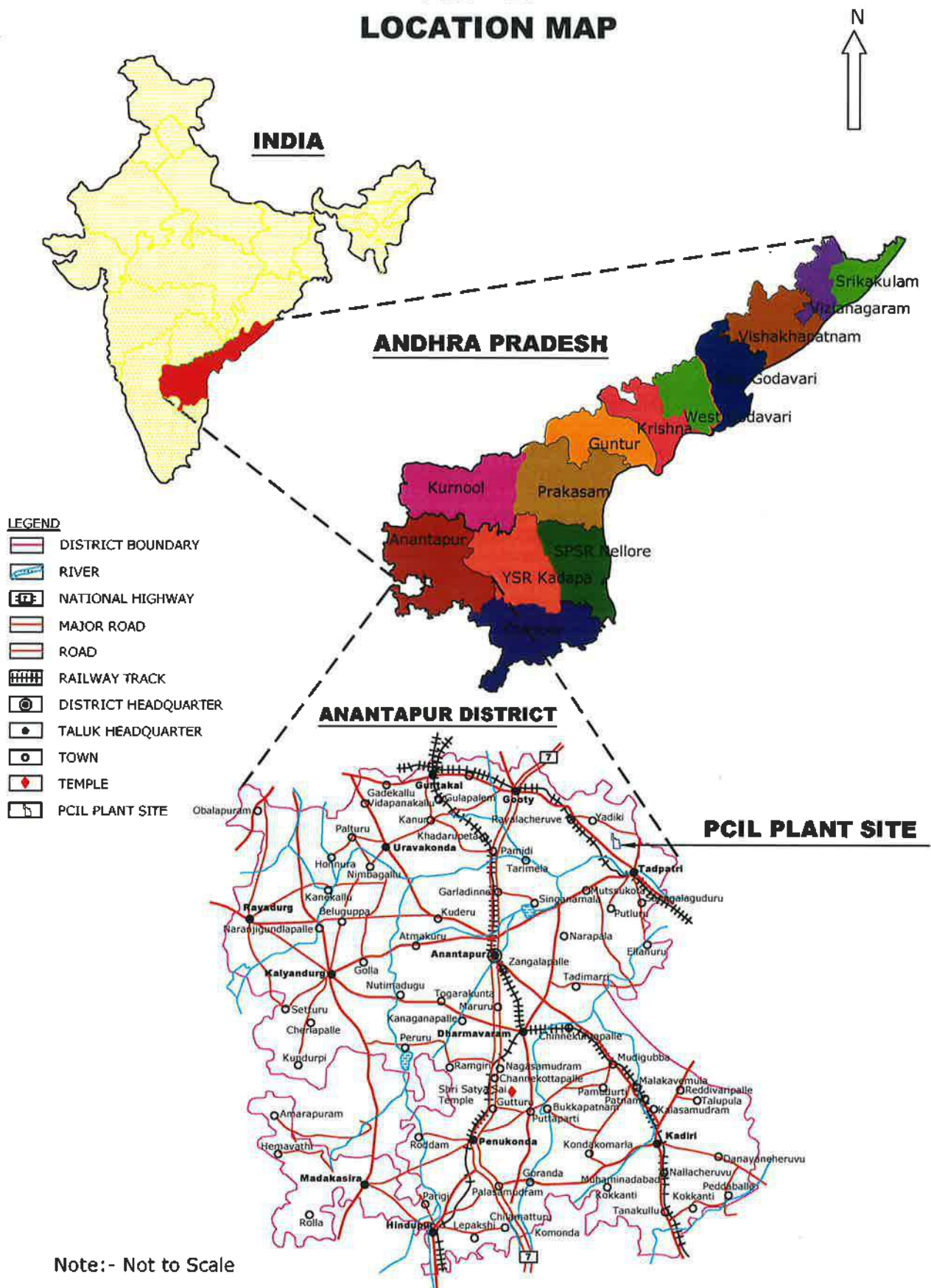
2.3 LOCATION OF THE PLANT

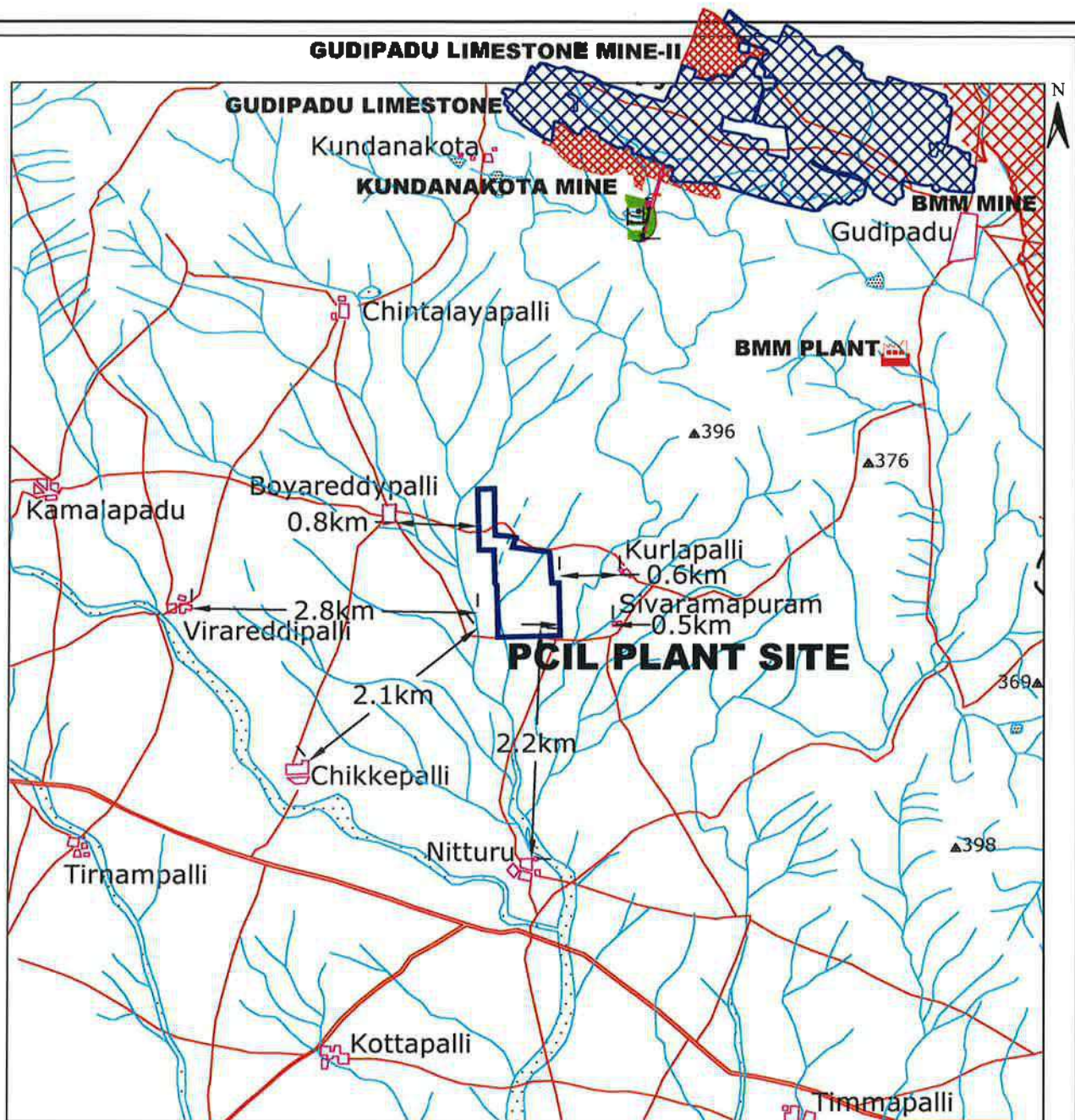
The Cement plant is located near Boyarreddypalli Village, Yadiki Mandal, Anantapur District, Andhra Pradesh. The site falls between 15° 3'35.20" - 15° 3'52.10"N latitude and 77°56'52.03 - 77°57'12.55 E longitude with an average altitude of 276m above MSL. The area falls within Survey of India Toposheet no. 57/E/16 [1:50000 scale]. **Fig - 2.1** shows the location map of the Plant Site.

Nearest railway line connecting Gunthakal - Renigunta of South Central Railway line is at 11.1 km to WSW direction from the site. Key map showing the location of various features around the Plant site is shown in **Fig - 2.2**.



**FIG - 2.1
LOCATION MAP**





SCALE



LEGEND

- ROADS
- STREAMS / TANKS
- SPOT HEIGHTS
- SETTLEMENTS
- DISTRICT BOUNDARY
- PCIL PLANT SITE

FIG - 2.2

CLIENT:	M/s. PENNA CEMENT INDUSTRIES LTD.,
PROJECT:	EXPANSION OF CEMENT PLANT Boyareddypalli Village, Yadiki Mandal, Anantapur District, Andhra Pradesh
TITLE:	KEY MAP
	Prepared by B.S. ENVI-TECH (P) LTD., SECUNDERABAD

Tadipatri is the major town at 17.8 km in SSE direction.

The National Highway (NH-44) connecting Dhone - Gooty is 29.5 km in WNW direction.

The State Highway (SH-57) connecting Bellary- Nellore is at a distance of 3.0 km in Southern direction.

The nearest railway station is Tadipatri, 17.7 km in SSE direction
Penna River - 11.4 km - S and Maruna Vagu - 8.9 km - WSW are the nearest waterbodies in the 10 km radius of the plant site.

Yadiki RF is the Nearest Forest at 8.4 km in WNW direction.

The Nearest Airport from the Plant site is Kadapa Airport - 106.1 km in SE.

BMM Cements Limited - 3.0 km - ENE. Ultratech Cement - 7.5 km - SE is the nearest Industries within the study area:

There are no National Parks/Wild life Sanctuaries/Eco Sensitive Zones within 10 km radius of the study area.

Project site does not fall near to polluted stretch of river identified by the CPCB.

All Corner coordinates of the plant site are superimposed on topo sheet as reflects in **Fig - 2.3**.

Fig - 2.4 shows the 10 km radius around Cement plant. Photographs of the plant site are shown in **Fig -2.5**

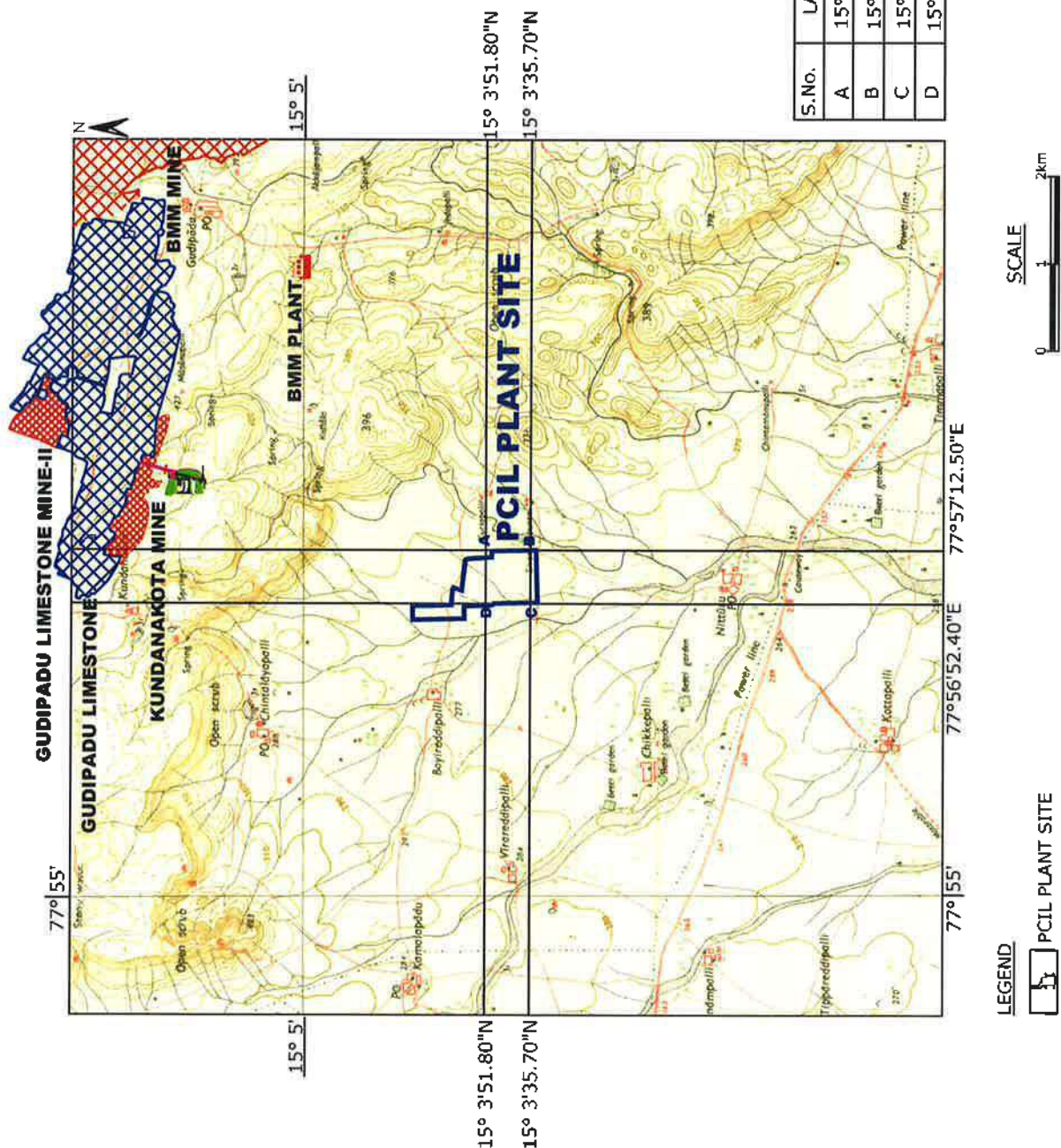
Google map-Earth of the project site is shown in **Fig - 2.6**.

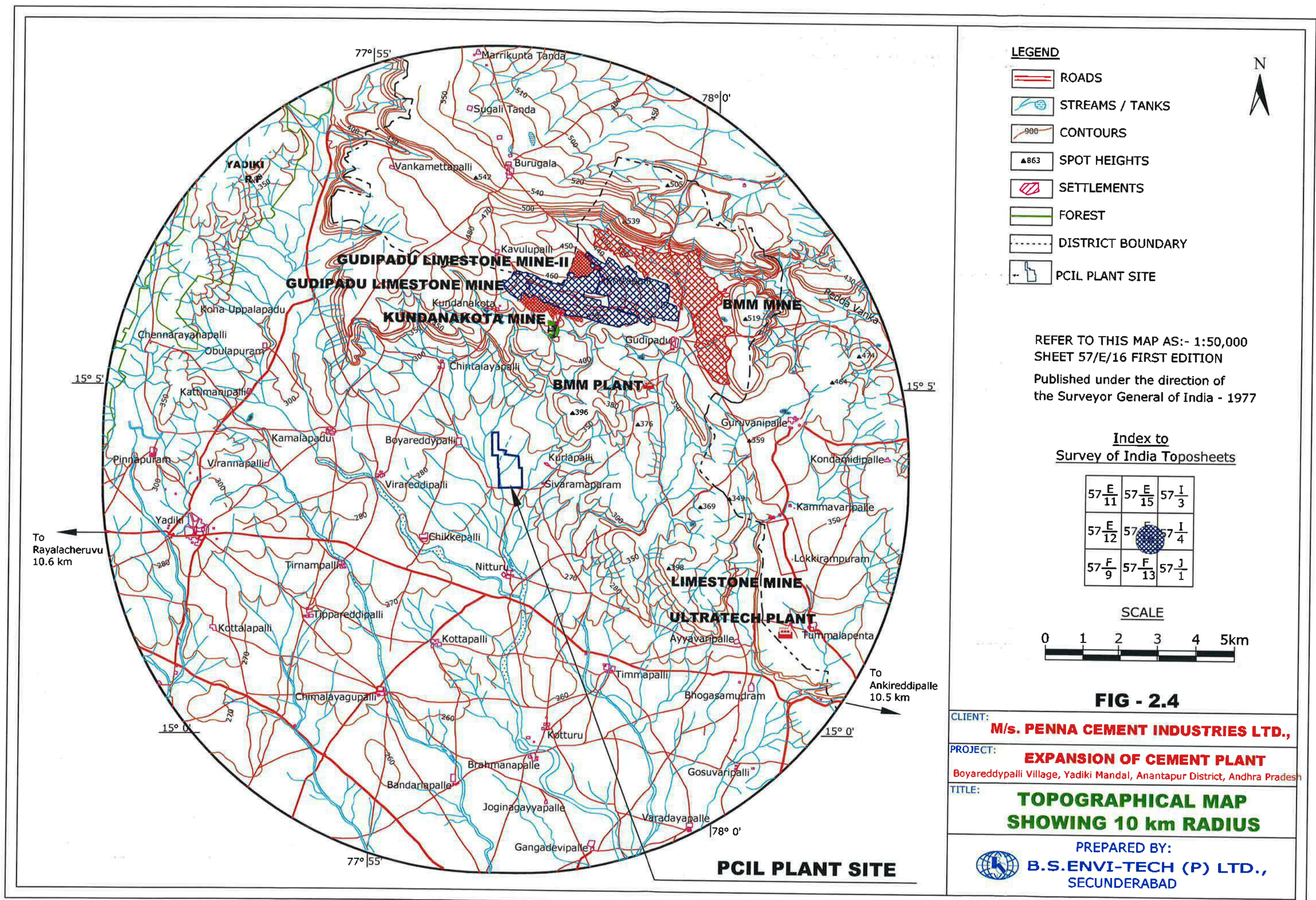
2.4 SCHEDULE OF PROPOSED EXPANSION

The project will be implemented within 14 months after obtaining statutory clearances.

FIG - 2.3

ALL CORNER COORDINATES OF THE PLANT SITE





**FIG -2.5
PHOTOGRAPH OF THE PLANT SITE**



GOOGLE EARTH IMAGERY OF THE PLANT SITE



FIG - 2.6

2.5 SIZE OR MAGNITUDE OF OPERATION

Clinker production capacity will be increased from 1.5 MTPA to 4.0 MTPA and cement from 2.0 MTPA to 4.6 MTPA. Captive Power generation from Waste Heat Recovery based Power plant will be increased from 10 MW to 20 MW.

PCIL is manufacturing blended cement. viz., Ordinary Portland cement (OPC)), Portland Pozzolana Cement (PPC) and Portland Slag Cement.

The existing and proposed production details of the cement plant are given below:

PRODUCTION CAPACITY (MTPA)

Unit		Present approved Capacity as per MoEF EC (MTPA)		Capacity after proposed expansion (MTPA)	
		Clinker	Cement	Clinker	Cement
Cement Plant	Unit -I	1.5	2.0	1.65	2.0
	Unit -II (new unit)	-	-	2.35	2.6
	Total	1.5	2.0	4.00	4.6
Waste Heat Recovery based Power Plant, MW		10		20	

2.6 REQUIREMENTS OF THE PROJECT

2.6.1 RAW MATERIALS

The major raw material for manufacture of Cement is Limestone and is sourced from the Captive Limestone Mine.

The requirement of raw material is given below:

RAW MATERIAL REQUIREMENT (MTPA)

	Before Expansion	After Expansion	Source	Mode of Transport
Limestone	2.30	5.30	Captive mines	Conveyor
Iron ore	0.02	0.10	Bellary / Hospet	Railway
Laterite/red mud	0.08	0.24	Veldurty, Rajahmundry HINDALCO, Belgaum	Railway
Gypsum	0.10	0.23	SPIC and Sterlite Industries, Tuticorin, EID Pary India Ltd., Chennai & Coramandel Fertilizers Ltd., Vizag	Railway
Coal / petcoke	0.26	0.60	Singareni Collieries Company Ltd/ Imported Coal/Petcoke from USA	Railway
Slag	0.50	1.67	Jindal Steel and Gerdau Steel	Railway
Ash requirement for PPC	0.10	1.14	Rayalaseema Thermal Power Station and Jindal Power Plant, AP Genco, Power Plant , Nellore	Road

Limestone from the captive mine is transported from Crusher to the cement plant through a 4.5 km length closed conveyor.



PCIL has provided railway siding for transportation of raw material and finished product.

Closed sheds are provided for unloading and loading of railway rake.

Clinker is stored in the closed tank, Fly ash is stored in closed silo and in covered sheds.

Finished product (Cement) & Clinker is transported by road & railways. It is ensured that all the trucks employed will be "Environmentally Compliant".

All stock piles are provided with covered sheds and paved floors to avoid leaching of materials to ground water.

2.6.2 LAND

The Cement Plant complex is located in an area of 60 Ha owned by PCIL. Keeping in view of utilizing the existing infrastructure, proposes to locate New Line adjacent to the existing kiln. Plant layout is shown in **Fig - 2.7**.

No additional land will be acquired. The land use breakup of the total land has been discussed hereunder.

LAND BREAKUP (Ha)

S.No.		Area (ha.)	
		Before expansion	After expansion
1	Plant area and roads	30	34
2	Colony with infrastructure	4	5
3	Parking area	4	1
4	Greenbelt	16	20
5	Vacant Land	6	-
Total		60	60



TOTAL PLANT SECTION WISE DETAILS

- Section-1: L.S Storage hopper
Section-2: Stacker and Recliner
Section-3: Raw material hoppers
Section-4: VRM Raw ml
Section-5: Blending Silo
Section-6: Preheater
Section-7: RABH LAB
Section-8: KILN
Section-9: CCR
Section-10: GRATE COOLER
Section-11: COAL MILL WITH PROPOSED DYNAMIC SEPARATOR
Section-12: CSP
Section-13: SLAG VRM
Section-14: CEMENT SILO'S
Section-15: CEMENT MILL HOPPERS
Section-16: CEMENT MILL
Section-17: PACKING PLANT
Section-18: LCI
Section-19: GYPSUM STORAGE
Section-20: SLAG STOCK PILE
Section-21: COAL STOCK PILE
Section-22: IRON ORE & BAUXITE STOCK PILE
Section-23: WAGON LOADING PLATFORM
Section-24: WAGON TIPPLER
Section-25: JUMBO CRUSHER
Section-26: SLAG & COAL STOCK HOPPERS (WTP-2)
Section-27: TOILETS
Section-28: ADMIN BUILDING
Section-29: CIVIL OFFICE
Section-30: UNDER GROUND WATER TANK
Section-31: PUMP HOUSE
Section-32: COOLING TOWER
Section-33: CANTINEEN
Section-34: AP BAVA OFFICE
Section-35: FLASH HOPPERS
Section-36: CLUNKER SILO'S
Section-37: CEMENT SILO'S
Section-38: REST ROOM
Section-39: FH BOILER
Section-40: AOC BOILER
Section-41: TG BUILDING
Section-42: AIR COOLED CONDENSER (ACC)
Section-43: FINE COAL HOPPER FOR HAG
Section-44: AUXILIARY COOLING TOWER
Section-45: DEMINERALISER BUILDING
Section-46: DM WATER STORAGE TANK
Section-47: HOT AIR GENERATOR (HAG)
Section-48: RAW WATER TANK
Section-49: STORES AND WORK SHOP
Section-50: I.O.C OIL STORAGE SHED
Section-51: BRICKS STORAGE SHED

PROCESS BAG FILTERS IN PLANT LAYOUT (4 Nos)

- BF-1 COAL MILL BAG FILTER
BF-2 REVERSE AIR BAG HOUSE (RABH)
BF-3 SLAG VRM BAG FILTER
BF-4S CEMENT MILL BAG FILTERS (1+1)= 2Nos
BF-6 COOLER ESP

DETAILS OF UNIT BAG FILTERS IN PLANT LAYOUT

- 2 TP-2 (Stacker bypass recliner feeding)
3 TP-3 (Recliner discharge)
4 TP-4 (Iron ore feeding)
5 TP-5 (Bauxite feeding)
6 Additive dump hopper vent
7 Additive crusher
8 TP-11 (Additive silicate feeding rev. belt)
9 Raw ml hoppers top (1+1)= 2 Nos
10 Raw ml hoppers bottom (UBF for WTP-8) =5 Nos
11 VRM Inlet + BE Venting
12 Rawmeal silo top
13 Rawmeal silo bin
14 Preheater Top (Bucket elevator vent)
15 Coal dump hopper vent
16 Coal crusher
17 Coal transfer post
18 Raw coal hopper top
19 Loss & Weight system bins- 2 Nos
20 CSP top-DDPC-1 Vent- 2 Nos
21 DDPC-2 & 3 Vents- 2 Nos
22 SLAG hopper top for slag VRM
23 Cement mill hopper top
24 Cement silo-1 top-1 No
25 Cement silo-2 top-1 No
26 Cement silo-3 top-1 No
27 Cement silo-4 top-1 No
28 GGBS Blending system
30 GGBS OPC Silo's bin vent system-3 Nos
31 Packing plant - Packer-1-1 No
32 Packing plant - Packer-2-1 No
33 Packing plant - Packer-3-1 No
34 Packing plant - Packer-4-1 No
35 For bulk loading system-1-1 No
36 For bulk loading system-2-1 No
37 Wagon tippler
38 Wagon tippler
39 Jumbo crusher
40 WTC-5 Discharge - 1 NO
41 BC-2 Discharge - 1 NO
42 BC-3 Discharge - 1 No
43 C.S.P Turners- 2 Nos
44 Cooler Discharge - 1 NO

- PROPOSED =
EXISTING =
PROPOSED GREENBELT
EXISTING GREENBELT

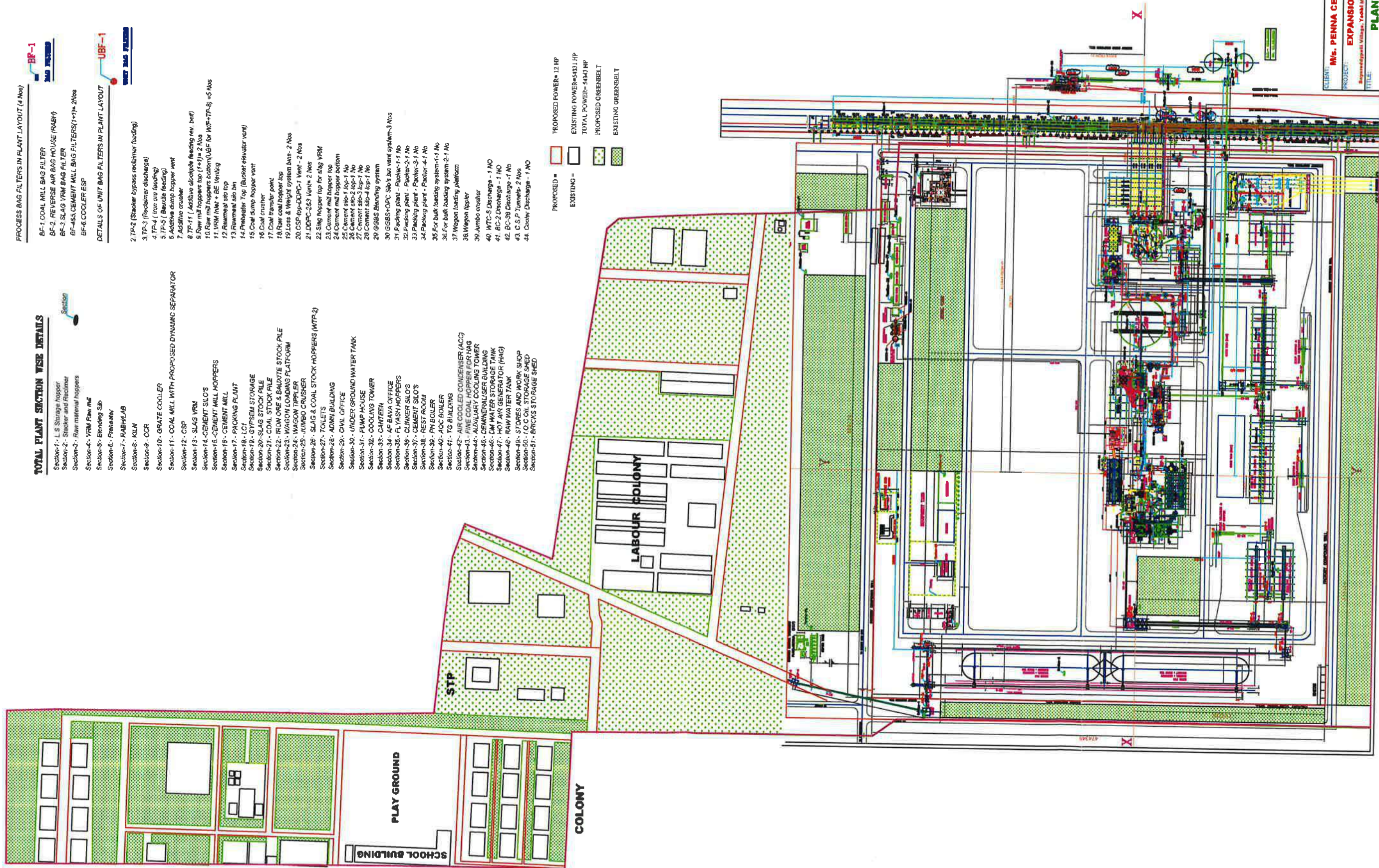


FIG - 2.7

CLIENT: **M/s. PENNA CEMENT INDUSTRIES LTD.,**
PROJECT: **EXPANSION OF CEMENT PLANT**
TITLE: **PLANT LAYOUT**

The area proposed for location of new unit is within the cement plant complex. Photograph of the area proposed for location of new line is shown below:

**PHOTOGRAPH OF AREA WHERE EXPANSION UNIT WILL BE
LOCATED WITHIN THE EXISTING CEMENT PLANT**



2.6.3 WATER

Water is required for cooling, dust suppression, Domestic use and gardening. The present water requirement of the plant is 930 m³/day. 700 m³/day for cement plant and colony is sourced from borewells within the plant site. Ground water withdrawal will not exceed 700 m³/day. 230 m³/day of water for existing waste heat recovery based power plant is met from mine pit.

Additional water requirement for expansion of cement plant and WHRB power plant is 500 m³/day and the same will be met from Mine pit.

2.6.4 POWER

The peak power consumption of the Cement plant at present is 25 MW. This requirement is met from Grid and WHRB Power Plant. Additional power required is about 35 MW and the same will be sourced from Grid and proposed WHRB Power plant.

2.6.5 MAN POWER

The manpower requirement of the project (Cement Plant and Mines) is given below:

MANPOWER REQUIREMENT

	Regular	Contract	Total
Present	150	600	750
Additional for Expansion	150	300	450
Total	300	900	1200

2.6.6 TOWNSHIP

PCIL has constructed a full-fledged colony consisting of 120 houses in an area of 4.0 ha. for the benefit of employees. All the necessary infrastructure facilities are provided in the colony. Additional 72 houses will be constructed in an area of 1.0 ha. adjacent to the existing colony.

A full-fledged water supply and drainage system is already in place and the wastewater generated from the colony is treated in the Sewage Treatment Plant to meet the on land discharge standards. The treated sewage is used for greenbelt development within plant and colony.

2.6.7 STORAGE OF RAW MATERIAL

The following norms for storage capacities have been proposed to ensure trouble free run of the plant:

Material	: Approx. Stock
Crushed Limestone	: 4.0 days
Kiln Feed	: 2.0 days of kiln production
Clinker	: 7.0 days of kiln production
Coal	: 10 days of coal mill production
Pozzolana (Fly ash)	: 3 days
Cement Silo	: 3.5 days of cement production
Gypsum Storage	: 7 days
Slag	: 3 days

Material storage is required at various stages of production for ensuring sufficient buffer stocks for continuous operation of the plant. The existing storage capacities of various materials are sufficient. The type of storage is as follows:

S. NO.	MATERIAL	TYPE OF STORAGE / REMARK
1.	Limestone	Covered Stock Pile
2.	Corrective Material	Covered Shed
3.	Raw meal – Blending	Cylindrical storage silo (RCC)
4.	Raw meal – Storage	Cylindrical storage silo (RCC)
5.	Raw coal	Covered Shed
6.	Laterite/Mill Scale	Covered Shed
7.	Clinker	Covered stock pile
8.	Gypsum	Covered Shed
9.	Fly Ash	Silo
10.	Cement	Cylindrical storage silos (RCC)
11.	Slag	Covered Shed

Limestone is transported to cement plant by covered conveyor.

2.7 TECHNOLOGY AND PROCESS DESCRIPTION

The following are the steps involved in manufacturing of cement:

- Limestone excavation and crushing
- Raw material preparation and blending operations
- Calcination in the kiln
- Clinker cooling and stocking
- Cement grinding and packing
- Quality and process control

2.7.1 BRIEF MANUFACTURING PROCESS OF CEMENT

Dry process of cement manufacture utilising the precalciner technology is adopted. The clinkerisation process along with the technological advances in the area of grinding, homogenization, pre-calciner as well as packing of cement will be incorporated.

The basic raw materials used in the cement plant are Limestone, Iron Ore, Laterite and Gypsum. Imported Coal will be used in the process.

A line diagram/flow sheet for the process along with EMP is shown in **Fig - 2.8**.

The mass balance and energy balance are shown in **Fig 2.9**.

Limestone excavated from the mines is crushed at the crusher located at 1.5 km from the captive limestone mine and the crushed limestone is transported through closed conveyor of 4.5 km length upto stacker reclaimer provided in the cement plant.

Limestone along with other ingredients is mixed in suitable proportions and is sent to raw mill where the raw material is ground to the required size. The powdered raw meal is stored in the raw meal silos. Silos with air lift /belt bucket elevator systems feed the raw material to Preheater cyclones.

The hot material with a temperature of about 860-900°C is allowed to flow into the Kiln for further calcination. The kiln is a long rotating shell with insulation in which the raw material is fed from one end and coal is fired from the other end. Pulverized coal is fired with the help of specially designed burners.

During the material transfer in the hot kiln, limestone decomposes into CaO and CO_2 and is subjected to physical and chemical changes to form clinker. The hot molten clinker is allowed to pass through a long movable grate where fresh air from the atmosphere at elevated pressures is supplied at various sections. The clinker thus cooled is transported to clinker storage.

Raw mills grind the clinker to manufacture the required grade of the cement. In order to increase the maneuverability and better loading on the cement mills located within the plant, suitable arrangements have been made to transport the clinker from clinker hopper to the cement mills.

Slag and Fly ash procured is being used in the cement plant for the manufacture of Portland Slag Cement (PSC)/Pozzolona Portland Cement (PPC).

Details of manufacturing process are given below:



FIG - 2.8

PROCESS FLOW DIAGRAM ALONG WITH EMP

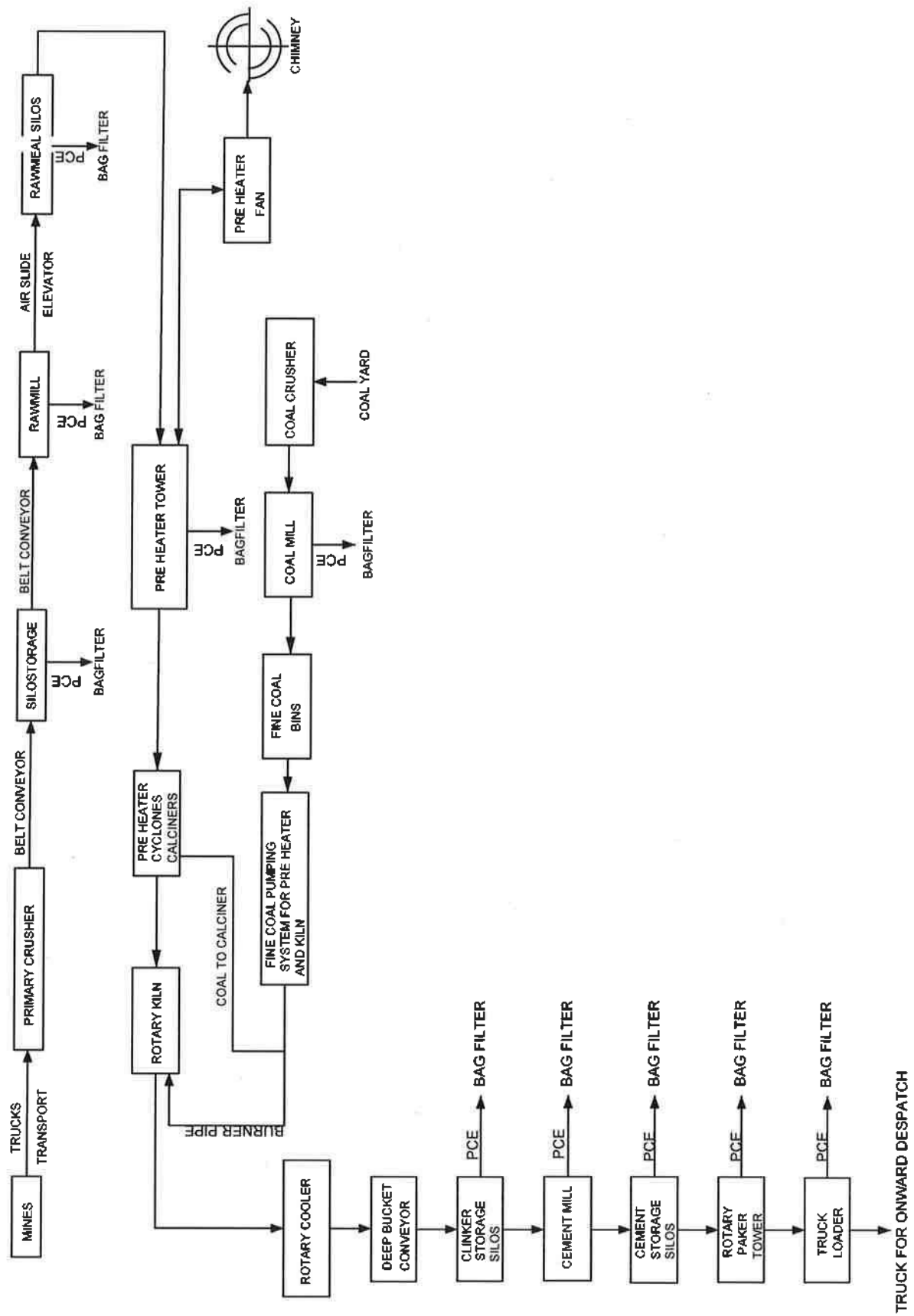
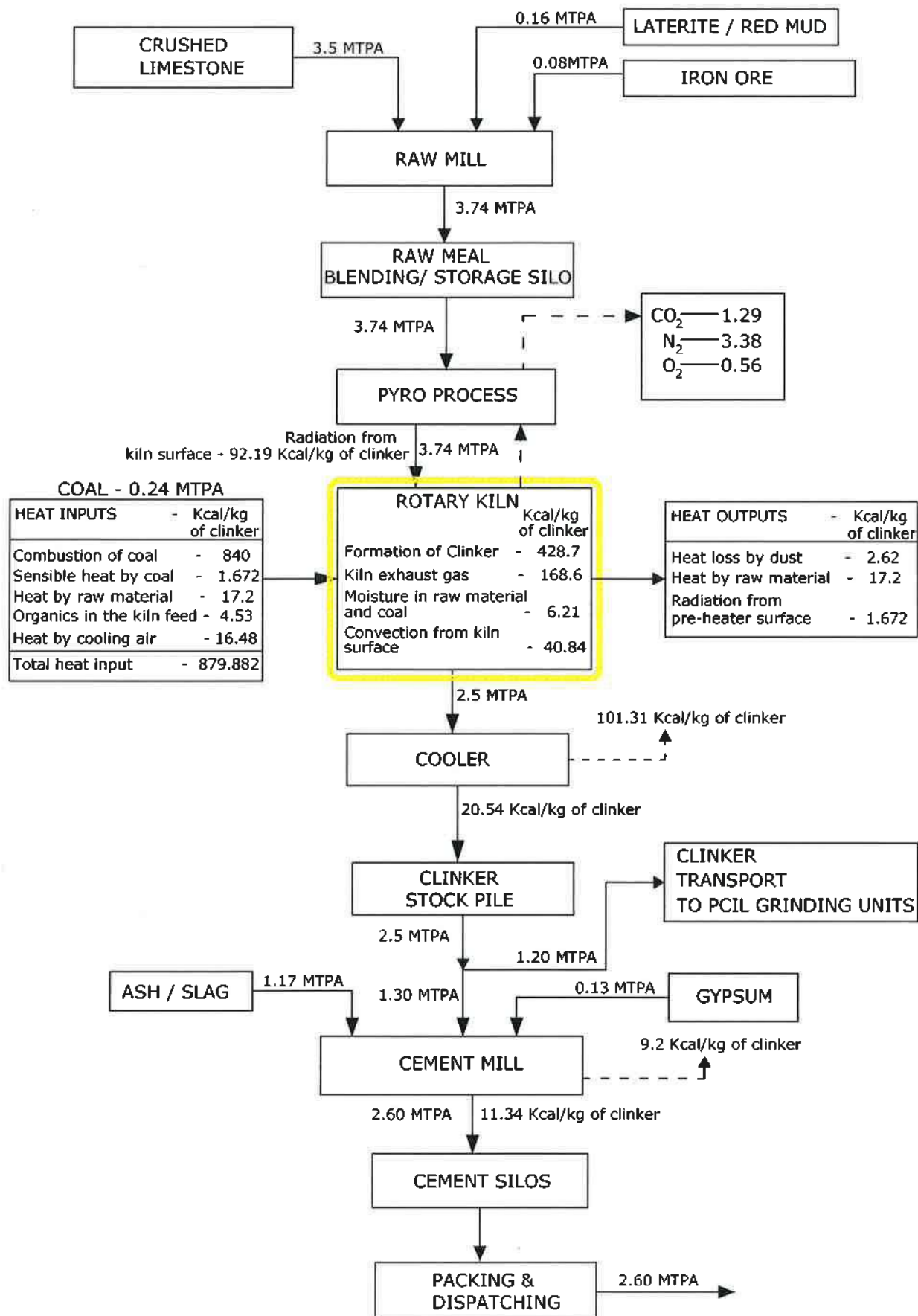


FIG - 2.9
MASS AND ENERGY BALANCE FOR PROPOSED EXPANSION



LIMESTONE MINING

Mechanized mining of lime stone is done by deep hole drilling, nonel blasting, excavation and hauling. The blasted lime stone of maximum size of 1300 mm is transported to lime stone crusher for crushing.

LIMESTONE CRUSHER

A single Rotor Impact Crusher of 850 TPH is in operation at 1.5 km from the mine installed to reduce limestone size from 1000 mm to 75mm. an additional crusher of 1000 TPH will be installed to cater to the cement plant expansion.

STACKING & RECLAIMING

The crushed lime stone is stacked longitudinally with stacker as per the required quality given by Quality Control Dept. The capacity of existing stock pile is 60000 T. After forming the stockpile, the reclamation will be started. The total process of stacking and reclaiming is called chevron method. An additional stock pile of 60000 T will be provided under expansion to meet the cement plant expansion.

RAW MATERIAL GRINDING

Blended lime stone is reclaimed and is filled into raw material hopper in the roller press. Laterite, Iron Ore and corrective limestone are filled into hoppers. All the materials with the required ratio are conveyed through the weigh feeders and belt conveyors to roller press, where grinding takes place.

Inbuilt system of separator will grind the raw materials 75 mm size to 18% R on 90 micron size. The product called raw meal is collected in cyclones and RABH and transported through air slides and bucket elevator and stored in blending Silo.

COAL CRUSHING & GRINDING

Raw Coal is unloaded from wagon tippler and conveyed to storage yard. Coal from storage yard is transported by Belt Conveyors to crusher where the size is reduced from 100mm to 25 mm and conveyed to raw coal hopper through conveyor belts. Vertical roller mill (VRM) pulverizes raw coal to fine coal with fineness of 10% R on 90 microns, which is collected in Bag Filter. The fine coal is further conveyed mechanically to fine coal bins and transported to kiln and calciner pneumatically (through FK pumps) for firing.

Coal crusher is in operation for sizing of the coal for the required size. Water spray system has been provided to control the fugitive dust generated during unloading of coal.

PYRO-PROCESSING

This system consists of Rotary Kiln with 6 stage Pre-heater. Raw meal from Silos is conveyed through pre-heater. Fine coal is fired through burner pipe into kiln and into pre-calciner. The material is 90 to 92 % calcined before entering into kiln and balance calcination, Pre burning and sintering takes place in the kiln for ensuring complete chemical reactions. Clinker formed is cooled in grate coolers with high pressure fans. The clinker after cooling is transported mechanically to clinker storage tanks.

CEMENT GRINDING

Clinker from clinker storage tank is conveyed to clinker hopper. Gypsum is filled into gypsum hopper. Closed Circuit Tube Mill with dynamic separator grinds clinker and gypsum in a ratio of 95:5 respectively. The product, called Ordinary Portland cement (OPC) is conveyed mechanically to cement storage silos.

Similarly Clinker, Fly Ash/slag, gypsum in a ratio of 60: 35: 5 respectively are ground in the VRM to make Portland Pozzolana Cement (PPC), Portland slag cement (PSC) & Portland Pozzolana Cement (PPC) which is conveyed mechanically to cement storage silos.

CEMENT PACKING

Electronic Packers (12 spout- double discharge) automatically fill the PP bags or paper bags of 50 Kg. These bags are loaded to the trucks through belt conveyors and loaders/Rail.

The Plant is well automated and operated from Central Control Room and Control system is based on PLC.

QUALITY CONTROL

All the raw materials, in- process and products are carried out by means of XRF and XRD of PAN Analytical. The preventive measures are taken to ensure the consistent and best quality is achieved. Material testing is undertaken on calibrated instruments for both Physical and Chemical parameters all the time. The people involved in this stream are highly qualified and experienced and quality conscious. The product is well accepted in the market and customers like Readymix concrete, Industries and Builders prefer our product very well.

2.8 PROCESS CONTROL

The plant operation through Automation is equipped with Expert Control Systems (ECS), comprising the SDR system. PIDs with closed loops systems are intact and PLC is in advanced modern system. Fuzzy logic from FLS is also adopted for smooth and consistent operation of the plant. The process parameter is designed by the experts and is operated by qualified and experienced engineers. The deviations are minimized and the tolerances are limited. This is resulting in achieving the productivity in terms of best quality, optimal production and energy conservation (thermal as well as electrical).

2.8.1 WASTE HEAT RECOVERY POWER PLANT

10 MW capacity is in operation. Component of hot gases generated from Kiln and Cooler are recovered in waste heat recovery boilers. The heat in the gases is utilized for steam generation, which in turn impinges on the Turbine blades to generate 10MW of power. Air cooling condensation is in place to conserve water.



2.9 PROPOSED EXPANSION

2.9.1 UPGRADATION OF UNIT - I FOR INCREASE OF CLINKER PRODUCTION CAPACITY FROM 1.5 MTPA TO 1.65 MTPA

The process line of Unit - I has inbuilt capacity for additional production upto 10%. In addition, the following modifications are proposed for enhancement of clinker production from 1.5 to 1.65 MTPA.

- Modification of pre-heater cyclones
- Up-gradation of pre-heater
- Up-gradation of Tertiary Air Duct
- Increase of surface area of cooler

2.9.2 PROPOSED UNIT - II NEW LINE

The major equipment are proposed under new line

PROCESS EQUIPMENT - UNIT - II

	Item	Type	Capacity(TPH)
Main Machinery	Limestone Crusher	Single stage impactor type Crusher	1250
	Limestone Stacker	Luffing Boom Type Stacker	1200
	Limestone Reclaimer	Bridge Type Reclaimer	1000
	Raw Material Grinding	Roller Press	2 X 300
	Coal Grinding	Vertical Roller Mill	45
	Preheater / Calciner	Twin String 5 Stage Preheater with Inline Precalciner - 6500 TPD	
	Kiln	Rotary Kiln - 6500 tpd	
	Clinker Cooler	Grate Cooler - 6500 tpd	
	Cement Grinding	VRM	2 X 210
	Packing Plant	Rotary Packer	4 X 180
	Limestone Stock pile	Longitudinal Stockpile	2x 60000

	Item	Type	Capacity(TPH)
	Chemical gypsum Stockpile	Closed stockpile	4000
	Raw Meal	Silo	15000
	Fly Ash	Silo	3000
	Clinker	Silo	65000
	Slag	Closed stock pile	7500
	Cement	Silo	2 X 8000

2.9.3 PROPOSED NEW WHR POWER PLANT

PCIL proposes to install 10 MW Waste Heat Recovery Based Power Plant in the expansion phase.

As per the advise of EAC MOEF, PCIL has carried out a detailed technical study for recovering more heat from the kiln and cooler. details of the same are given below

2.9.3.1 FEASIBILITY STUDY FOR PROPOSED 2.5 MTPA CLINKER GRINDING UNIT - WASTE HEAT RECOVERY SYSTEM

PCIL is operating 1.5 MTPA Clinkerisation plant. A 10 MW Waste heat Recovery based power plant was installed connected to the cement plant for generation of Power. At the design stage of 1.5 MTPA existing Cement Plant, it was estimated that the proposed heat recovery system will be capable of producing power to an extent of 10 MW. Accordingly PCIL has installed 10 MW capacity waste heat recovery plant capturing the hot gases from the Kiln and Cooler. However, the operating experience of PCIL has shown that the maximum power generation is 6.0 MW against the expected capacity of 10.0 MW.

Based on the operational experience of existing plant, PCIL has carried out a detailed technical feasibility to explore the possibility of more waste heat recovery to generate power of more than 10 MW from the proposed new line of 2.5 MTPA Clinker Capacity.

The project is based on waste heat recovery of the hot gases generated in the pre heater and cooler. The Waste Heat Recovery

Boilers (2 Nos) will be designed to make use of waste heat of flue gases coming out from Kiln/Preheater and Cooler

Based on the operating experience of the existing plant, the estimated inlet flue gas parameters to the waste heat recovery boilers of the new proposed plant are estimated and given below

Kiln Clinkerisation capacity (5 stage PH)		6500 TPD (Performance)	
Parameter	Unit	AQC	Pre-heater
Source of Gases	-	Mid tap	Pre heater outlet
Flue gas flow rate at boiler inlet	Nm ³ /hr	185250	379,000
Flue gas Temperature at cooler mid tap incase if AQC boiler/Preheater exit incase of PH of boiler	°C	400	310
Flue gas Pressure at cooler mid tap incase if AQC boiler/Preheater exit incase of PH of boiler (assumed)	mmWC	-10	-600
Flue gas Dust Loading (assumed)	gm/Nm ³	40	60 to 65
Maximum flue gas pressure drop across boiler (including pre-duster in case of AQC boiler)	mmWC	~50	~60
Flue gas temperature at boiler outlet	°C	95±5	165±5

Following are the performance parameters during normal operation of the plant. Performance data is based on zero blow – down and zero makeup and steady state condition.

S.No	Description	Unit	Performance Guarantee	Potential/ Indicative Data
1.1	AGC boiler -HP Steam including PH boiler steam			
1	Steam flow at Turbine inlet (note 6)	TPH	37.9	51.4
2	Steam Pressure at Turbine inlet (note 7)	Ata	18.0	18.0
3	Steam temperature at boiler Turbine inlet	Deg C	370±5	370±5
1.2	PH boiler -LP Steam			
1	Steam flow at Turbine inlet	TPH	14.2	18.0
2	Steam Pressure at Turbine inlet (note 7)	Ata	2.5	2.5
3	Steam temperature at Turbine inlet	Deg C	195±5	195±5

Note:

- Above steam generation is based on operating plant experience (Flue gas analysis, Flue gas flow, Flue gas pressure, Flue gas temperature and dust loading) as detailed out in design basis for the proposed 2.5 MTPA new line.
- Above indicated all parameters subject to availability of inputs (flue gas analysis/composition, Flue gas flow, Flue gas pressure, Flue gas temperature) on continuous basis at inlet of boilers from Kiln simultaneously to guarantee the above said performance condition parameters.

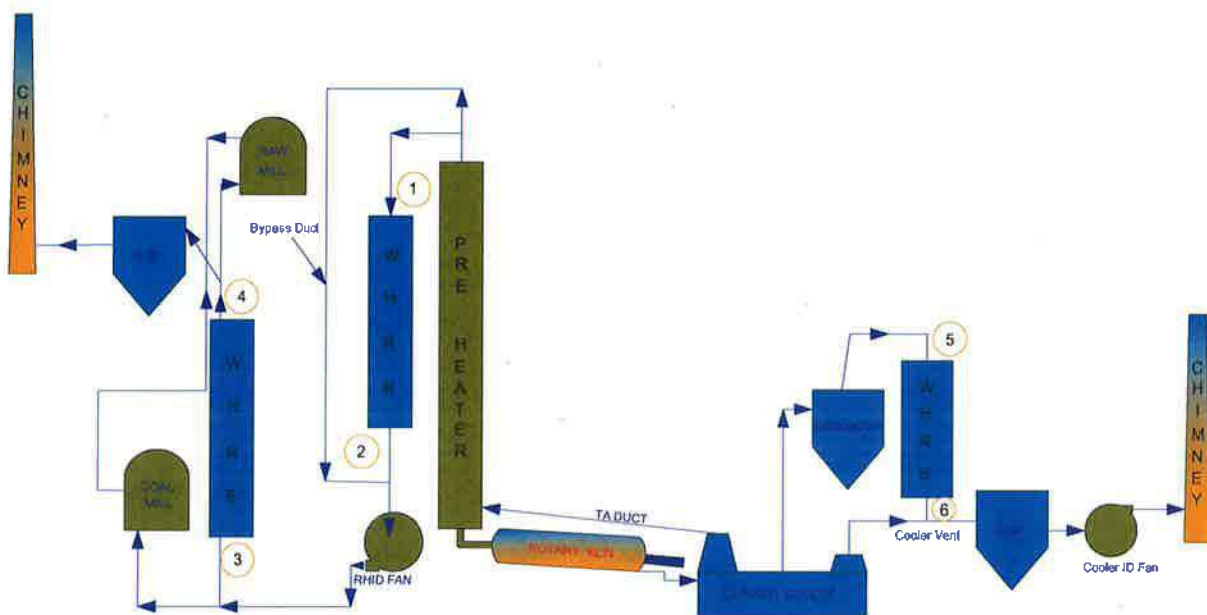
Considering the steam availability potential and pressure drop across the values, with the low pressure, the maximum power generated is estimated to be about 10.0 MW.

PCIL also collected the data from operating experience of various Waste Heat Recovery Based Power Plants in operation by the Cement Plants based on Preheater and Cooler. Based on the data obtained, the maximum power generation is 30 kwh/t of clinker (after drying off nominal moisture in raw material and coal) and based on this, the new plant can generate maximum power of 10.40 MW. Hence WHRB power plant of 10 MW is considered.

2.9.3.2 COMMITMENT ON NON USE OF PETCOKE AS FUEL IN THE POWER PLANT

PCIL has not installed any power plant which is based on solid fuel. The existing and proposed power plants are based on waste heat recovery system.

No pet coke will be used in power generation.



2.10 MITIGATION MEASURES INCORPORATED INTO THE PROJECT TO MEET ENVIRONMENTAL STANDARDS, ENVIRONMENTAL OPERATING CONDITIONS, OR OTHER EIA REQUIREMENTS.

All possible sources of particulate emissions are provided with collection equipment as follows:

S.NO	SOURCE	POLLUTION CONTROL EQUIPMENT	RESIDUAL DUST CONTENT
1	Roller press/Kiln	RABH	Bag house installed at the stacks of cement plant to restrict particulate matter emission <30 mg/Nm ³ and incase of clinker cooler, ESP of >99.98% efficiency will be installed to limit the particulate matter emission to < 30 mg/Nm ³ . Low Nox pre heater system with twin string ILC. Low NOx burners are proposed for maintaining the prescribed NOx emission levels.
2	Cooler	ESP	
3	Cement Mill	Bag Filter	
4	Packing Unit	Bag Filter	
5	Stock Pile	Bag Filter	
6	Silo	Bag Filter	

Wastewater is generated from power plant, domestic activities at cement plant and residential colony. Waste water from power plant is treated in common tank and the sewage is treated in Sewage Treatment Plant (STP). Treated wastewater is reused for process and greenbelt development.

No solid waste generation from the plant.

2.11 ASSESSMENT OF NEW & UNTESTED TECHNOLOGY FOR THE RISK OF TECHNOLOGICAL FAILURE

Dry process cement manufacturing technology is adopted which is a proven technology adopted by all cement plants and the same technology is proposed for new Unit – II.

CHAPTER - 3

DESCRIPTION OF ENVIRONMENT



CHAPTER – 3: DESCRIPTION OF ENVIRONMENT

3.1 STUDY AREA

The study area covers 10 km radius around the cement plant of PCIL at Boyareddypalli Village, Yadiki Mandal, Anantapur District, Andhra Pradesh.

The study area of 10 km radius is covered in Survey of India toposheet No. 56 P/13 [1:50000 scale].

The baseline environmental quality represents the background environmental scenario of various environmental components. Pollution in the area is mainly due to surrounding Industries and unpaved road conditions and vehicular traffic.

STUDY PERIOD

The baseline environmental quality represents the background scenario of various environmental components in the study area. As part of Environmental Impact Assessment study, baseline environmental monitoring was carried out for Winter Season, 2016-17, covering the months of December '16, January'17 and February '17.

3.2 METHODOLOGY OF EIA STUDY

The various steps involved in Environmental Impact Assessment study of the proposed expansion are divided into the following phases.

- Identification of significant environmental parameters are identified and assessed to study the existing status within the impact zone with respect to air, water, noise, soil and socio-economic components of environment.
- Study of various activities of the proposed expansion unit to identify the areas leading to impact / change in environmental quality.

- Identification/Prediction of impacts for the identified activities and to study level of impact on various environmental components.
- Evaluation of impacts by superimposing the predicted / quantified scenario over the baseline scenario.
- Formulation of Environmental Management Plan for implementation in the cement plant after expansion.

3.2.1 COLLECTION OF BASELINE STATUS

A. MICRO METEOROLOGY

An auto weather monitoring station was installed to record meteorological parameters like Wind speed, Wind direction, temperature, and relative humidity on hourly basis continuously for the Winter Season, 2016-17, covering the months of December '16, January'17 and February '17 on hourly basis.

Wind speed, wind direction data recorded during the study period was used for computation of relative percentage frequencies of different wind directions. The meteorological data thus collected has been used for interpretation of the existing Ambient Air Quality status, and the same data has been used for prediction of impacts of future scenario due to the project.

B. AMBIENT AIR QUALITY

The scenario of the existing Ambient air quality in the study region has been assessed through a network of Eight ambient air quality stations during the study period i.e., Winter Season, 2016-17 within 10 km radius of study area.

The Ambient air quality monitoring network has been designed keeping in view the available climatological norms of predominant wind direction and wind speed of this particular region.

The following points were also taken into consideration in designing the network of sampling station:

- Topography / Terrain of the study area
- Populated areas within the study area
- Residential and sensitive areas within the study area.

The existing Ambient Air Quality (AAQ) status has been monitored for PM₁₀, PM_{2.5}, SO₂, NO_x and CO. PM₁₀, PM_{2.5}, at each station has been monitored on 24 hourly basis. CO was monitored on 8 hourly basis.

Pre-calibrated Respirable dust & Fine dust samplers have been used for monitoring of the existing AAQ status. Methodologies adopted for sampling and analysis were, as per the approved methods of Central Pollution Control Board (CPCB). Maximum, minimum, average and percentile values have been computed from the raw data collected at all individual sampling stations to represent the ambient air quality status of the study area.

C. NOISE ENVIRONMENT

Noise monitoring has been carried out at various locations to identify the impact due to the existing sources on the surroundings in the study area during winter season'16-'17. Noise levels were recorded during the day and night times to compute the day equivalent and night equivalent levels.

D. WATER ENVIRONMENT

Water samples from various locations within 10 km radius were collected for assessment of the existing physico-chemical and bacteriological quality during winter season'16-'17.

Methodologies adopted for sampling and analysis were according to the IS methods. The parameters analyzed were compared with IS 10500. The activities surrounding the source during sampling were taken into consideration in the interpretation of the water quality of that particular source.

E. LAND ENVIRONMENT

Field surveys were conducted to identify the land use in and around 10 km radius of the site. Representative soil samples were collected from five locations within 10 km radius of plant for analysis of the physico chemical characteristics. Standard procedures were followed for sampling and analysis. The samples collected were also analysed to check the suitability for growth of native species in and around the proposed project. Information on flora and fauna in the study area has been collected as part of the Ecological survey conducted during the study period.

3.2.2 STUDY OF VARIOUS ACTIVITIES

Various operations involved in the expansion have been studied in detail to identify areas having impact on various environmental components. The study is based on the various other secondary sources of information.

3.2.3 QUANTIFICATION/PREDICTION OF IMPACTS

The identified impacts based on the above study are quantified using various mathematical models.

3.2.4 EVALUATION OF IMPACTS

The quantified incremental impacts are superimposed on the baseline status of various environmental components to have an overall scenario. The overall scenario estimated has been checked for compliance with various statutory requirements / standards.

3.2.5 FORMULATION OF AN ENVIRONMENTAL MANAGEMENT PLAN

Based on the environmental status & quantified impacts, a detailed Environmental Management Plan has been formulated for implementation during the expansion phase of cement plant.

A detailed environmental monitoring programme has been drawn for further strengthening.



3.3 BASELINE ENVIRONMENT

3.3.1 MICRO METEOROLOGY OF THE STUDY AREA

REGIONAL METEOROLOGY

The tropical climate of the region is manifested in hot and humid summer, moderately monsoon and mild winter seasons. May is the hottest month in the year. The maximum temperature during the day time was recorded as 45.6 °C and December the coldest with the temperature during the day time falling down to about 34.4°C. The night temperature in winter is as low as 15°C. The months of December, January & February are considered to have pleasant climate.

SITE METEOROLOGY

An auto weather monitoring station was installed during the months of December'16 to February'17 to record various meteorological parameters on hourly basis to understand the wind pattern, Temperature variation, solar insolation and relative humidity variation etc.,

Percentage frequencies of wind in 16 directions have been computed from the recorded data of Winter 2016-'17, during the study period for 8 hourly (01-08hrs, 09-16 hrs and 17-24 hrs) and 24 hrs (01-24hrs) intervals to plot wind roses. **Fig - 3.1 and 3.2** represents the wind pattern of the study period.

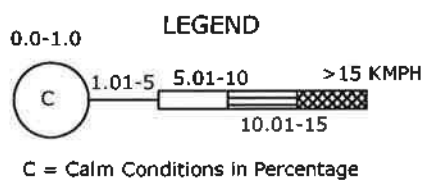
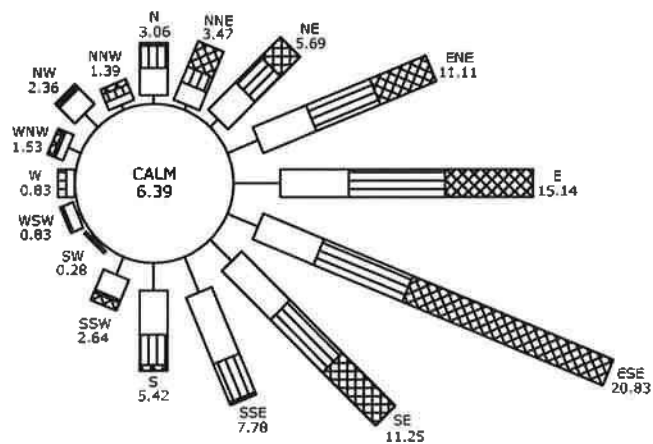
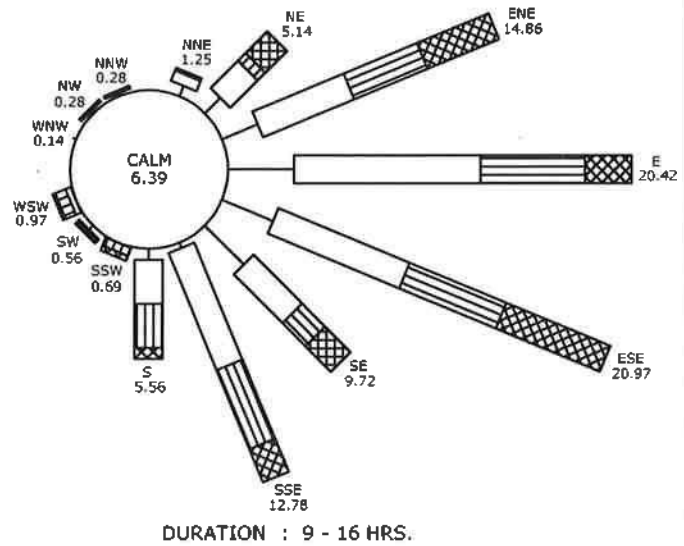
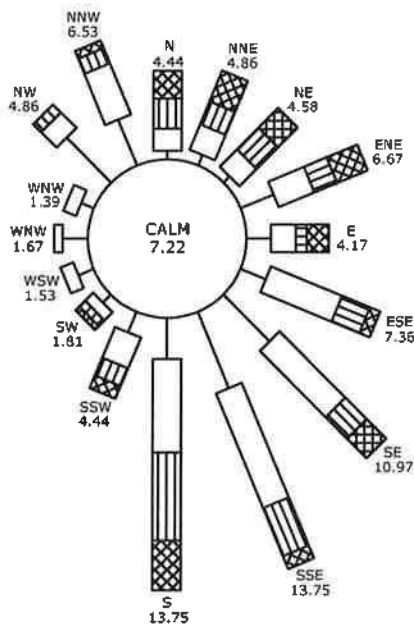
SUMMARY OF WIND PATTERN

Duration (Hrs)	Predominant Wind Direction	Wind Rose Enclosed as
00:00 – 08:00	ESE-SE-SSE-S Sector	Fig-3.1 & 3.2
08:00 – 16:00	ENE-E-ESE-SE-SSE Sector	
16:00 – 24:00	ENE-E-ESE-SE Sector	
00:00 – 24:00	ENE-E-ESE-SE-SSE Sector	

FIG - 3.1
WINDROSE DIAGRAM

CLIENT : PENNA CEMENT INDUSTRIES LIMITED
PROJECT : EXPANSION OF CEMENT PLANT
LOCATION : BOIREDDYPALLI

PERIOD : WINTER - 2016-2017



NOTE : All readings are in percentage occurrence of wind

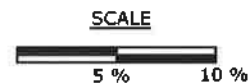
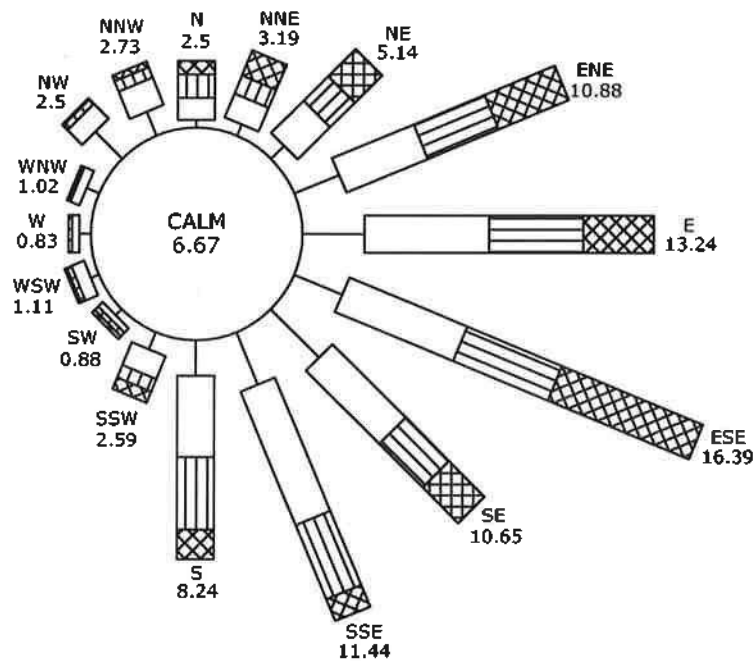


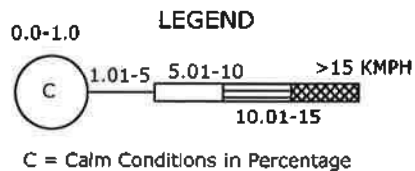
FIG - 3.2
WINDROSE DIAGRAM

CLIENT : PENNA CEMENT INDUSTRIES LIMITED
PROJECT : EXPANSION OF CEMENT PLANT
LOCATION : BOIREDDYPALLI

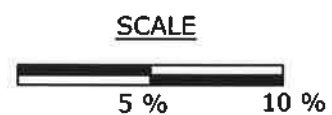
PERIOD : WINTER - 2016 - 2017



DURATION : 1 - 24 HRS.



NOTE : All readings are in percentage occurrence of wind



WIND PATTERN DURING 00:00 - 08:00 HOURS

The predominant wind directions during this period were from ESE-SE-SSE-S sector accounting to about 45.83% of the total time. Average wind speeds during this period were varying between 1.01-15 kmph and during most of the time the winds were more than 15 kmph. The wind of less than 1.0 kmph was treated as calm, about 7.22 % of the time the winds were under calm condition.

WIND PATTERN DURING 09:00 - 16:00 HOURS

The predominant wind directions during this period were from ENE-E-ESE-SE-SSE sector accounting to about 78.75 % of the total time. Average wind speeds during this period were varying between 1.01-15 kmph and during most of the time the winds were more than 15 kmph. The wind of less than 1.0 kmph was treated as calm, about 6.39 % of the time the winds were under calm condition.

WIND PATTERN DURING 17:00 - 24:00 HOURS

The predominant wind directions during this period were ENE-E-ESE-SE sector accounting to about 58.33 % of the total time. Average wind speeds during this period were varying between 1.01-15 kmph and during most of the time the wind were more than 15 kmph. The wind of less than 1.0 kmph was treated as calm, about 6.39 % of the time the winds were under calm condition.

WIND PATTERN DURING 01:00 - 24:00 HOURS (WINTER SEASON 2016-17)

The predominant wind directions during this period were from ENE-E-ESE-SE-SSE sector accounting to about 62.6% of the total time. Average wind speeds during this period were varying between 1.01-15 kmph and during most of the time the winds were more than 15 kmph. The wind of less than 1.01 kmph was treated as

calm, about 6.67% of the time the winds were under calm condition.

3.3.2 AMBIENT AIR QUALITY

In order to identify the background air quality data and also to represent the interference from various industrial and local activities, screening techniques have been used for identification of air quality stations in the study area.

The following points have been considered for the selection of air quality monitoring stations.

- Predominant wind directions
- Topography of the study area
- Terrain and sensitive areas
- Populated areas near to the plant area
- Magnitude of the surrounding industries

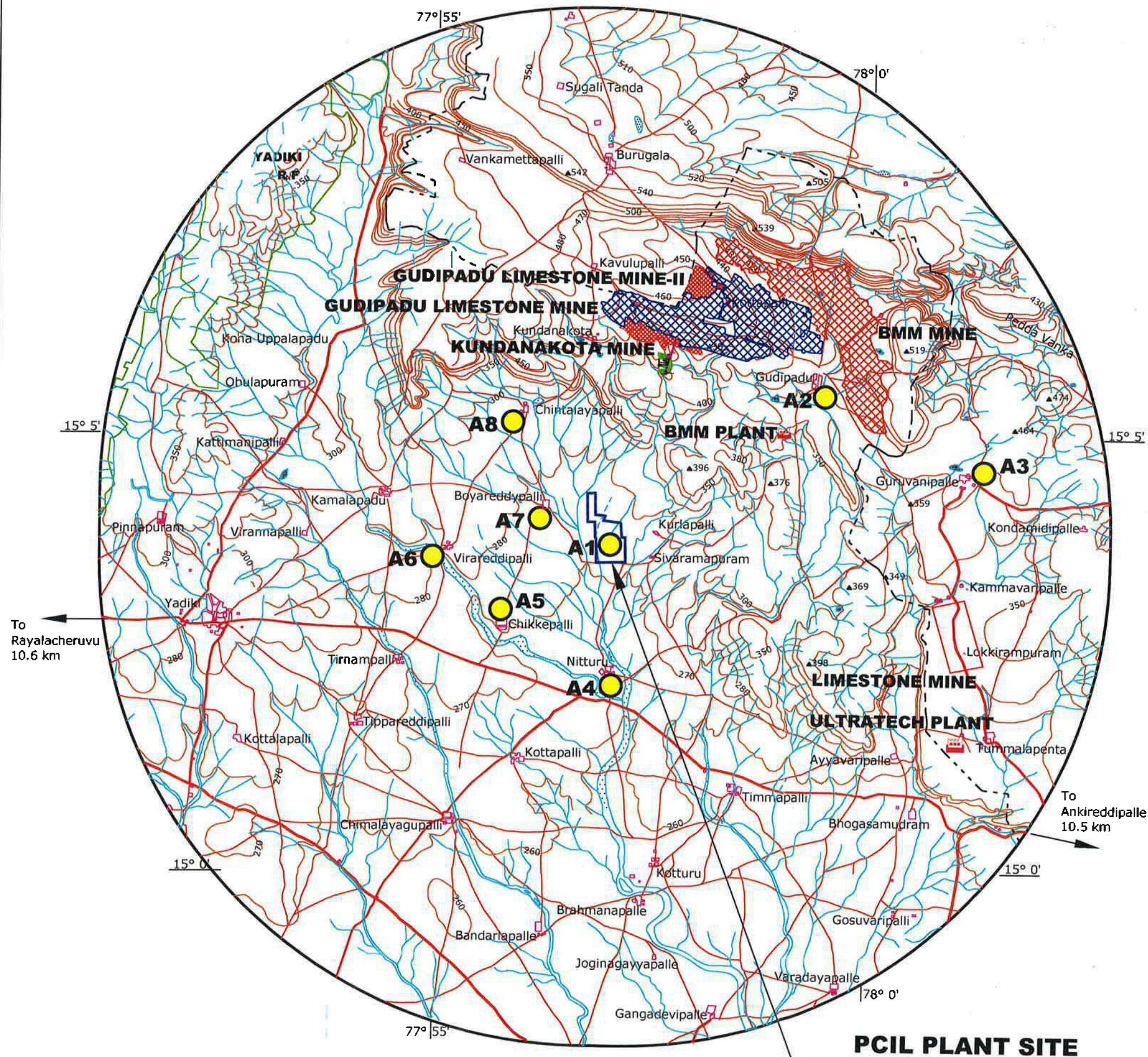
3.3.2.1 AMBIENT AIR QUALITY MONITORING STATIONS

Ambient air quality of the study area has been assessed through a network of 8 ambient air quality locations. The locations of stations in the study area are given in **Table - 3.1**.

TABLE - 3.1
AMBIENT AIR QUALITY MONITORING STATIONS

Station Code	Locations	Distance [km]	Direction w.r.t Plant	Representation
A1	Plant Site	---	---	---
A2	Gudipadu	4.8	NE	Crosswind
A3	Guruvanipalle	7.0	ENE	Upwind
A4	Nitturu	2.2	S	Upwind
A5	Chikkepalli	2.2	SW	Crosswind
A6	Virareddypalli	2.9	W	Downwind
A7	Boyareddypalli	1.1	WNW	Downwind
A8	Chintalayapalli	2.1	NW	Downwind

Fig - 3.3 shows the location of ambient air quality monitoring stations in the study area.



LEGEND

- ROADS
- STREAMS / TANKS
- CONTOURS
- SPOT HEIGHTS
- SETTLEMENTS
- FOREST
- DISTRICT BOUNDARY
- PCIL PLANT SITE
- AMBIENT AIR QUALITY MONITORING STATIONS

REFER TO THIS MAP AS:- 1:50,000
SHEET 57/E/16 FIRST EDITION
Published under the direction of
the Surveyor General of India - 1977

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Survey of India Toposheets

57 $\frac{E}{11}$	57 $\frac{E}{15}$	57 $\frac{I}{3}$
57 $\frac{E}{12}$	57 $\frac{F}{16}$	57 $\frac{I}{4}$
57 $\frac{F}{9}$	57 $\frac{F}{13}$	57 $\frac{J}{1}$

SCALE



FIG - 3.3

CLIENT:
M/s. PENNA CEMENT INDUSTRIES LTD.,

PROJECT:
EXPANSION OF CEMENT PLANT
Boyareddypalli Village, Yadiki Mandal, Anantapur District, Andhra Pradesh

TITLE:
**AMBIENT AIR QUALITY
MONITORING STATIONS**

PREPARED BY:
 B.S. ENVI-TECH (P) LTD.,
SECUNDERABAD

Data on the activities surrounding the ambient air quality monitoring stations were collected for interpretation of the ambient air quality status.

3.3.2.2 ANALYSIS OF BASELINE CONCENTRATIONS

PARTICULATE MATTER - PM₁₀

Respirable particulate matter monitored in the study area showed 98th percentile values in the range of 50.9 – 56.5 µg/m³. The PM₁₀ concentration in the study area was found to be well within the norms prescribed by NAAQ.

PARTICULATE MATTER - PM_{2.5}

PM_{2.5} values monitored at 8 locations showed 98th percentile values in the range of 21.2 – 26.0 µg/m³. The PM_{2.5} concentration in the study area was found to be well within the norms prescribed by NAAQ.

SULPHURDIOXIDE - SO₂

98th percentile value of Sulphur dioxide in the study area from the monitored data was in the range of 11.7 – 13.0 µg/m³. The values of SO₂ monitored in the study area are well within the limits of NAAQ standards.

OXIDES OF NITROGEN - NO_x

Ambient air quality status monitored for nitrogen oxides in the study area were in the range with 98th percentile values between 12.8 – 14.4 µg/m³. The values of NO_x monitored in the study area are well within the limits of NAAQ standards.

CARBON MONOXIDE - CO

CO concentration at all the locations was found to be less than 1 ppm.

SUMMARY OF AAQ DATA

Summary of AAQ in 10 km radius of study area is given below in **Table – 3.2** and date wise data of ambient air quality is presented in **Annexure – 3A**.

TABLE – 3.2
SUMMARY OF AAQ MONITORING

Station Code	Locations	98 TH PERCENTILE VALUES ($\mu\text{g}/\text{m}^3$)			
		PM ₁₀	PM _{2.5}	SO ₂	NO _x
A-1	Plant Site	56.5	24.3	12.7	13.9
A-2	Gudipadu	51.4	21.2	11.7	13.2
A-3	Guruvanipalle	55.7	26.0	12.5	13.7
A-4	Nitturu	52.8	22.9	11.9	12.8
A-5	Chikkepalli	50.9	23.6	12.1	13.3
A-6	Virareddypalli	54.3	24.7	13.0	14.1
A-7	Boyareddypalli	55.2	25.8	12.8	13.6
A-8	Chintalayapalli	53.5	25.5	12.3	14.4

Note: CO values are observed less than 1 ppm during study period.

3.3.2.3 STACK EMISSION MONITORING

As part of EIA study, emissions from existing units have been monitored. The following table gives the stack emission data.

STACK EMISSION MONITORING

S. No.	Name of Stack	Particulate Matter, mg/Nm^3
1	Cooler	26
2	Coal mill stack	20
3	Crusher Stack	16
4	Cement mill stack	27
5	Kiln Main Stack	22
6	Packer-I	12
7	Packer-II	11
8	Packer-III	12
9	Packer-IV	12
10	Cement Silo-I	14
11	Cement Silo-II	17

3.3.3 NOISE ENVIRONMENT

In order to assess the noise levels in the study area, monitoring was carried out at 8 different locations within 10 km radius of the study area. Noise levels were recorded at each station to compute equivalent noise levels for day-equivalent and night-equivalent. Details of noise monitoring stations and the summary of the day & night – equivalent values computed for various locations in the study area are given in **Table - 3.3**.

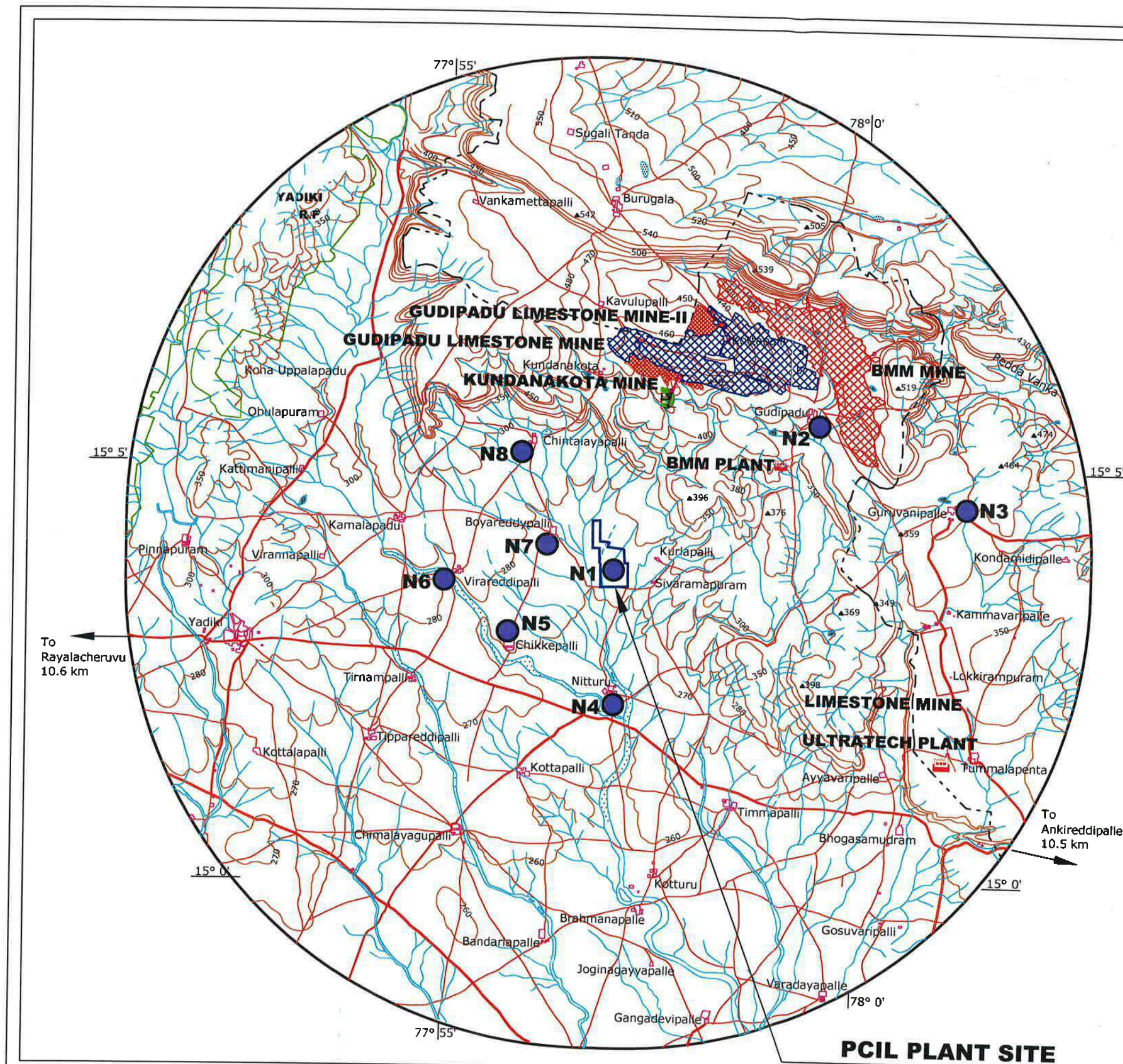
TABLE - 3.3
NOISE MONITORING STATIONS

Code	Locations	w.r.t plant		NOISE LEVEL, dB (A)	
		Distance [km]	Direction	Day Equivalent	Night Equivalent
N1	Plant site	---	---	70.3	61.7
National Ambient Air Quality Standards w.r.t Noise for industrial area				75	70
N2	Gudipadu	4.8	NE	54.5	42.6
N3	Guruvanipalle	7.0	ENE	51.8	43.5
N4	Nitturu	2.2	S	50.5	41.7
N5	Chikkepalli	2.2	SW	52.7	40.3
N6	Virareddypalli	2.9	W	53.1	42.1
N7	Boyareddypalli	1.1	WNW	51.3	44.4
N8	Chintalayapalli	2.1	NW	53.9	41.8
National Ambient Air Quality Standards w.r.t Noise for Residential area				55	45

The noise recording stations are shown in **Fig - 3.4**. Noise levels recorded were found to be in the range of 50.5 – 70.3 dB (A) during daytime and in the range of 40.3 – 61.7 dB (A) during night time.

3.3.3.1 SOURCE NOISE LEVELS – PLANT AREA

Noise levels in the cement plant have been measured at various places within the plant. The major noise generating sources in the cement plant are cooler fans, compressor house, cement mill and ball mill section.



LEGEND

- ROADS
- STREAMS / TANKS
- CONTOURS
- SPOT HEIGHTS
- SETTLEMENTS
- FOREST
- DISTRICT BOUNDARY
- PCIL PLANT SITE
- NOISE LEVEL MONITORING STATIONS

REFER TO THIS MAP AS:- 1:50,000
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57 $\frac{E}{11}$	57 $\frac{E}{15}$	57 $\frac{I}{3}$
57 $\frac{E}{12}$	57 $\frac{E}{16}$	57 $\frac{I}{4}$
57 $\frac{E}{9}$	57 $\frac{E}{13}$	57 $\frac{I}{1}$

SCALE



FIG - 3.4

CLIENT:

M/s. PENNA CEMENT INDUSTRIES LTD.,

PROJECT:

EXPANSION OF CEMENT PLANT

Boyareddypalli Village, Yadiki Mandal, Anantapur District, Andhra Pradesh

TITLE:

**NOISE LEVEL
MONITORING STATIONS**

PREPARED BY:



**B.S. ENVI-TECH (P) LTD.,
SECUNDERABAD**

The spot noise levels measured during the study period at 1m from various noise generating sources are given below

SPOT NOISE LEVELS AT VARIOUS SOURCES

Location	Noise Level in dB (A)
Crusher	83
Cement mill	79
Kiln	81
Packer Unit	70
Cement Silo	76
Steam Turbine	85

The maximum level of noise in the plant complex was produced at compressor house, milling sections of Cement and Coal. The Noise levels are complying with OHSA standards.

3.3.4 WATER ENVIRONMENT

Assessment of water quality in the study area has been done by collecting eight ground water samples from various locations in and around the plant site within 10 km radius. Collected samples were assessed for physico-chemical and bacteriological quality as per the Indian standard IS 10500 (drinking water standard).

No surface water body exists within 10 km of the Study area. Drainage of the project up to 5km radius of study area is shown in **Fig - 3.5**. Hence the surface water samples could not be collected. One sample was collected from the mine pit.

The locations of water sampling are shown in **Fig - 3.6**. Details of water sampling locations are given in **Table-3.4**.



LEGEND




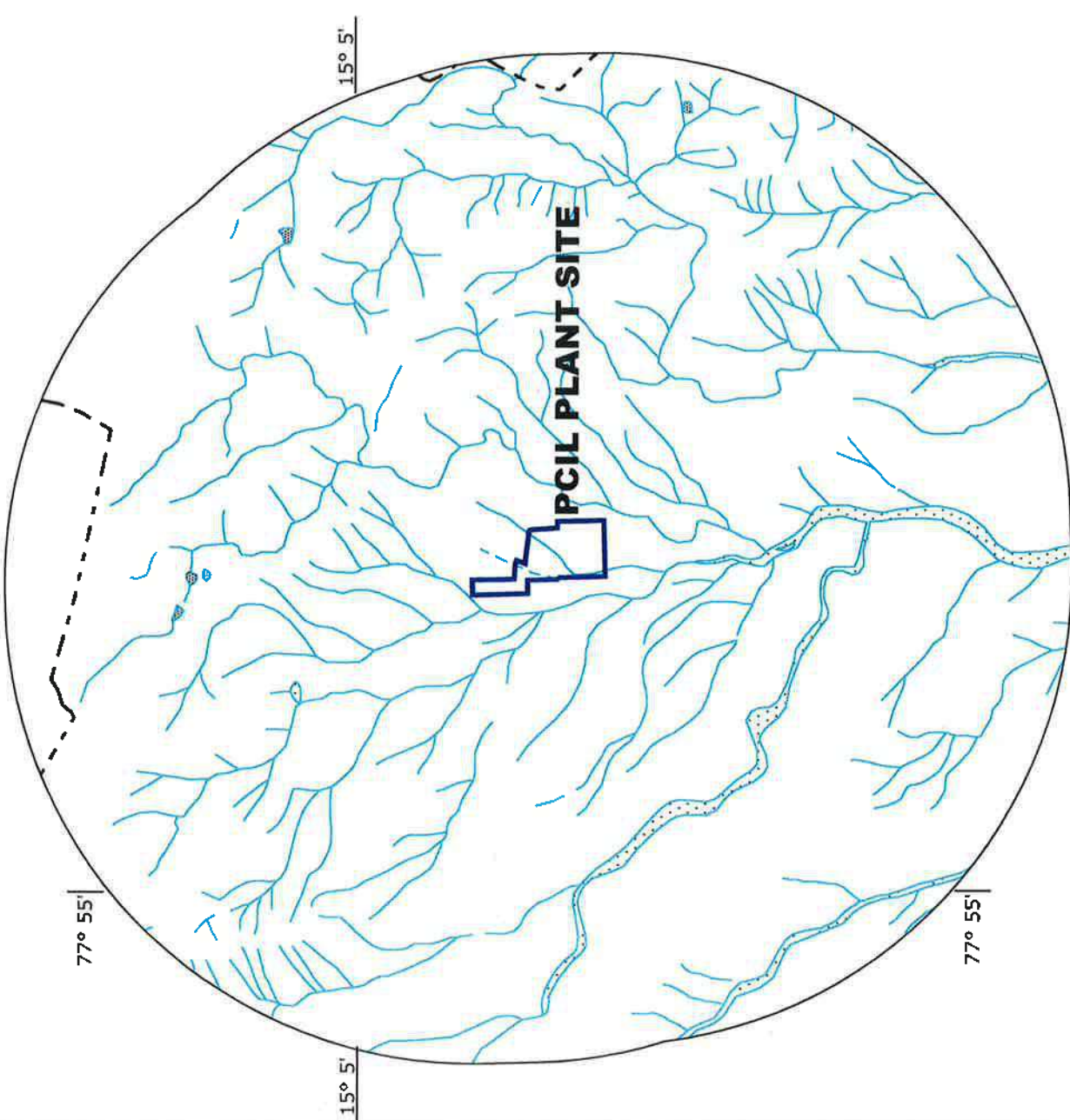
-  STREAMS / TANKS
-  DISTRICT BOUNDARY
-  PCIL PLANT SITE

FIG - 3.5

CLIENT: **M/s. PENNA CEMENT INDUSTRIES LTD.,**
PROJECT: **EXPANSION OF CEMENT PLANT**
Bevaraddypalli Village, Tadikl Mandal, Anantapur District, Andhra Pradesh
TITLE: **DRAINAGE MAP**

PREPARED BY:
 **B.S. ENVI-TECH (P) LTD.,**
SECUNDERABAD



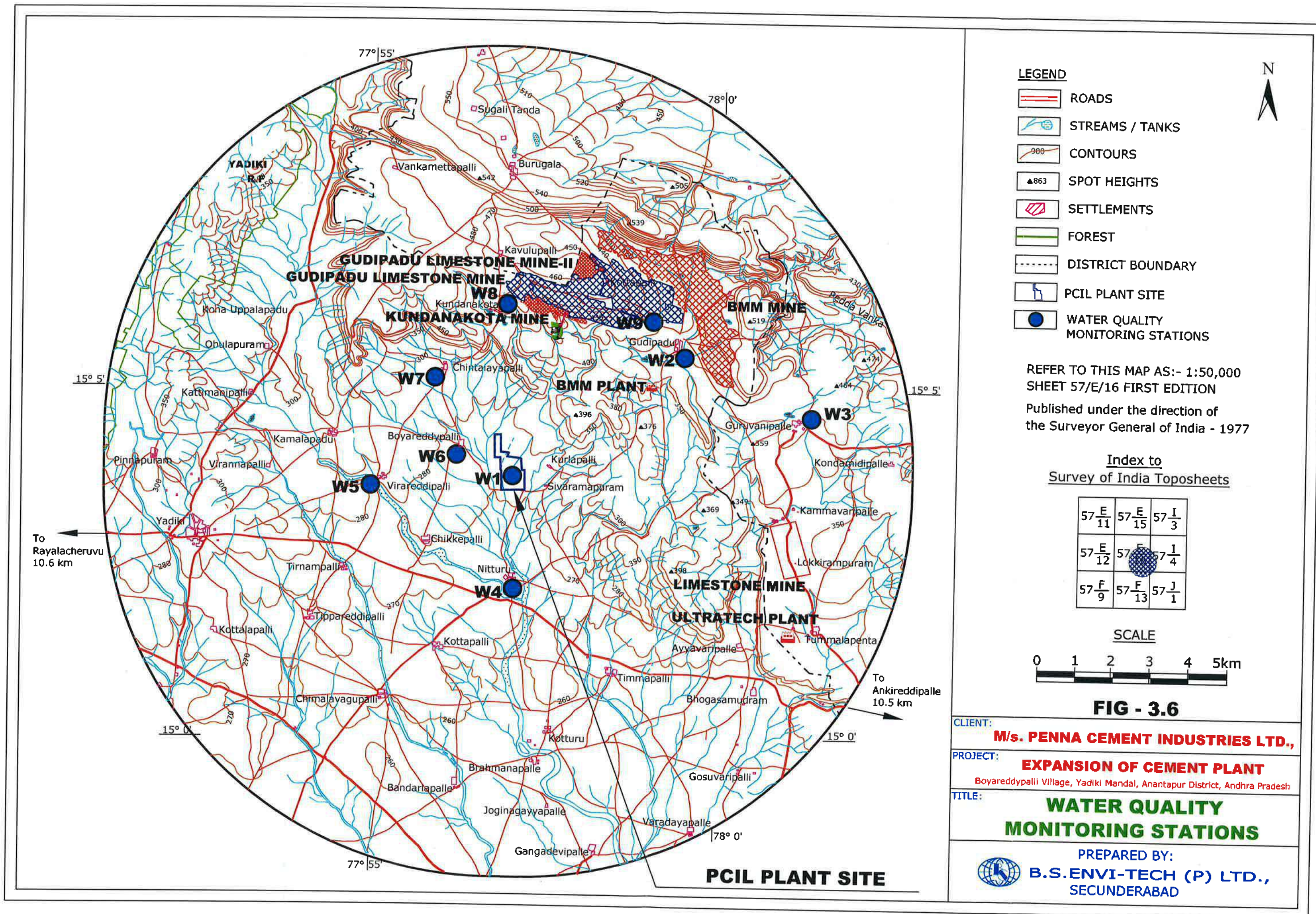


TABLE-3.4
WATER SAMPLING LOCATIONS

CODE	LOCATIONS	DISTANCE [KM]	DIRECTION w.r.t PLANT
GROUND WATER			
W1	Plant Site	---	---
W2	Gudipadu	4.8	NE
W3	Guruvanipalle	7.0	ENE
W4	Nitturu	2.2	S
W5	Virareddypalli	2.9	W
W6	Boyareddypalli	1.1	WNW
W7	Chintalayapalli	2.1	NW
W8	Kundanakota	3.2	N
W9	Mine Pit – Gudipadu	5.0	N
SURFACE WATER			
W9	Mine Pit – Gudipadu	5.0	N

Annexure – 3B presents the water quality data at the above locations.

SUMMARY OF WATER QUALITY DATA

GROUND WATER SAMPLES WITHIN 10 KM RADIUS

- It is observed that the pH of the water sample collected near plant was 7.12 - 7.56.
- Total dissolved solids in the sample were 72 - 605 mg/l.
- Chlorides concentration was found to be 23 - 110 mg/l.
- Fluoride concentration was found to be 0.16 – 1.12 mg/l.
- Sulphates concentration was found to be <4 - 74 mg/l.
- Heavy metal concentrations in the samples were found to be Below Detectable limits.

SURFACE WATER – MINE PIT

- It is observed that the pH of the Mine pit sample is 7.26.
- Total dissolved solids in the sample were 412 mg/l.
- Chlorides concentration was found to be 53 mg/l.
- Fluoride concentration was found to be 0.76 mg/l.
- Sulphates concentration was found to be 43 mg/l.
- Heavy metal concentration in the sample was found to be Below Detectable limits.

3.4 LAND ENVIRONMENT

GEOLOGY

The area is underlain by Tadipatri shales of lower Cuddaph. The shales are brown, arid grey in colour and show fine to medium grained texture. They occur as shales and calcareous shales

HYDRO GEOLOGY

Hydro Geology report based on GEC methodology is enclosed as **Annexure – 3B1**.

3.4.1 SOIL QUALITY

Five soil samples were collected from various locations within 10 km radius around the plant site for analysis of fertility properties and physico-chemical characteristics. **Fig - 3.7** and **Table - 3.5** shows the location of soil sampling stations.

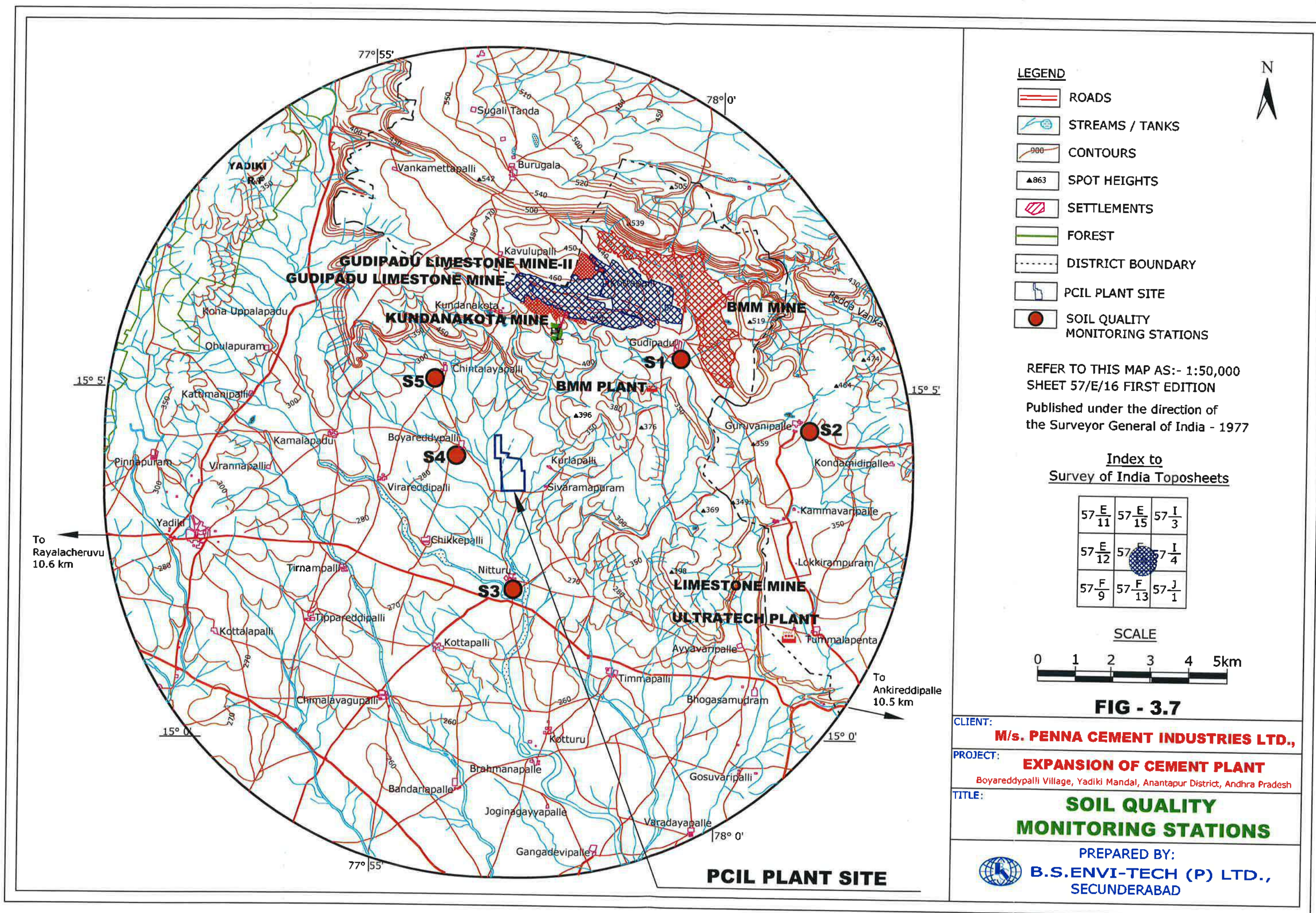
TABLE-3.5
SOIL SAMPLING STATIONS

Code	Location Name	Distance in (km)	Direction w.r.t plant
S-1	Gudipadu	4.8	NE
S-2	Guruvanipalle	7.0	ENE
S-3	Nitturu	2.2	S
S-4	Boyareddypalli	1.1	WNW
S-5	Chintalayapalli	2.1	NW

Results of soil sampling analysis are given in **Annexure – 3 C**.

SOIL SAMPLES WITHIN 10 KM RADIUS

- pH of all the soil samples were found to be in the range of 7.52 – 7.98.
- Soluble salts were found to be in the range of 270 - 350 mg/kg.
- Organic Carbon content of the soil samples was found to be in the range of 0.4 – 0.52%.



- Soils in the area were found to be sandy clay in texture with sand percentage in the range between 32 - 64%, silt between 16 - 30% and Clay 18 - 38%.
- Chloride content of the soil samples were in the range of 60 - 75 mg/kg.

SOIL SAMPLING BASED ON LANDUSE

The various landuses in 10 km radius of the cement plant are given below

- a. Barren Land – S1
- b. Agriculture crop land – S2
- c. Agriculture Fallow Land – S3
- d. Forest Land – S4
- e. Water Bodies
- f. Builtup Area
- g. Other Mines/quarries

Four soil samples from the above locations have been collected. **Fig - 3.7 A** shows the sampling locations on the land use map.

Soil Quality of the samples collected at the above locations along with are enclosed as **Annexure - 3C1**

3.4.2 LANDUSE PATTERN

Landuse pattern of the study area has been assessed through Remote Sensing methodology using IRS-P6, LISS-III geocoded images.

IRS-P6, LISS-III **Fig - 3.8** shows the satellite imagery and landuse pattern of the study area is shown in **Fig - 3.9**. All corner coordinates of the Plant area are superimposed on High Resolution. Level - I land use / land cover categories identified in the area are built-up, agricultural land, wasteland, water bodies and others.

The land use pattern of the study area is given below and in detail presented in below

FIG - 3.7A

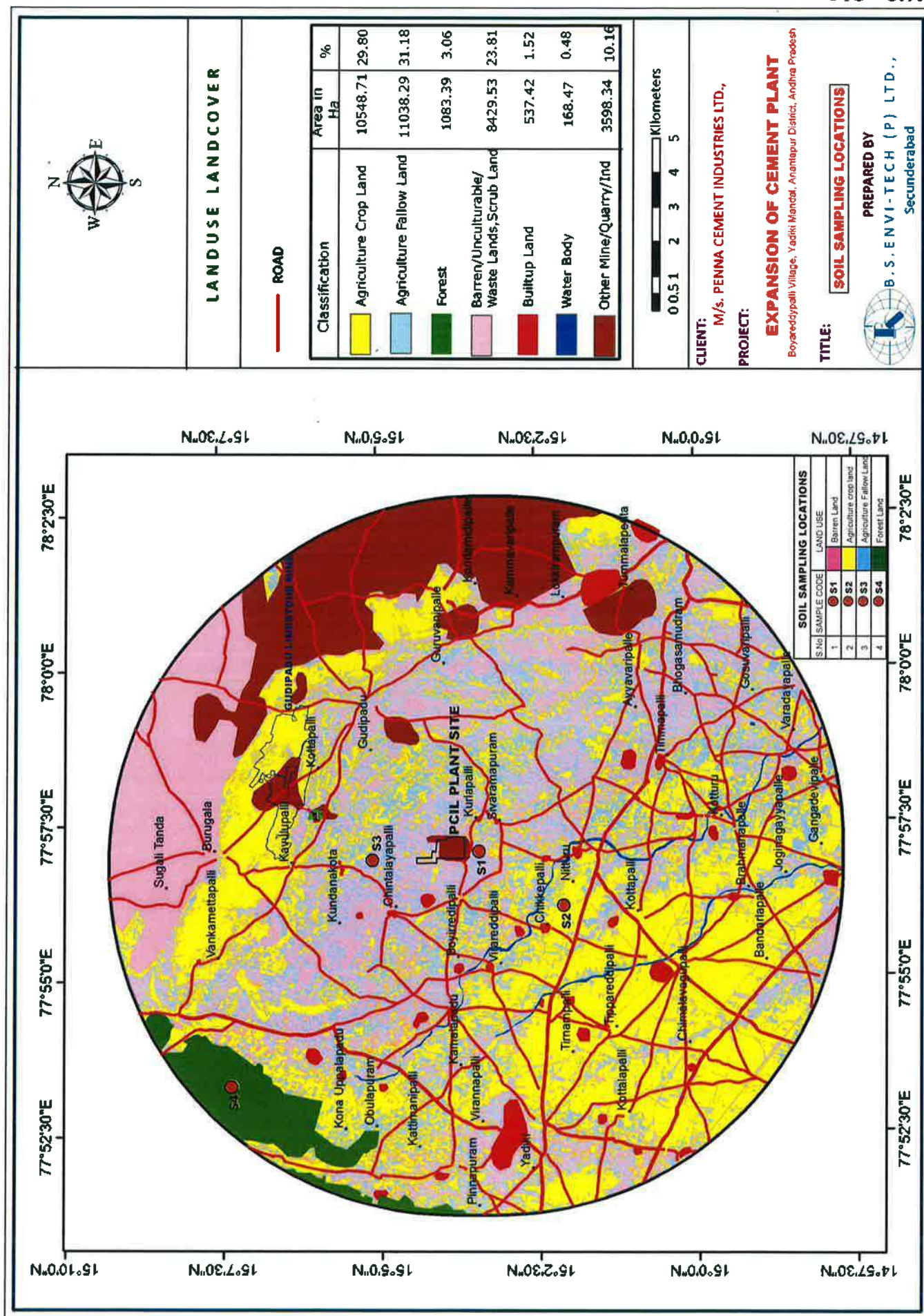


FIG - 3.8

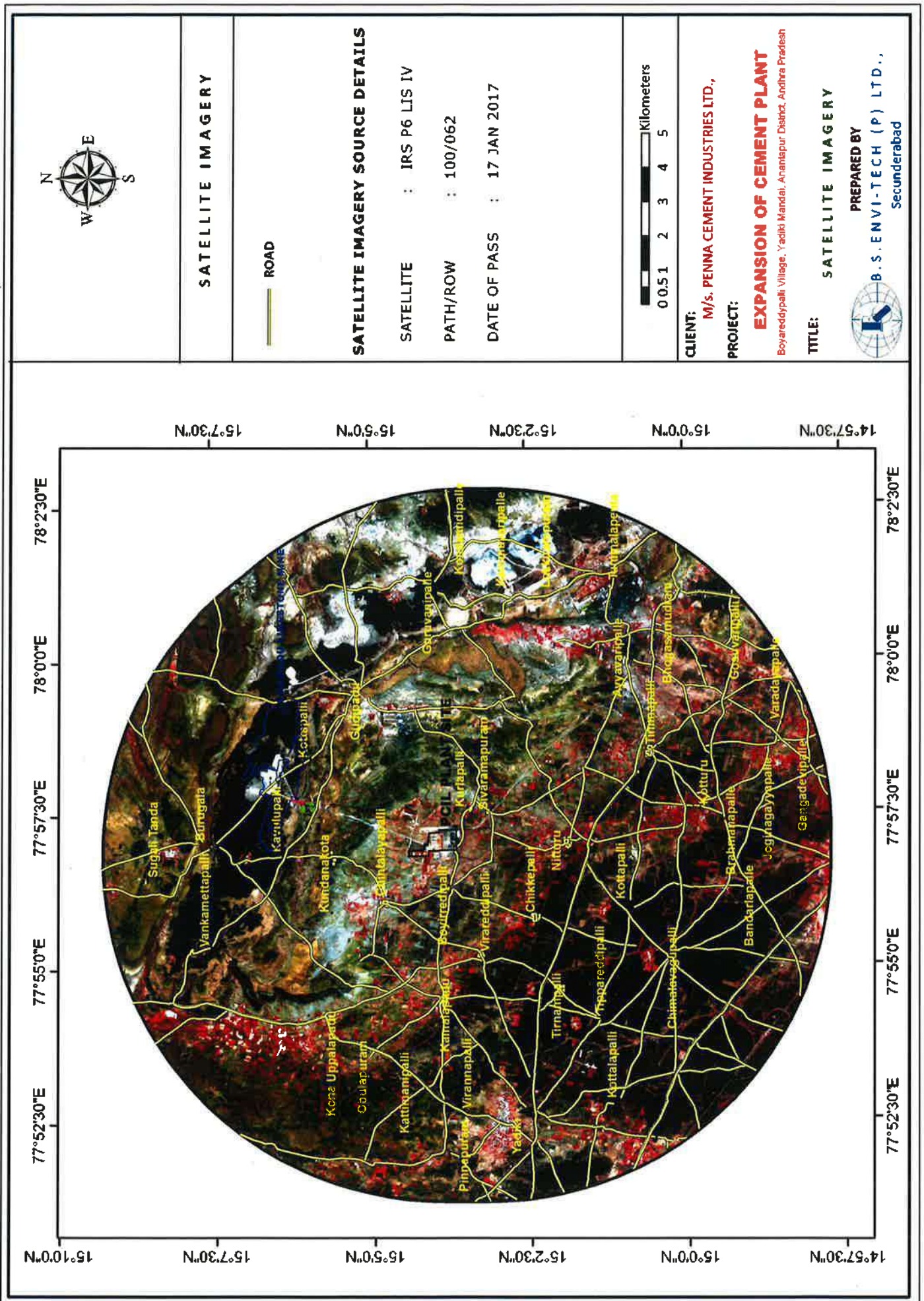
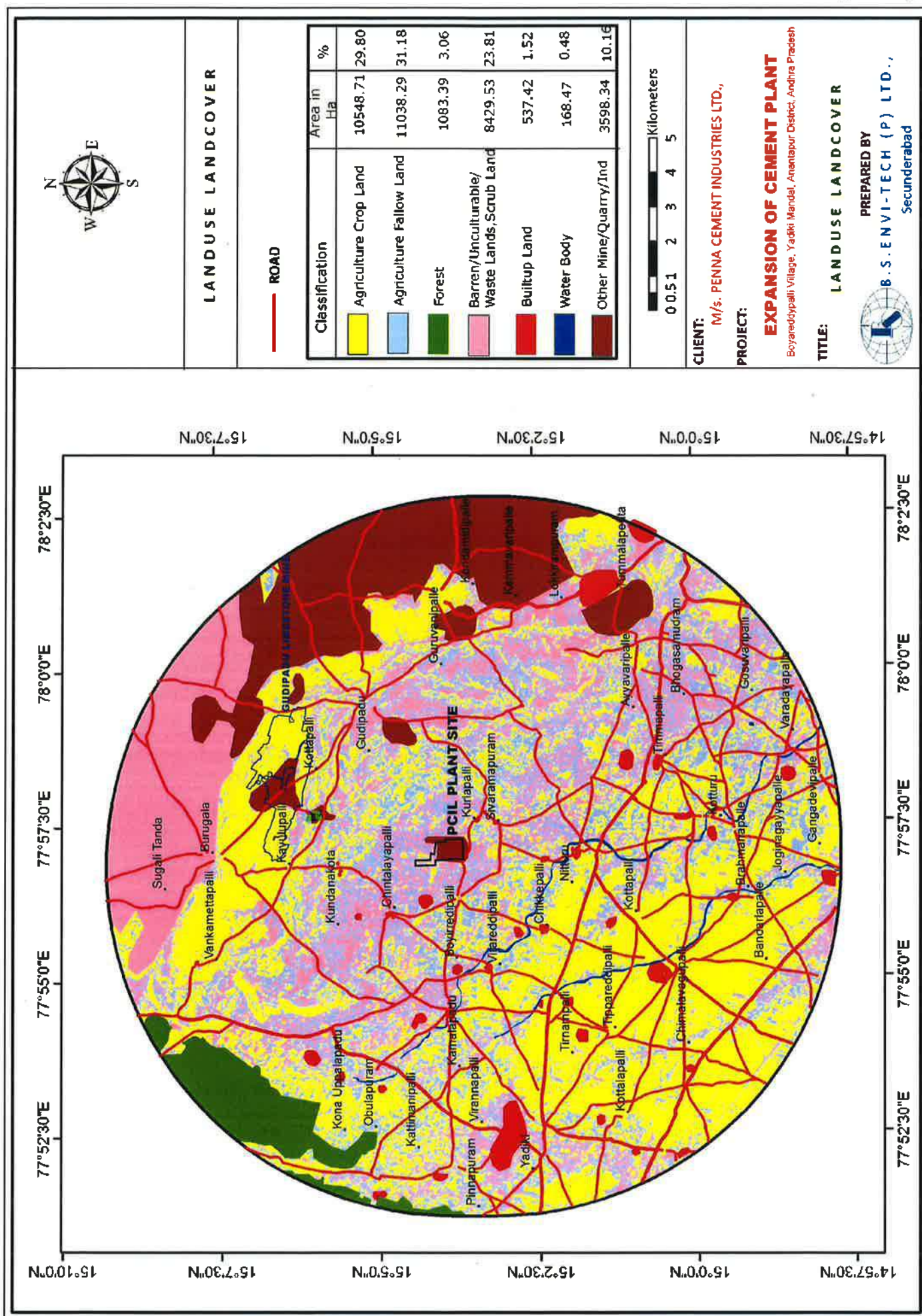


FIG - 3.9



SPATIAL DISTRIBUTION OF LEVEL-II LAND USE / LAND COVER CLASSES WITH IN STUDY AREA

S.NO.	LU\LC	AREA	
		km ²	PERCENTAGE
1	Agriculture Crop Land	105.48	29.80
2	Agriculture fallow land	110.38	31.18
3	Forest	10.83	3.06
4	Barren/ Unculturable/ Waste Lands, Scrub Land	84.29	23.81
5	Built Up Land	5.37	1.52
6	Water Body	1.68	0.48
7	Other Mine/Plant/Ind	35.95	10.16
TOTAL		354	100

DESCRIPTION OF LAND USE/LAND COVER CLASSES

1. AGRICULTURAL LAND

It is defined as the land primarily used for cultivation of agricultural crops. Major crops in the area are Paddy, cotton, corn. Pulses, Millets & Oil Seeds

The main source of water for this activity is ground water only.

The Agricultural crop land in the study area accounts for 105.48 sq. km or 29.80 % and Agricultural Fallow land in the study area accounts for 110.38 sq. km or 31.18 % of the total study area.

FOREST LAND

The Forest land in the study area accounts 10.83 sq. km or 3.06 % of the total study area.

2. BUILT-UP LAND

It is defined as an area of human habitation developed due to non-agricultural activities. It comprises dwellings, roads, vacant land, etc. The total area estimated in this category is 5.37 sq.km or 1.52 % of the total study area.

3. WASTELAND

These are the lands, which are lying un-utilised and can be brought under good vegetative cover. This category is mainly observed on the fringes of the forest areas which predominantly consist of Barren/ Unculturable/ Waste Lands, Scrub Land. This category is observed in patches in the entire study area. It occupies an area of 84.29 sq. km or 23.81% of the total area.

4. WATER BODIES: RIVER/STREAM

These classes comprise areas of surface water either impounded in the form of ponds, lakes and flowing streams etc. The water bodies account for 1.68 sq. km or 0.48 % of the total study area.

5. OTHER MINE/PLANT/IND

The other mine/Plant/Ind in the study area accounts 35.98 sq. km or 10.16 % of the total study area.

3.5 BIOLOGICAL ENVIRONMENT

3.5.1 FORESTS

Yadiki Reserve Forest is present at a distance of 8.4 km in WNW direction away from the cement plant. The study area is a dry part of Anantapur district in Andhra Pradesh. The general terrain is undulating.

The period of monsoon is very short lived in this area, which has a significant bearing apart from other biotic pressures, on the floristic composition of the forests. These are open forests in which thorny and usually hard wood species predominate. The trees have short bores and low branching crowns. There is usually a mixture of relatively few species. The vegetation is mostly spiny and often with xerophytic character, extending down to low shrub growth.

3.5.2 FLORA AND FAUNA STUDIES

A natural ecosystem is a structural and functional unit of nature. It has components, which exists in harmony and survives by interdependence. Ecosystems have self-sustaining ability and control the numbers of organisms at any level by cybernetic rules. The effects of this are that an ecosystem does not become imbalanced.

Considering the rich bio-diversity of organisms, their role in productivity and their importance in human livelihood, it is vital to protect and safeguard these dynamic ecosystems.

Vegetation-Environment complex based on the mature ecosystem having interaction with climatological aspects on a particular edaphic system, leads to identification of certain patterns of the forest or vegetation composition. Whittaker has stressed that neither mono-climax nor poly climax govern either the distribution of vegetation units or their stability in space and time. For climax vegetation, he asserts that the pattern of populations should correspond to the patterns of environmental ingredients that occur as a partially stabilized steady state of climax forest or vegetation.

The objectives of the present study were undertaken with a view to understand the biological resources of 10 km radius study area.

FLORAL STUDIES

The forest types of study area mainly composed of Southern tropical dry mixed deciduous type. This type of growth is dry mixed deciduous, which is typical of maiden tract on poor shallow soil with inadequate rainfall. Low, stunted, branchy boles, diffused crowns with admixture of xerophytes and thorny species are contributing to make up an incoherent patchy forests canopy. Details of recorded plant species from study area are presented in **Table 3.6 of Annexure-3D**. Details of Reserve forest blocks in study area are presented in table below.

DETAILS OF RESERVE FOREST BLOCKS IN STUDY AREA

S.No.	Name of Forest Block	Area (in ha)	Distance (in km)	Direction
1.	Yadiki Reserve forest	1156.0	8.4	WNW

PRIMARY SURVEY

Based on the physical setting and the kind of distribution of flora and fauna, the study area can be classified into cropland, forestland, terrestrial vegetation structure and aquatic ecosystems.

CROPLAND ECOSYSTEM

This is also known as manmade ecosystem or artificial ecosystem because of man tries to control biotic community and physical environment. The common crops in crops land ecosystem in study area are *Oryzha sativa*, *Triticum vulgare*, *Triticum diococcum*, *Pennesitum glaucam*, *Eluceana coracona*, *Sorghum vulgare*, which are mainly dependent on rainwater during monsoon season and also through ground water source, tubewells, open wells during non-monsoon season. In this crop land ecosystem in addition to the crop raised, a number of weeds like *Cynodon dactylon*, *Euphorbia hirta*, *Cyperus rotundus*, *Digetaria sp* and *Alyscicarpus sp* also contributing to the primary production. Apart from that commercial crop like ground nut, sunflower gossypium and several vegetable red chillies, Brinjal, Bhendi and leafy vegetable crops could also grow in this region. The details of staple crops and commercial crops in study area are presented in **Table-3.7** of **Annexure - 3D**.

TERRESTRIAL ECOSYSTEM

Natural vegetation is mostly restricted to herb layer having drought resistance. Other than herb layer the area is almost devoid of major forest type tree except agroforestry types and commercial plantations such as *Tectona grandis*, *Leucenaleucophloe* and *Cocos nucifera*. *Phoenix aculis*, *Azadirachta indica*, *Ficus sp* *Acacia sp* which are mainly restricted to waste and culturable waste lands and in case of near villages and in case of

agricultural lands, *Delonix regia*, *Azadirachta indica*, *Cocos nucifera*, *Terminalia catapa*, *Psidium guava*, *Albizia lebbek*, *Dalbergia sissoo* and *Tamarindus indica* are predominant. The details of natural vegetation in study area are presented in **Table-3.8 of Annexure - 3D**.

FOREST AREAS

The forests in the study area are mainly composed of Southern tropical dry mixed deciduous type. This type of growth is dry mixed deciduous, which is typical of maidan tract on poor shallow soil with inadequate rainfall. Low, stunted, branchy boles, diffused crowns with admixture of xerophytes and thorny species are contributing to make up an incoherent patchy forests canopy. The hill top in this range mainly comprises of *grasses* and *Acacia* spp. and several *euphorbia* spp. The details of list of forest plant are presented in **Annexure - 3D**.

CRYPTOGAMIC VEGETATION

The area shows many algae, fungi, bryophytes and ferns. Algae are present in aquatic bodies or in marshy places. Fungi, particularly from ascomycetes and basidiomycetes are located on ground or epiphytically. Lichens of crustose, foliose and fruticose types are present on different substrates (Lichens, Ascomycetes and Basidiomycetes could be observed near old building tops, old walls of the houses). Bryophytes occur in wet areas and occasionally on barks of trees and old walls of houses. The commonly observed bryophytes are given below. The identified list of bryophytes and pteridophytes in study area are presented in **Table-3.9 of Annexure - 3D**.

LIFE FORM SPECTRUM

Primary surveys were conducted in and around study area, forest areas, open areas near villages, waste lands, agricultural lands along the water bodies, along slopes in forest blocks to identify the floristic composition of the area and listed the plant species

identified in Study Area is presented in **Table -3.10** of **Annexure - 3D**.

Life forms, as suggested by Raunkiaer, reflect the quality of environment in which plants belonging to a particular community live. It is based on the nature of protection afforded to perennating organs of plants, to overcome stresses in the environment. The following groupings are commonly recognized for life forms.

Raunkiaer defined life forms as the sum of adaptations of plants to the climate. Braun-Blanquet (1951), whose system is adapted in this study, modified the Raunkiaer's system. The details of life forms are presented in table below.

DETAILS OF LIFE FORMS AS PER RAUNKIAR' SYSTEM

Phanerophytes	These are trees, shrubs and climbers where the growing buds are located on the upright shoot much above the ground surface and they are the least protected.
Therophytes	Are plants which survive the adverse season in the form of seeds. The plants produce flowers and seeds in the favorable season. They are annuals, predominantly found in extremes of dry, hot or cold conditions.
Hydrophytes	Water plants except plankton free floating and submerged macrophytes.
Hemicryptophytes	This type of plant species is again predominantly present in cold climatic regions. Perennating buds are present just under the surface soil and remain protected there. Mostly these are biennial or perennial herbs whose vegetative growth and aerial parts are conspicuous in warm seasons only. Buds may also be present at the soil surface but they are never exposed, they remain concealed under dead leaves and twigs
Geophytes	Plants, with perennating parts buried in substratum such as bulb and rhizomes
Epiphytes	Parasitic plants or plants without contact with ground
Climbers	Lianas, stragglers and climbing plants and

270 plant species were recorded from 64 families from study area during study period. The highest number of plants belongs to Therophytes (43.0%) of the total populations. The predominant members of therophyte group are *Cassia tora*, *Cassia occidentalis*,

Crotalaria burhia, *Eupatorium* sp, *Ageratum conyzoides*, *Tridax procumbens*, *Blumea lacera* and *Jatropha* sp. The plant species occurs in agricultural fields, open spaces and waste lands in the study area. The second dominant group belongs to Phanerophytes which represent 42.22% in the total population. The main composition of Phanerophytes are *Albizia lebbeck*, *Albizia procera*, *Acacia*, *Dalbergia sissoo*, *Erythrina indica*, *Gmelina arborea*, *Eugenia jambolina*, *Ficus hispida* and *Dendrocalamus strictus*. These species present either on forest blocks, hill slopes or open lands near villages and along the road side area in study area.

Grasses i.e. hemicryptophytes form bulk of this type of plants, which are 10.74% of the total.

PHYTOSOCIOLOGICAL STUDIES-PRIMARY SURVEY

The floristic composition assessment of the study area has been planned to evaluate by:

Using least count quadrature method carried out phytosociological studies. Trees and shrubs were sampled by taking quadrates of 100m² and in case of herbaceous vegetation of 1 m² distributed randomly. Their girths (GBH at 132 cm from the ground) were recorded. The data obtained was further used to estimate Relative Frequency, Relative Density, Relative Basal area and calculated Importance Value Index (IVI).

IMPORTANCE VALUE INDEX

The Importance Value Index (IVI) is a statistical quantity, which gives an overall picture of the importance of the species in the vegetative community. It considers the relative values of density, frequency and basal area of every species in given area. It thus incorporates three important parameters, which are measures of diversity and productivity of every species. In any community structure, the quantitative value of each of the frequency, density and basal area and basal cover has its own importance. But the total picture of ecological importance cannot be obtained by one of these vegetation structure in respect to varying environmental

factors can also be studied through such study of basal area, density and frequency of the community. The Importance value index as such, gives the total picture of sociological structure of species in a community but it does not give the dimension or share of relative values of frequency, density and dominance. The dominant plant species observed in the study area are *Borreria articulatum*, *Cassia tora* and *Sporolobus diander*.

PLANT DIVERSITY

Diversity means variety or variability. Species diversity therefore refers to the variation that exists among the different living forms. It is estimated that there are more than 50 million different species of living organisms on the earth. With the growing concern of species going extinct at a very rapid pace, identification of the different species of plants and animals and conserving them is of primary importance. Species indicates the extent of biodiversity in the ecosystem. Species diversity is a statistical abstraction with two components. These are the number of species or richness and evenness or equitability. For better understanding of plant diversity, the Shannon-Weaver index of diversity was used. The index considers two important characters of vegetation, i.e. floristic richness and proportional abundance of the species. Diversity index increases with the floral spectra (more species means that more wide species diversity) that show that undisturbed scenario of ecosystem. The index is given as;

$$H' = - \sum (P_i \ln P_i)$$

Where P_i = Proportional abundance of the i^{th} (individual) species

H' = Shannon-Weaver diversity index

The species diversity varies between 2.45 and 3.49 in studied population.

RARE, ENDANGERED AND ENDEMIC PLANTS IN STUDY AREA

On the basis of literature survey, from Red data books of Indian plants, detailed list rare and Endangered plant genera of Kurnool and Anantapur districts of Andhra Pradesh reveals that there are

no endangered, threatened, rare plant species observed or recorded during study period and this plant species is quite commonly present in dry deciduous forest type.

TERRESTRIAL-FAUNA

Wildlife being an important strand in the complex food web in most of the forest ecosystems, its status symbolizes the functioning efficiency of the entire ecosystem. The forest management therefore, cannot be isolated from wood exploration and wild life conservation in the same vulnerable vegetation complex. Just as wild flora needs special treatment for preservation and growth, wild fauna as well deserves specific conservatory pursuits for posterity. Unfortunately, our past efforts had been unscientific in rearing and preserving our valuable heritage resulting in dwindling of many interesting species, which the nature had bestowed on us. Wild animals move from one place to another place in search of food, water and other basic need. During the period, wild animals may visit the villages for search of food.

PRESENCE OF PROTECTED AREAS AS PER WILDLIFE PROTECTION ACT, 1972 IN STUDY AREA

As per Ministry of Environment and forests and Forest department of Government of Andhra Pradesh notifications reveals that there are no biospheres, tiger reserves, elephant reserves, national parks, wildlife sanctuaries, conservation reserves and community reserves in 10-km radius from project boundary. List of Animal Species Recorded in study area as per wildlife protection act, 1972 is presented in **Table-3.11** of **Annexure-3D**.

PRIMARY SURVEY-FAUNA

Primary field monitoring studies were carried out through physical observations and also collected data from elderly persons of the area and forest officials.

MAMMALS

There are several minor carnivorous and herbivorous wild animals in the study area. The commonly observed or reported mammals during study period are presented in below Table.

LIST OF MAMMALS OBSERVED IN STUDY AREA

S. No.	Technical Name	Local name	Distribution
1	<i>Herpestes edwardsi</i>	Common Mongoose	Observed during study period
2	<i>Lepus nigricollis</i>	Indian Hare	Observed during study period
3	<i>Canis auratus</i>	Jackal	Observed during study period
4	<i>Rousettus leschenaultii</i>	Fruit Bat	Observed during study period
5	<i>Bandicota benghalensis</i>	Bandicoot	Observed during study period
6	<i>Bandicota indica</i>	Rat	Observed during study period
7	<i>Funambulus palmarum</i>	Squirrel	Observed during study period
8	<i>Mus rattus</i>	Indian rat	Observed during study period
9	<i>Hystrix indica</i>	Porcupine	Observed during study period
10	<i>Mus musculus</i>	Common Mouse	Observed during study period
11	<i>Macaca mulatta</i>	Monkey	Observed during study period
12	<i>Sus scrofa</i>	Wildbear*	Recorded from forest area
13	<i>Presbytis entellus</i>	Langur	Observed during study period

* Data collected through interactions with local elderly personnel and forest officials of respective forest ranges

AMPHIBIANS AND REPTILES

Amphibians were noticed mainly in fresh water and marshy places. Frogs and toads were present in this area. No tailed amphibians were cited in the survey. Below table gives the details of different amphibians and reptiles in the study area.

LIST OF REPTILES AND AMPHIBIANS OBSERVED IN STUDY AREA

S. No	Technical Name	Local Name	Distribution
Reptiles			
1.	Varanus sp*	Tree monitored lizard	Recorded in study area
2.	Naja naja*	Monocellate cobra	
3.	Vipera sp*	Russel viper	
4.	Bungarus candidus	Common krait	
5.	Hemidactylus sp	House Lizard	Observed in study area
6.	Calotes versicolor	Garden Lizard	
7.	Chameleon zeylanicus	Lizard	
Amphibians			
8.	Rana tigrina	Common frog	Observed during study period
9.	Bufo melanostoticus	Toad	

* Data collected through interactions with local elderly personnel and forest officials of respective forest ranges

LOCAL/ MIGRATORY BIRDS IN STUDY AREA

The list of avifauna observed in the study area is presented in Table 3.12 of ANNEXURE-3D.

BUTTERFLIES

The list of identified butterflies from study area is presented in below table.

LIST OF BUTTERFLIES OBSERVED IN STUDY AREA

Sr.No.	Technical Name	Local name	Distribution
1	<i>Euploca cora</i>	-	Common
2	<i>Euploca crassa</i>	-	Common
3	<i>Oeuploca dicitotianua</i>	-	Common
4	<i>Graphium agamemnos</i>	Tailed jay	Common
5	<i>Papilio polymnstor</i>	Blue Mormon	Common
6	<i>Junonia atlites</i>	Grey pansy	Common
7	<i>Junonia almanac</i>	Peacock pansey	Occasional
8	<i>Pelopides assemensis</i>	-	Common
9	<i>Polytrema discreta</i>	-	Rare

* Data collected through interactions with local elderly personnel and forest officials of respective forest ranges

ENDANGERED ANIMALS

A comprehensive Central Legislation namely Wild Life (Protection) Act was enforced in 1972. This law is enacted to provide protection to wild animals and for all matters related to their ancillary or incidental death. Schedule-I of this Act contains the list of rare and endangered species, which are completely protected throughout the country. The recorded or observed list of wild animals and their conservation status as per Wild Life Act (1972) are presented in **Table – 3.13 of ANNEXURE – 3D.**

3.6 SOCIO ECONOMIC ENVIRONMENT

The description of the demographic and socio-economic environment within the study area is based on Census Data (CD based data) of Anantapur Districts.

The census data has been analyzed with respect to various demographic and socio-economic parameters for the study area and the results are represented in the following sections.

POPULATION

The population profile shows that total population of the study area villages is 81,808. The villages falling in this Study area are Akkajampalle, Kottala, Chintalapalle, Gudipadu, Burugula, Kundanakota, Nitturu, Kondampalle, Kamnavaripalle, Obulapuram, Kamalapadu, Konauppalapadu, Ayyavaripalle, Venkatampalle, Bhogasamudram, Yadiki, Uppalapadu and Chennarayunipalle.

Yadiki has the highest population (56,122) and Bandarlappalle village has the lowest population (42). The total population density of the study area is about 260 persons/sq. km. The population profile of the study area is given in **Annexure- 3E.**

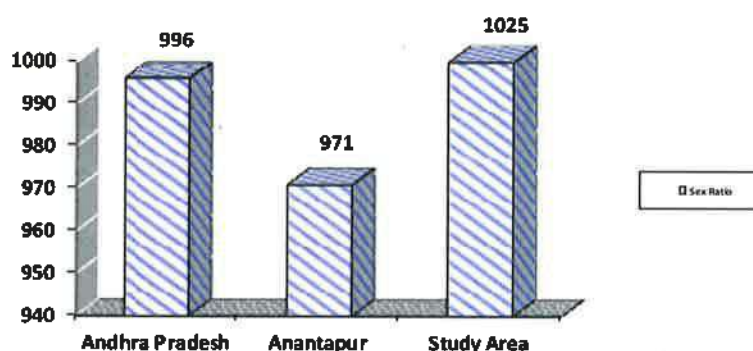
Population, Household size & Sex Ratio in the Study Area

	Total (0 - 10 km)
Household	20274
Population	81808
Male Population	41457
Female Population	40351
Household Size	3-4
Sex Ratio	1025

Source: - Census: 2011

SEX RATIO

The sex ratio for the state (Andhra Pradesh) and district (Anantapur) is 996 and 971 respectively. The average sex ratio in the whole study area is 1025. The details are given in Annexure-3E. Comparative Sex Ratio is given in below Figure.

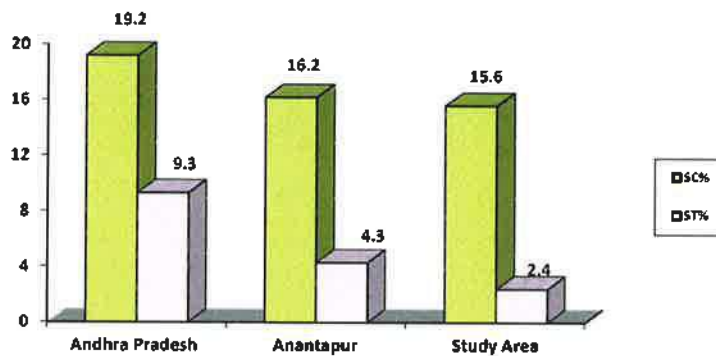


Sex Ratio in the Study Area

The Percentage of SC population for state (Andhra Pradesh) and district (Anantapur) is 19.2%, 16.2% respectively. The percentage of SC population for the whole study area is 15.6%, which is lower than state and district SC population percentage.

The percentage of ST population for state (Andhra Pradesh) and districts (Anantapur) is 9.3% and 4.3% respectively. There is 2.4% of ST population in the whole study area. Comparative analysis of SC & ST population is given in below Figure. The details of SC & ST population are given in **Annexure- 3E**.

Comparative Analysis of SC & ST Percentage in the Study Area



Source: - Census: 2011

LITERACY

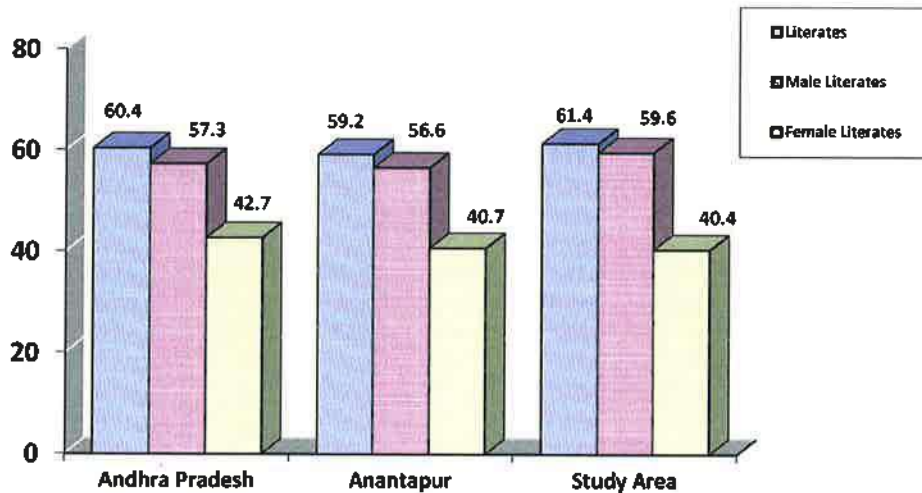
The literacy level for state (Andhra Pradesh) and district (Anantapur) is 60.4% and 59.2% respectively. The literacy percentage of the study area is 61.4 %, which is higher than state and district level.

The literacy level of the male population for state (Andhra Pradesh) and district (Anantapur) is 57.3% and 59.3% respectively. The literacy level of male population for the study area is 59.6 %, which is higher than state and district level.

The literacy level of the female population for the state (Andhra Pradesh) and district (Anantapur) are 42.7% and 40.7% respectively. The literacy level of female population for the study area is 40.4% which is lower than state and district level.

The Literacy status of the study area is given in **Annexure- 3E**. Comparative analysis of literacy level is given in below Figure.

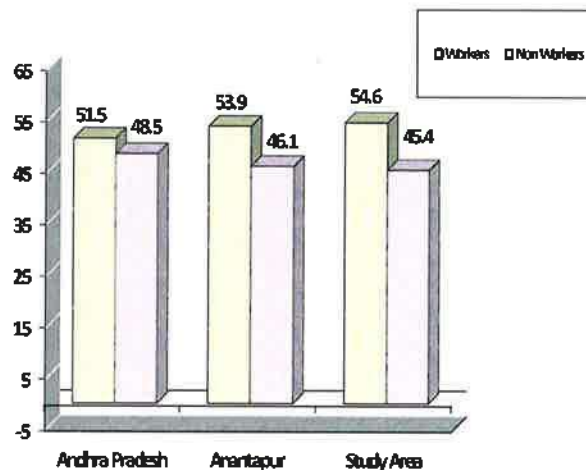
Comparative Analysis of Literacy Level in the Study Area



ECONOMIC PATTERN AND LIVELIHOOD

Total work participation rate in whole study area is 54.6% of the total population, which is higher than Andhra Pradesh, Anantapur district worker participation rate 51.5%, 54.4% respectively. The main workers in the whole study area are 87.0% and marginal workers are 13.0% of the total labor force.

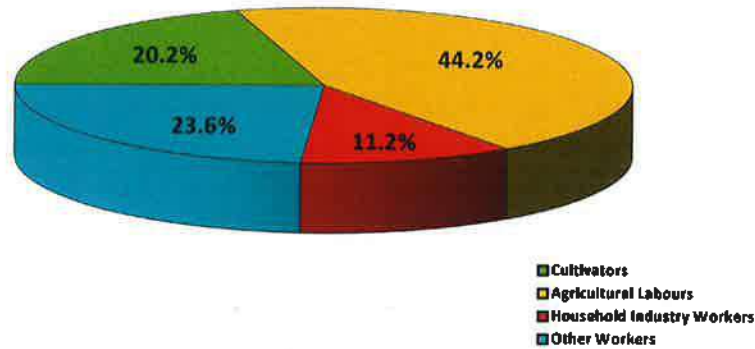
Comparative Analysis of the workforce in the Study Area



The employment pattern in the villages suggest that only 20.2% work as cultivators, 44.2% as agricultural labors, 24.5% as other workers and 11.2% as household industry workers. Most of the villagers are agriculturists. The occupation status in the study area is given in **Annexure- 3E**.

Comparative analysis of zone wise work force is given in below Figure

Comparative Analysis of Economic Activity in the Study Area



The male workers in the study area account to 56.2% of the total working population. The female workers in the study area account to 43.8% of the total working population.

It has been observed that household activities such as pre-cooking, cooking, post-cooking, washing clothes, cleaning house, collection of fuel wood, care of children are left to women with negligible involvement of men. The details are given in below Table.

Work Participation: Male & Female

Category	Study Area			
	Male		Female	
	No.	%	No.	%
Total Workers	25080	56.2	19568	43.8
Main Workers	23280	59.9	15560	40.1
Marginal Workers	1800	31.0	4008	69.0
Cultivators	6020	66.9	2983	33.1
Agricultural Laborers	8378	42.5	11351	57.5
Household Industry Workers	2682	53.7	2308	46.3
Other Workers	8000	73.2	2926	26.8

INFRASTRUCTURAL FACILITIES AND AMINITIES

The infrastructure and amenities available in the area denote the economic wellbeing of the region. A review of infrastructural facilities available in the study area has been done based on the information given in the amenities census data (village level).

DRINKING WATER

All the villages in the study area have drinking facility (Tap water, Well water, Tank water, Tube well water, Hand Pump, River water and other sources). The details of water sources available in villages are detailed as below:

Water source for drinking	No. of villages
Hand pumps	19
Open wells	1
Tap water	11
Tube Well	5
River Water	0
Tank water	2
Canal	0
Lake	0
Spring	0
Other sources	0

TRANSPORT & COMMUNICATION

Transport accessibility is one of the important factors required for the overall development of the area. Transportation and communication facility needs to be strengthened before any major development process is established. The study area is well connected by road and rail. Most of the villages in the study area have road network services. Government bus services are available in almost all the villages in the study area.

The details of communication facilities available in the study area are given below:

Total no. of villages in study area	19
Total No. of bus facilities in the study area	24
No. of villages having bus facility within 5 km range	6
Total No. of rail facilities in the study area	37
Total No. of approach paved road in the study area	24
Total No. of approach Mud road in the study area	34
Total No. of approach Foot path in the study area	37

MARKET FACILITIES

Commercial activities form the backbone of the economy. The study tends to tell the kind of employment it generates for the people of the area and the kind of services it provides for the attainment of a better living. Major market facilities are available at Burugula Village.

HEALTH FACILITIES

Health is the main basic service indicator, which need to be studied so as to know the quality of life in the area.

MEDICAL FACILITIES

The details of medical facilities available in the study area are given below:

Total No. of villages in study area	19
Total No. of medical facility	25
No. of villages having health center	0
No. of villages having primary health center	0
No. of villages having Child welfare center	1
No. of villages having Maternity home	1

EDUCATIONAL FACILITIES

The details of educational facilities available in the study area are given below:

Total no. of villages in study area	19
Total no. of primary school facility	40
Total no. of middle school facility	9
Total no. of secondary school facility	1
Total no. of college facility	1
Total no. of industrial School	0
Total no. of training School	0

ELECTRICITY

In the study area, all the villages have electricity connection for their daily activities.

POST AND TELEGRAPH

The details of postal and telegraph facilities available in the study area are given below:

No. of villages having post office facility	12
No. of telephone connections available in the study area	61

3.6.1 PRIMARY SURVEY

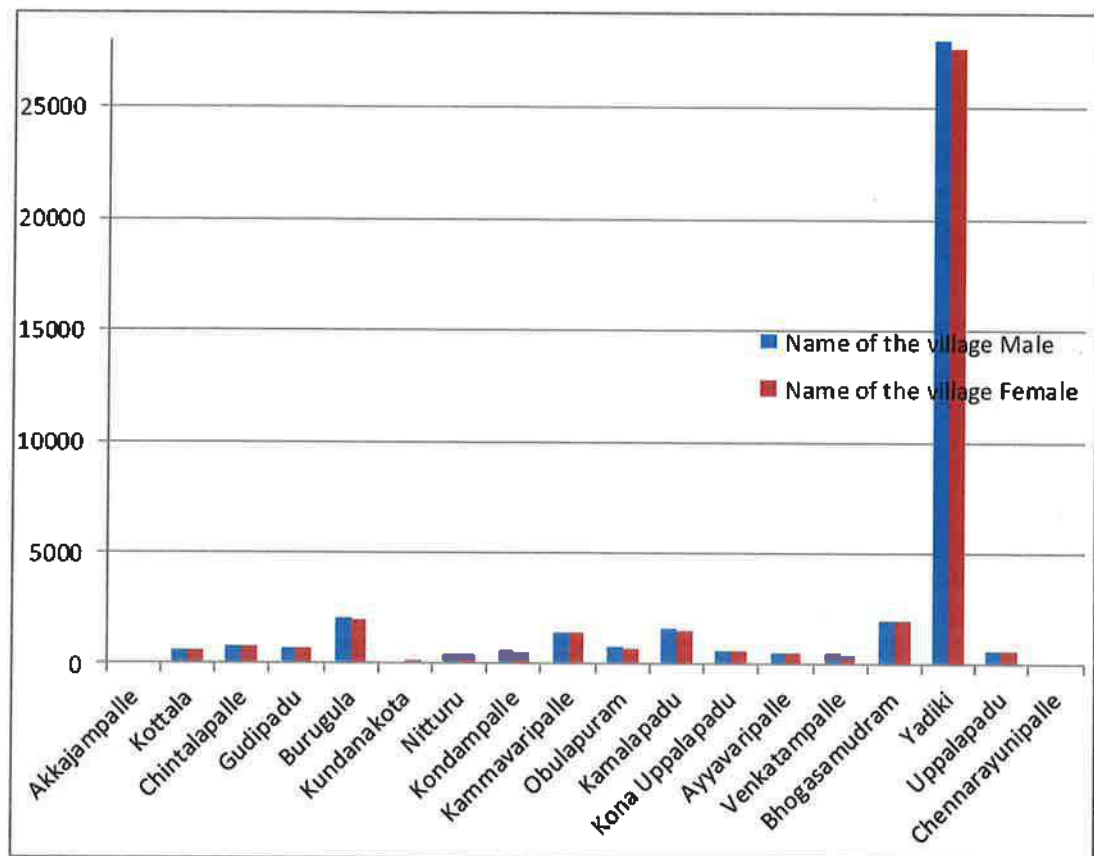
The villages selected for Primary Survey are Burgula, Kundankota, Gudipadu, Kovallapalle, Chinnaryanapalle, Kamalpadu, Veerareddipalle, Boyareddipalle, Venkatampally.

3.6.1.1 TOTAL POPULATION

Out of the study villages Yadiki has, highest population with 56122, with 28411 Males, and 27711 females, comprising of 13,941 households and with a sex ratio 975. The next second biggest Burugula with a 4085 total population comprising 2061 males and 2024 females and 982 sex ratio. The lowest ones are Akkajampalle with 165 total population, 46 households and with 774 sex ratio, in 0.5-3.0 Km, and in the Buffer zone Chennaraynipalli is having the lowest population with 50 total population and 11 households and 100 sex ration, in 7-10 Kms

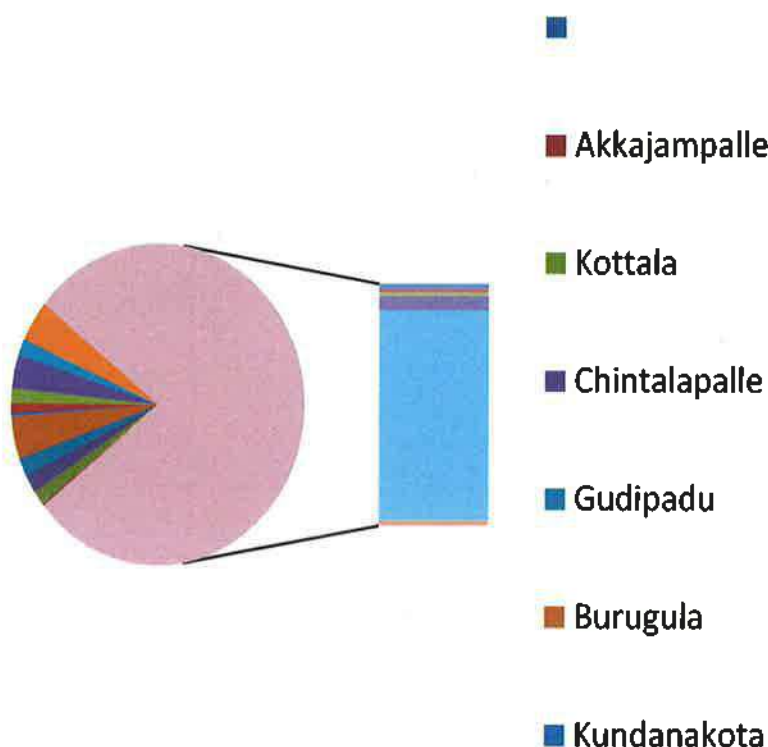
radius. Below Figure gives a clear picture of the total population and number of households etc.

TOTAL POPULATION



NO.OF HOUSEHOLDS

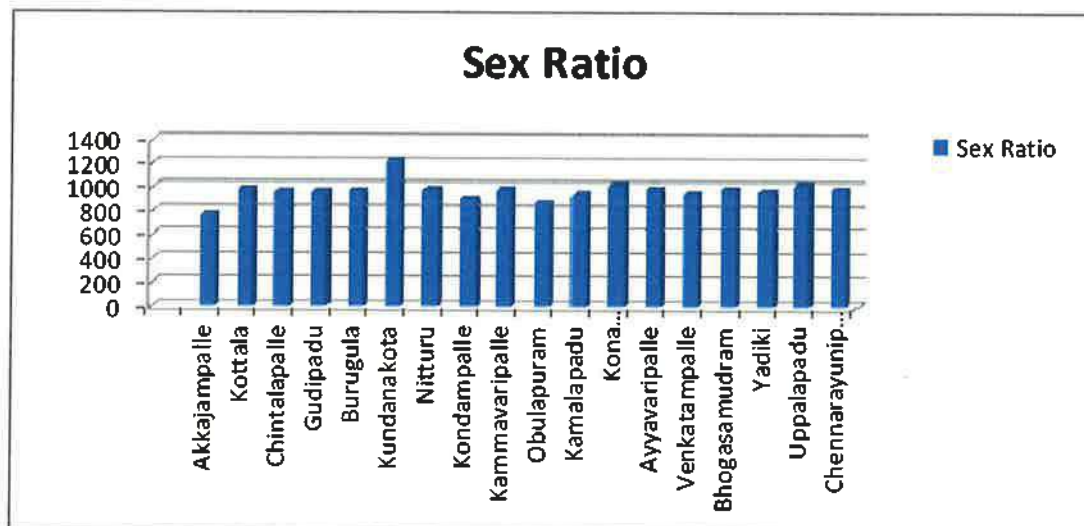
Total No of Households



3.6.1.2 SEX RATIO

The sex ratio in the study villages, are comparatively high in all the village for every 1000 males the female sex ratio is 1000 in five villages, Chennaryunipalle, Konauppalapadu, Ayyavaripalle, Bhogasamudram, Uppalapadu 1231 in Kundanakota, so overall it is female population is ore comparatively male population.

THE SEX RATIO OF THE POPULATION IN THE STUDY VILLAGES

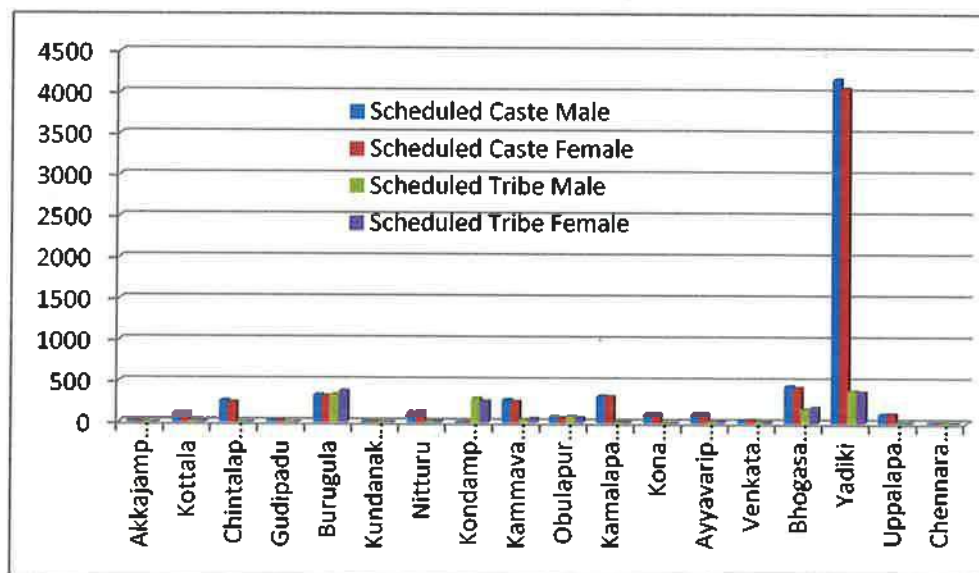


3.6.1.3 CASTE DISTRIBUTION

Out of the 18 study villages, the Schedule Tribe population is only in 11 villages all together, highest tribals are in Yadiki, with 766, and 721 in Burugula followed by Kondampalle with 555, others are minor in the study villages.

Most of the prevailing castes are Scheduled Caste, B.C. and, Reddy, Kapu, Kamma and other economically backward castes are there. Below Figure gives clear picture of both S.C & S.T Population in selected villages.

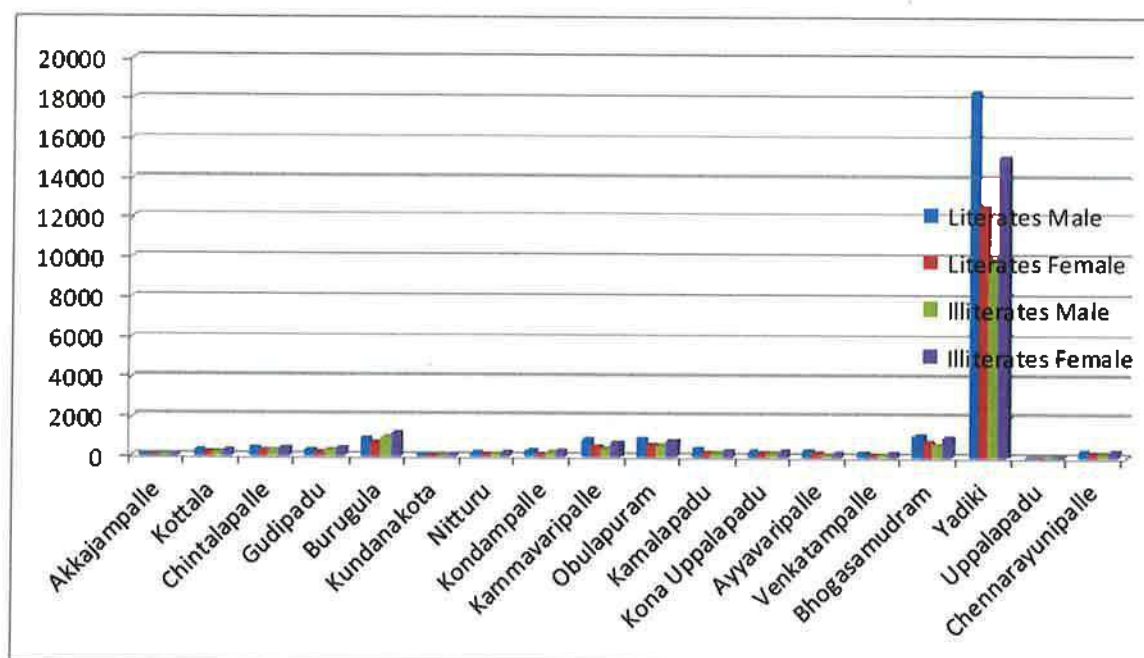
SC & ST POPULATION



3.6.1.4 LITERACY LEVEL

The literacy is one of the vital factors for human development. The total literates in the study area are 44543 comprising of Males 26464 (59.4%) and females - 18079 and i.e., (40.6%) , Out of all the villages shows Yadiki is highest literacy among males 70.0% and 30.0% are females, where as in 0.5- 3.0 Km group of villages shows more literacy 59.4 male literates. The study observes from the villages and it also confirms from the FGD discussions that girl child is improving faster than boys. Illiterates are also on overall all more number of female illiterates are there i.e, 59.6% compared to total illiterates in the study area. Below Figure gives a clearer picture of the total literate and illiterates in the study area.

LITERATES AND ILLITERATES



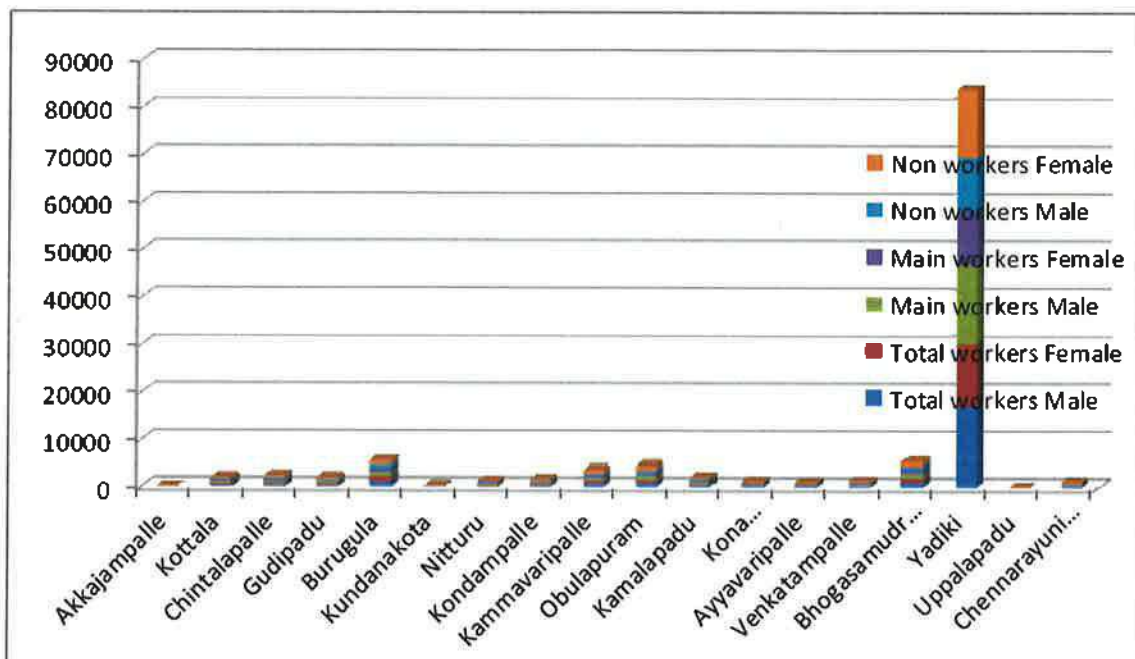
3.6.1.5 TOTAL WORKING AND NON-WORKING FORCE IN THE STUDY AREA

TOTAL WORK FORCE

Out of the total population, the male workers are (55.8%) and females (44.2%) and among the main workers (59.6%) are male

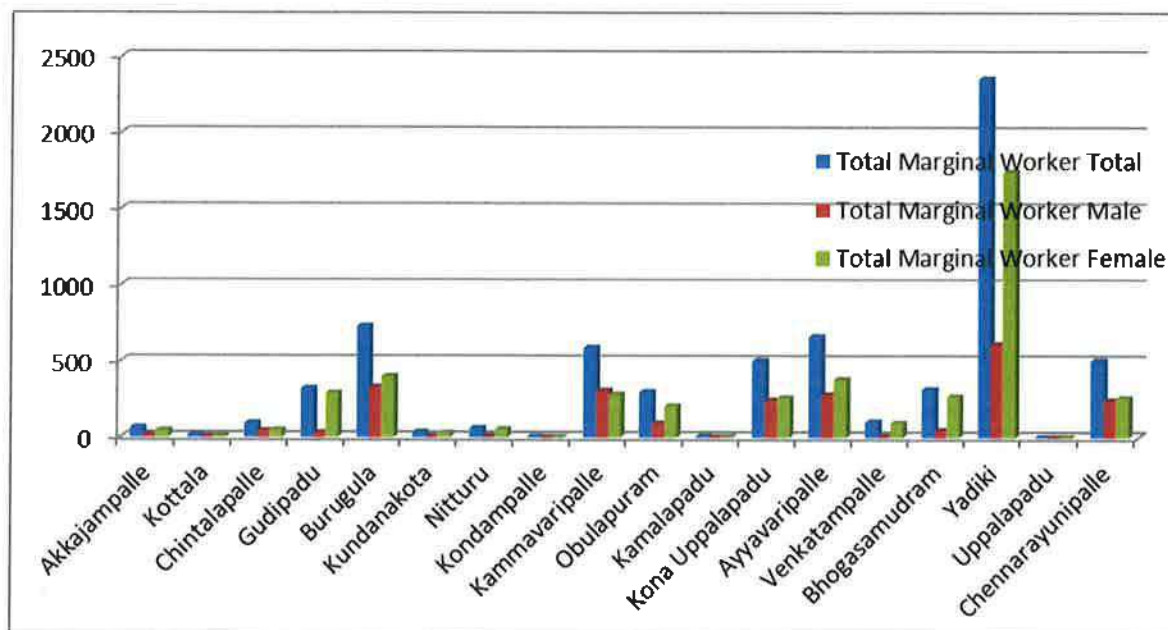
and (40.4%) are female, and non-working population is more among women (55.8%) and whereas (44.2%) are there. Comparative analysis of village wise work force needs lot of attention to the women force. The female workers in the study area of the total workforce, majority are the agricultural labour. It has been seen that household activities such as pre-cooking, post-cooking, washing clothes, house cleaning, collection of fuel wood, taking care of children are left to women with negligible involvement of men.

SHOWS THE TOTAL WORK FORCE IN THE STUDY VILLAGES



Out of the total 6672 marginal workers male contribution is (34.2%) and female contribution is (65.8%). The marginal workers more innuber in Yadiki, Kamamavaripale 589, followed by Kona Uppalapadu. Others include in this category are workers engaged as artisans and other occupations.

SHOWS THE TOTAL MARGINAL WORK FORCE IN THE STUDY VILLAGES



3.6.1.6 ECONOMIC PATTERN OF LIVELIHOOD

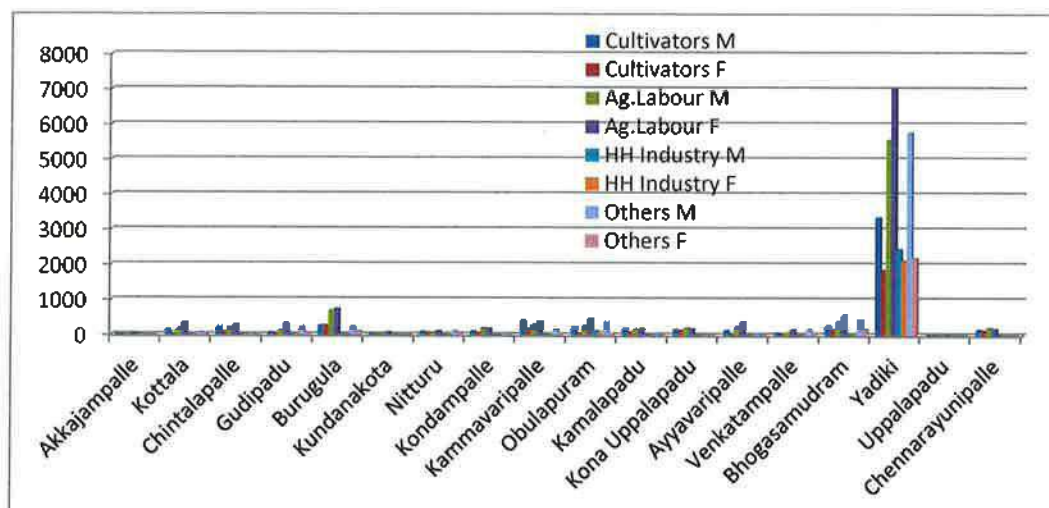
Out of the labour force, the total cultivators are 9129 comprising 5930 (64.9%), Males and 3199 (35.1%) are females.

Out of the agricultural labourers 20543, 8934 (43.5%) are males and 11609 (56.5%) are females. Out of the total 4985 Household industry male workers are 2687 (53.9%) are females 4985 (46.1%)

In other activities women contribute only 27.3% only, and male contributes 72.7%. It was observed through Focused Group Discussions, that most of the women groups are depended upon Dairy activity for their family income contribution, whereas men depends on mining, and agricultural labour.

Source: Personal visit to schools and observations from the FGD discussions with the villagers

VILLAGE WISE CULTIVATORS, AGRICULTURAL LABOUR, HH INDUSTRY, AND OTHER WORKERS



3.6.2 AMMENITIES/INFRASTRUCTURAL FACILITIES:

Availability of infrastructure is one of the important factor on which development depends, and it is one of the important parameter to define the development of the area. Infrastructure Development in rural areas is crucial for inclusive growth of the economy and for bridging the rural-urban gap. The village infrastructure like transport, communication and road facilities will enable growth of economic activities and enable production and distribution of goods and services for human welfare. Social infrastructure such as education, health care, water supply, sanitation, housing, integrated child development services etc., help in human capital formation and human development. High rates of human development indicators will help in economic growth of a country. Provision of adequate and quality infrastructure in rural areas is necessary for increasing the productivity and efficiency of agriculture. Improving the credit absorption capacity, will lead to enhancing the productivity of crops and livestock which in turn increases generating employment and increasing farmers' income thereby minimizing the incidence of rural poverty.

3.6.2.1 EDUCATIONAL FACILITIES

Out of the total 8 villages surveyed for the study every village is having primary school upto 1st class to Vth class and VIIth class.

In Burugula, Gudipadu, the school is upto VIIth class, after completion the student has to go to Yadiki Mandal headquarters which is far away from the village. The request is from the villagers to upgrade the school upto 10th class. The existing schools are not having the basic infrastructure facilities like drinking water, toilet facilities, tables, chairs, and Play ground. Due to summer holidays we could not met any children in the school. Midday meal programme is there in all the villages. In all the villages the parents showed their interest to send their children for English Medium schools.

The following are some of the photographs of the schools, and facilities available.



3.6.2.2 DRINKING WATER FACILITIES

Drinking water is one of the essential infrastructures for anybody either in rural area or urban areas. Villagers in most of the villages mainly depend on hand pumps. In the focus group discussions it was also revealed that they are not having sufficient drinking water supply. The major reasons are due to erratic power supply, and lack of ground water facility due to failure of monsoon. One more important observation from the FGD discussions, that they are not having any proper rain water harvesting structures. Whatever the little rain comes goes waste. It was observed that the entire area is covered by two three industries, so one way Sagar Cements helping them and other way the Penna Cements are also helping in providing the drinking water to the villagers. It was observed last three weeks there is a heavy rain and the ground water has increased to a good level. But still the drinking water is a scarce in all the villages. It is one of the priority of the basic necessity of the villagers. The following table gives very clearer picture about the Drinking water facilities village wise.

AVAILABLE DRINKING WATER FACILITIES IN THE STUDY AREA:

S. No.	Name of the village	Common Tap	Overhead Tank	Hand Pumps	StandPost	Tube wells
1	Burugula	2	2	HP	Nil	1
2	Kundankota	2	2	HP		1
3	Gudipadu	2	2	HP	Nil	1
4	Kovalpalli	2	2	HP	Yes	1
5	Venkatampalle	2	2	HP	Nil	1
6	Kamalapadu	2	2	HP		1
7	Veerareddipalli	2	2	HP	Nil	2
8	Boyareddipalli	2	1	HP	Yes	2
9	Chintalayapalli	2	1	HP	Yes	2

Note: 1 Available 2 Not available Source: FGD Discussions with the villagers, and personal observations in the village, some of the photographs also enclosed in the Appendix



Water Problem in Chintalayapalli



3.6.2.3 HEALTH FACILITIES

Health is one of the main basic service indicators, which was examined to make out quality of life in the area. However, the doctor to population ratio is less than the state average. There is a need to improve the public health system in Yadiki Mandal. Most of the villages in the study area do not have Primary health centers and even sub-centers. Burugulu is having primary health center. It was observed from the FGD (Focused Group Discussions) medical facilities are not reaching the rural poor properly. Yadiki or Tadipatri is the major medical centers available to the people. It was also noticed there are no medical camps was organized. In case of emergency 104/108 service are available.

Medical Facilities Available Village-Wise

S.No	Name of the village	Medical facilities			
		MCE	Phc	Hospital	RMP
1	Burugula	5KM+	0 Km	10KM+	5KM+
2	Kundankota	8Km+	10KM+	10KM+	8Km+
3	Gudipadu	12KM+	10KM+	10KM+	12KM+
4	Kovalpalli	10KM+	10KM+	10KM+	10KM+
5	Venkatampalle	10KM+	10KM+	10KM+	10KM+
6	Kamalapadu	5KM+	10KM+	10KM+	5KM+
7	Veerareddipalli	8Km+	10KM+	10KM+	8Km+
8	Boyareddipalli	12KM+	10KM+	10KM+	12KM+

3.6.2.4 SANITATION

It was observed that in all the 8 villages, overall 20 to 30% individual household members are having the toilets in all the villages. The main problems are lack of sanitation, drainage, in the villages. FGD discussions reveals this in each and every village. Lack of Proper Sanitation causing waterborne diseases in the villages, and some common diseases like fever, dengue. FGD reveals that in Gudipadu the people are well aware of the things and they are keeping the side drains very clean.

3.6.2.5 ROAD, TRANSPORT AND COMMUNICATION

Roads have generally been viewed as the most important economic infrastructural development. Economic benefits such as increased income, employment, productivity gain, better income distribution and opportunity for diversification can be generated through rural roads. Transport accessibility is one of the important factors required for the overall development of the area. Transportation and communication facility needs to be strengthened before any major development process is established. It was observed from the available data, that the village wise roads are there, but there are no Pucca internal roads are available. Even they are not properly connected to the main roads.

Below table gives a clear picture of the Road, Transport and Communication facilities available village wise.

VILLAGES BY TYPE OF COMMUNICATION/ FACILITIES AVAILABLE

S.N o.	Name of the village	Post office	Bus stand/Stop	Bus frequency	Pucca/Kutcha Road	Railway Station
1	Burugula	1	2	1	2 Km	2
2	Kundankota	2	2	2	1,3Km	2
3	Gudipadu	1	2	2	2 Km	2
4	Kovalpalli	2	2	2	2,3	2
5	Venkatampalle	2	2	1	1,3	2
6	Kamalapadu	1	2	2	1,3	2
7	Veerareddipalli	2	2	2	1-2 Km	2
8	Boyareddipalli	2	2	2	1-2 Km	2
9	Chintalayapalli	2	1	1	0.50 Km	2

1= Available 2. Not available 3= Bus frequency morning one 8-9A.M. and evening one trip 5-6 Pm, Road= 1. Katcha Road 2.Pucca Road 3.Internal Road is not available.

Source: FGD Discussions with the villagers, and personal observations in the village, some of the photographs also enclosed below.

Note: It was observed from all the villages there is no bus facility, and the frequency of the buses are very very less. The Mode of transport for the people is auto, in case of emergency they have to pay double the price to save their lives

3.6.3 FOCUSED GROUP DISCUSSION

At the outset of the FGD, it is prime important to have an interaction among all the stake holders in the study area, keeping this we have touched all those members available on the day of our survey, Anganwadi centers, unemployed youth in the villages, and village elders. Some of the Groups participated very well in the FGD Discussions and gave their opinion and feed backs about the mining project, and the felt needs of the villages. A summary of the observations, suggestions, and Need based activities from all the 9 villages studied for in-depth study, presented below. Thus we had 90 households from 9 villages and the results are presented below.

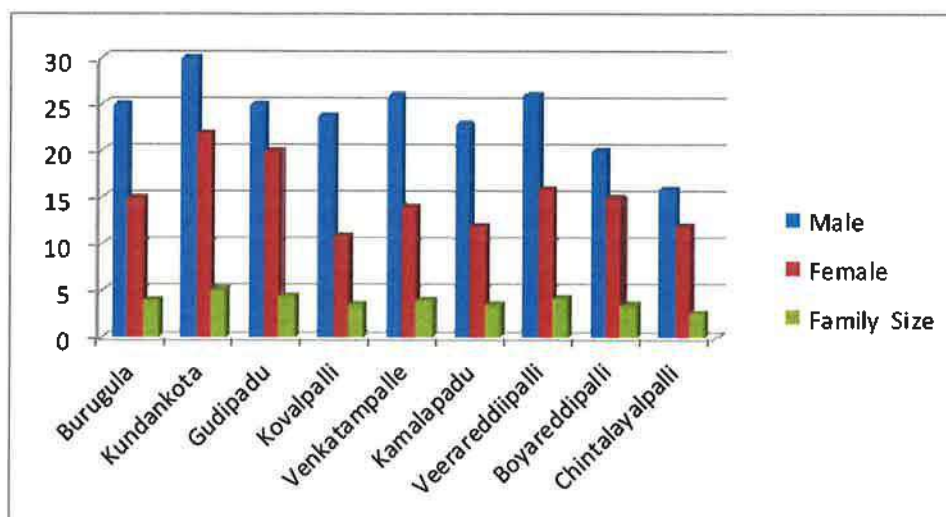
3.6.3.1 COMPOSITION OF THE FGD MEMBERS

BSET got good response in the total 9 villages where FGD interviews were conducted. The villagers freely came forward to express their opinions, problems, and their economic position. Out of 90 households, the total male members are 215, and females are 137. The average size of the family is 3.9. Below table and figure gives the details of total no of house hold and family size of each village in study area.

TOTAL NO OF HOUSEHOLDS AND FAMILY SIZE OF EACH VILLAGE IN THE STUDY AREA.

SL No.	Name of the village	Total No of people attended the FGD	Total No. of family members	Male	Female	Family size	No. of Literate from the total family
1	Burugula	10	40	25	15	4	25
2	Kundankota	10	52	30	22	5.2	30
3	Gudipadu	10	45	25	20	4.5	27
4	Kovalpalli	10	35	24	11	3.5	18
5	Venkatampalle	10	40	26	14	4	24
6	Kamalapadu	10	35	23	12	3.5	18
7	Veerareddipalli	10	42	26	16	4.2	24
8	Boyareddipalli	10	35	20	15	3.5	28
9	Chintalayapalli	10	28	16	12	2.8	16
	Total	90	352	215	137	3.91	210

TOTAL NO OF HOUSE HOLD AND FAMILY SIZE OF EACH VILLAGE IN STUDY AREA.



FGD Discussions in Gudipadu



FGD in Burugula



FGD in Burugula



FGD at Veerareddipalli



FGD at Kovalapalli



3.6.3.2 TOTAL FAMILY SIZE

The average family size of the FGD members covered in the study area having a total family size is 3.91 whereas Kundankota 5.2, and Gudipadu 4.5, and Chintalayapalli 2.8

3.6.3.3 AWARENESS ABOUT THE PROJECT

The PCIL mine area deposit located in Boyareddipalli and Gudipadu mines Yadiki mandal of Ananthapur District. Majority of the people in the study villages were aware about the project, through the surpunches, Gram Panchayat elected members and elderly people. The overall opinion of the people collected through the Focused Group Discussions, from the villagers, and same was presented below table.

AWARENESS ABOUT THE PROJECT, KNOWLEDGE FROM WHOM

SL No	Name of the village	Awareness		If Yes how did you know through whom				
		Yes	No	Local Leaders	Through MLA	Sarpanch	Local People	Others
1	Burugula	1		1			1	1
2	Kundankota	1				1	1	
3	Gudipadu	1		1		1	1	
4	Kovalpalli	1				1	1	1
5	Venkatampalle	1		1		1	1	
6	Kamalapadu	1		1		1	1	1
7	Veerareddipalli	1		1				
8	Boyareddipalli	1				1	1	1
9	Chintalayapalli	1		1		1	1	1
	Total	9						

• Multiple answers were also recorded.



3.6.3.4 SOCIAL STATUS OF SAMPLE HOUSEHOLDS.

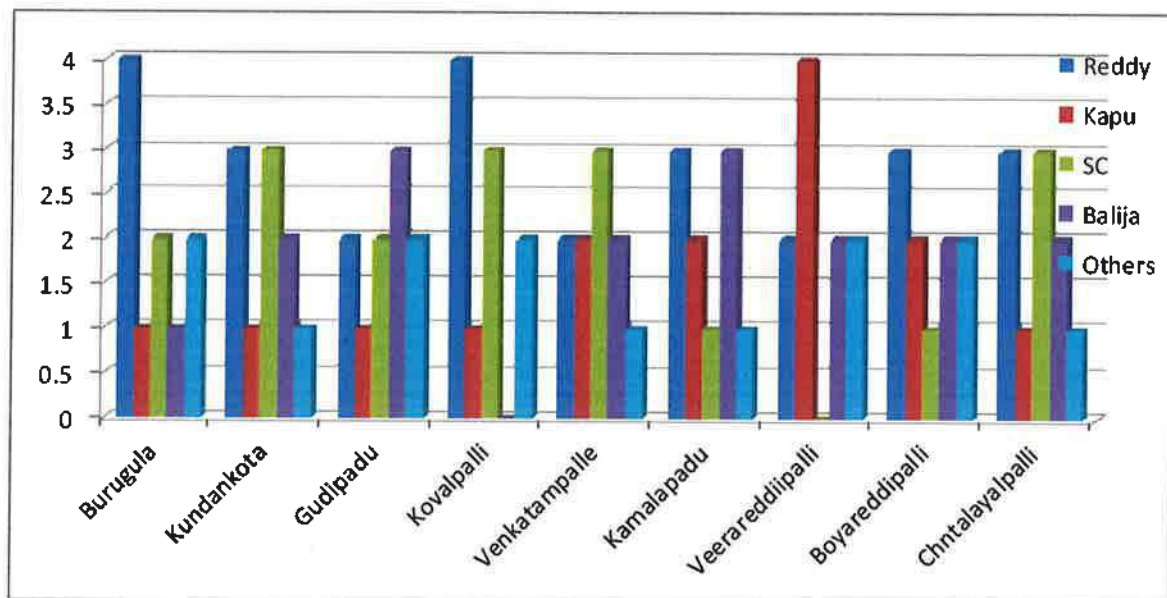
Out of the total 90 members in all the 9 villages surveyed represents OBC community, followed by Scheduled Castes Reddy, Naidu, are the predominant castes in the villages. There are 32 Members in Reddy, 27 are from Naidu, SC communities, 31 members are B.C. and others are 20 members. Below table and figure gives the details of social status of the sample households of each village in study area.

SOCIAL STATUS OF THE SAMPLE HOUSEHOLDS

SL No	Name of the village	Reddy	Kapu	SC	Muslims	Baliya	Others	Total
1	Burugula	4	1	2	0	1	2	10
2	Kundankota	3	1	3	0	2	1	10
3	Gudipadu	2	1	2	0	3	2	10
4	Kovalpalli	4	1	3	0	0	2	10
5	Venkatampalle	2	2	3	0	2	1	10
6	Kamalapadu	3	2	1	0	3	1	10
7	Veerareddipalli	2	4	0	0	2	2	10
8	Boyareddipalli	3	2	1	0	2	2	10
9	Chintalayapalli	3	1	3	0	2	1	10
	Total	26	15	18	0	17	14	90

Source: FGD Discussions with the villagers, and personal data collected through structured schedule. in the village, some of the photographs also enclosed above.

SOCIAL STATUS OF THE SAMPLE HOUSEHOLDS



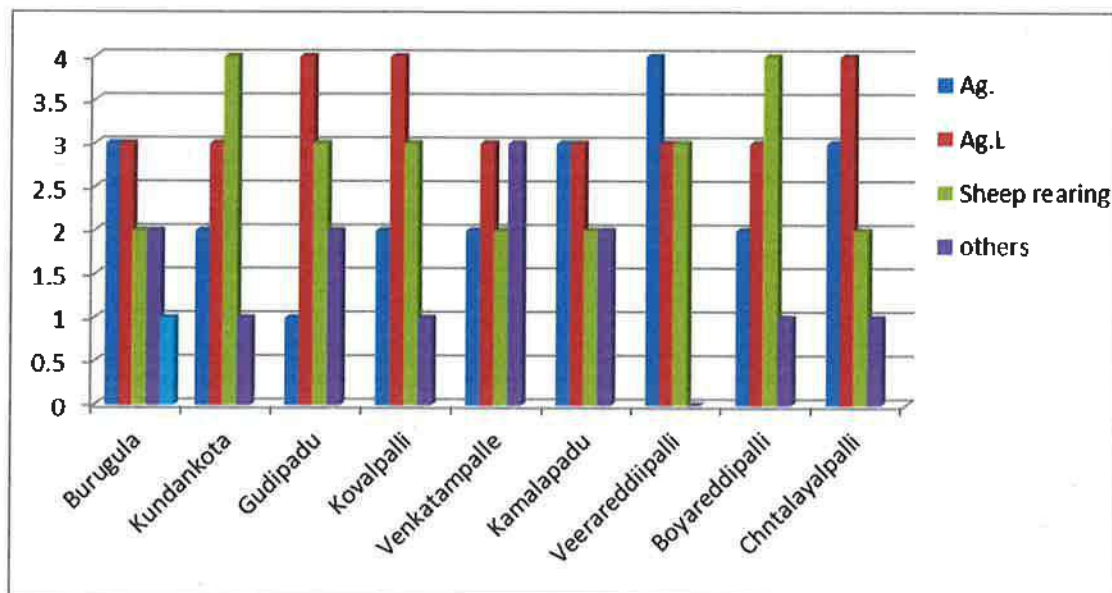
3.6.3.5 PRIMARY OCCUPATION

Out of the total 90 members 22 members are working as cultivators, 30 are doing wage labour, 25 are Sheep rearing activity, and 13 are doing other activity. The major source of income comes from the sheep rearing and agricultural labour work only. FGD discussions reveal most of the agricultural labour activity has been taken up by the women group, and sheep rearing by men. Below table and figure gives a clear picture of the Household's Primary occupation.

PRIMARY OCCUPATION OF SAMPLE HOUSEHOLDS

SL No	Name of the village	Primary Occupation				
		Ag.	Ag.L	Sheep rearing	Others	Total
1	Burugula	3	3	2	2	10
2	Kundankota	2	3	4	1	10
3	Gudipadu	1	4	3	2	10
4	Kovalpalli	2	4	3	1	10
5	Venkatampalle	2	3	2	3	10
6	Kamalapadu	3	3	2	2	10
7	Veerareddipalli	4	3	3	0	10
8	Boyareddipalli	2	3	4	1	10
9	Chintalayalpalli	3	4	2	1	10
	Total	22	30	25	13	90

PRIMARY OCCUPATION OF HOUSEHOLDS



3.6.3.6 EDUCATIONAL STATUS

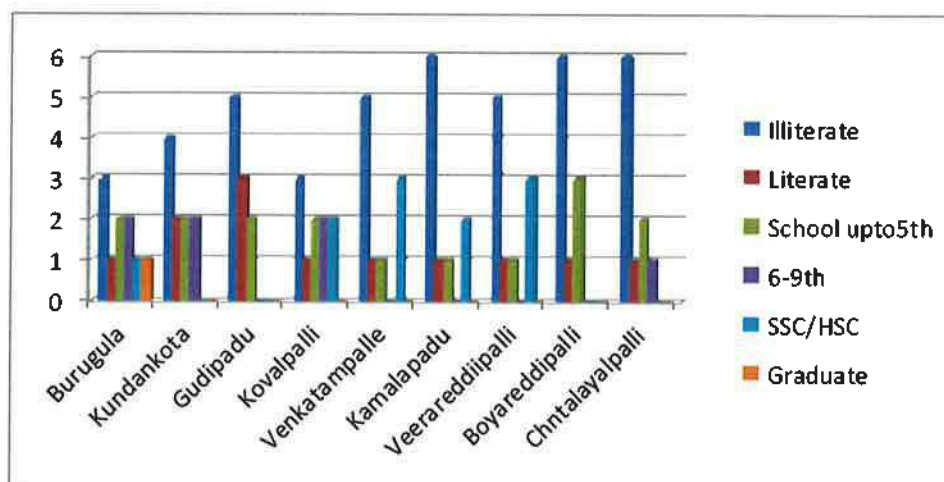
Out of 90 members, the incidence of illiteracy is higher in all the villages, compared to literates. About 43 are illiterates, 12 are literates, where they can read and write, 16 members are educated up to 5th class, 7 members are up to 6-9th class, 11 members are up to SSC/HSC, and only one member is graduate. Below table gives a clear picture village wise the educational level of the members.

EDUCATIONAL STATUS OF THE MEMBERS

SL No	Name of the village	Illiterate	Literate	School upto 5 th	6-9 th	SSC/HSC	Graduate	Total
1	Burugula	3	1	2	2	1	1	10
2	Kundankota	4	2	2	2	0	0	10
3	Gudipadu	5	3	2	0	0	0	10
4	Kovalpalli	3	1	2	2	2	0	10
5	Venkatampalle	5	1	1	0	3	0	10
6	Kamalapadu	6	1	1	0	2	0	10
7	Veerareddipalli	5	1	1	0	3	0	10
8	Boyareddipalli	6	1	3	0	0	0	10
9	Chintalayapalli	6	1	2	1	0	0	10
	Total	43	12	16	7	11	1	90

Source: FGD interviews

EDUCATIONAL STATUS OF THE MEMBERS



3.6.3.7 SELF-HELP GROUPS

With regard to self-help groups, the picture obtained from the discussions is very encouraging. In 9 villages, they have been benefitted by taking up the sheep activity of their income source. The groups are running well and they are repaying the bank loans. On an average, it was observed only 5 to 10 groups are there, Self Help Groups, and sheep groups. Majority of the groups, are doing internal loaning and few members have purchased goats and sheep.

3.6.3.8 BPL STATUS OF THE SAMPLE FAMILIES

About 95% of the families are under Below Poverty Line (BPL) and only 5% are Above Poverty Line (APL).

3.6.3.9 INCOME STATUS OF THE SAMPLE FAMILIES

It was noticed that out of 90 members, 75 members income is in the range of Rs. 20,000 to 30,000, and other 15 members are above 30,000 to Rs. 50,000/- The major source of income is Agriculture, sheep, agricultural activity, and non-agricultural operations. Below table gives a clear picture of the members.

INCOME LEVEL OF THE MEMBERS

SL No	Name of the village	20,000 to 30,000	30,000 to 50,000	Total
1	Burugula	8	2	10
2	Kundankota	8	2	10
3	Gudipadu	8	2	10
4	Kovalpalli	8	2	10
5	Venkatampalle	9	1	10
6	Kamalapadu	8	2	10
7	Veerareddipalli	8	2	10
8	Boyareddipalli	9	1	10
9	Chintalayapalli	9	1	10
	Total	75	15	90

Source: Personal interviews with the villagers

3.6.3.10 EXPENDITURE PATTERN OF THE HOUSEHOLDS

On an average the total family expenditure in the rural areas is very much on the food items i.e., Rs.30,500/-.The major expenditure is on Agriculture and livestock i.e., Rs.2600/ per year. On an average the total expenditure is Rs. *60,000/ - for the households in the study area. Below table gives a clear picture of annual expenditure of all the family members for the year 2014-15.

AVERAGE ANNUAL EXPENDITURE OF THE FAMILY FOR THE YEAR 2013-14

Item	Rs.
Food	40,000
Fuel	2000
Clothing	2000
Housing	1500
Education	2000
Health	2500
Transport	3000
Social ceremony/Recreation	3000
Debt clearance	3500
Agriculture	4000
Others	6500
Total	
*Rounded upto 60,000	70,000

*According to Ranjaran committee report the rural expenditure is Rs.60,000/-only,per annum per family. Due to Consumer price index has gone so high, it can be taken upto Rs.70,000.00

3.6.3.11 MARKET FACILITIES

Commercial activities form the backbone of the economy. The main market is Yadiki, Bellary and Tadipatri. For cotton Bellary is the main marketing center and other crops Tadipatri, Yadiki and local market, whose mostly dominated by the middlemen from small quantity of the agricultural produce. The Main marketing products are, Jowar, Chena, Castor Cotton, and Sunflower.

3.6.3.12 COMMUNITY PARTICIPATION AND VILLAGE INSTITUTIONS

Participatory approaches designed to motivate and empower men and women have been a key process in project activities. The established a variety of local-level institutions, including self-help groups (SHGs), cluster-level associations of SHGs, user groups/village development committees (for example, for education, health, irrigation, grain banks) and a nodal institution in the form of villages.

The latter were conceived on the one hand as a forum for the expression of community priorities and concerns and on the other as a means of delivering project and programmes to the community participation in helping communities identify village priorities and implement and monitor development activities in the sphere of health and education. There are no such community buildings in the Yadiki Mandal and in the study villages. The demand for community buildings are came from two to three villages.

3.6.3.13 HEALTH PROFILE/DISEASE PATTERN

The Focus Group Discussions revealed that there are common diseases like cough, cold, and seasonal diseases. There are no major problems. The PHC centres are not near to the villages, and we could not get any doctors. Hence exact data could not be ascertained. But there is a great need to improve the health conditions of the people in the villages. Medical facilities to be extended and the PHC's should be strengthened through paramedical doctors, along with medicines In Veerareddipalli, a doctor from the native place working in Hyderabad, viz., K. Nagalakshmi who is Doctor conducts the medical camps twice in all the three four villages. Her services are appreciated by all the people in the village.

3.6.3.14 SCHOOL BUILDINGS

People expressed in the Focus Group Discussions, that there are sufficient school buildings. But it needs to be upgraded from the

Primary school to secondary school and high school. Some school buildings require whitewashing and other infrastructural facilities.

3.6.3.15 ANGANWADI CENTERS

Anganwadi centers are present in all the villages and are running successfully except in two to three village i.e, they are not having own buildings and running in a rented buildings. New buildings are necessary and it was pointed out in the Need based chapter.

3.6.3.16 INDUSTRIAL TRAINING CENTERS

The Demand for the Industrial training centers are very much needed by the local people to improve the skills for the local uneducated and unemployed.

3.6.3.17 ANIMAL HUSBANDRY

It was observed that in all the village it was observed that need of Veterinary doctor, and, it was mentioned by the people that doctors were available on call.

3.6.3.18 EMPLOYMENT OPPORTUNITIES

Unemployment is prevalent in all the villages. There is a need to provide employment opportunities for the educated as well as uneducated. FGD discussions in the villages makes it clear that people are looking for an alternative i.e., self-employment activities. Most of them suggested having the training facilities nearby at Yadiki or Tadipatri, and some financial assistance may be given to them. The majority of people sold their lands to PCIL and other Industries. So they require alternative employment opportunities to run their day to day life.

3.6.3.19 ECONOMIC EFFECTIVENESS

- Though the relative share of crops, livestock sectors in the total household income has increased by and large, their absolute contribution has considerably gone up. Small



farmers and Marginal farmers have richly benefitted from livestock than the other persons.

- Migration appears to be very high in three villages, i.e, Kundankota, Burgula, Gudipadu, and in other villages seasonal migration or day to day migration for the labour work.. Self-employment opportunities, training facilities need to be provided for getting good jobs, for educated, uneducated unemployed youth in the 9 villages, to have a secure comfortable life.

CHAPTER - 4

ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES



CHAPTER – 4: ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

4.0 ANTICIPATED ENVIRONMENTAL IMPACTS & MITIGATION MEASURES

PCIL has incorporated all necessary steps to mitigate the environmental pollution in the design stage itself. Environmental Management Plan of the plant details the environmental quality control measures by PCIL during operations phase of the project in order to maintain environmental quality within the stipulated standard limits specified by State Pollution Control Board, CPCB and Ministry of Environment and Forests. PCIL is certified with ISO 14000 for implementation of Environmental Management Systems.

The impacts of proposed expansion of cement plant on various environmental components have been assessed to formulate the mitigation plan for implementation in operational phase.

Impact on air quality has been assessed through USEPA approved AERMOD mathematical model. In case of water, land, biological and socio-economic environments, the predictions have been made based on available scientific knowledge and judgments.

PCIL has incorporated all necessary steps to mitigate the environmental pollution in the design stage itself. Environmental Management Plan of the plant details the environmental quality control measures proposed by PCIL during operation phase of the project in order to maintain environmental quality within the stipulated standard limits specified by State Pollution Control Board, CPCB and Ministry of Environment and Forests.

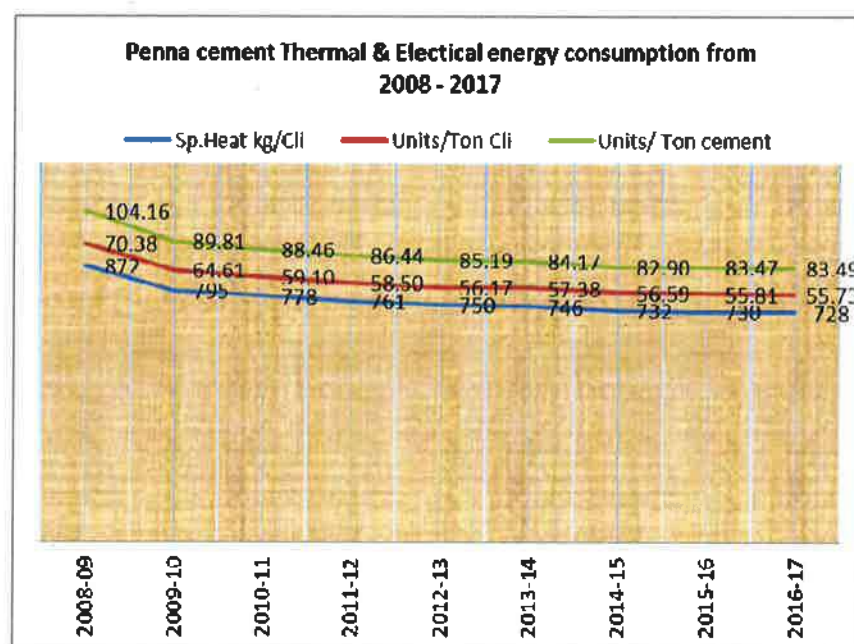
PCIL has implemented the following Eco developmental measures
Drip irrigation for development of greenbelt.

- Entire treated wastewater from STP is used for greenbelt development

- Wastewater generated from the waste heat recovery based power plant is reused in the cement plant in process and for dust suppression.
- Solar fence has been provided all along the compound walls built by PCIL within plant and colony.
- PCIL has replaced more than 50 % of the conventional lights with LED bulbs to save energy
- Colony waste is composted and used as manure

The concept of waste-minimisation, recycle/reuse/recover techniques, Energy conservation, and natural resource conservation have been considered and detailed below.

PCIL over a period of time has reduced the Energy Consumption in producing the clinker and cement. Also PCIL has achieved reduction in specific heat consumption in producing the clinker. The reduction in energy consumption and specific heat consumption are shown in the graph below



Waste minimization: PCIL is using about 0.26 MTPA of ash for producing PPC and slag of 0.50 MTPA for producing PSC at subject plant. Under the expansion, with installation of new line, flyash and slag consumption at subject plant will increase to 0.56 MTPA and 1.14 MTPA respectively.

Under the expansion plant, PCIL proposes to install Roller Press mill in place of ball mill which don't have Girth Gears that require continuous injection of grease for lubrication which is continuously discharged out from the gearbox as hazardous waste (category 5.2 of HW Rules, 2008).

Recycle, Reuse and Recovery: The wastewater generated i.e. about 120 m³/day of treated sewage water is reused for greenbelt development in place of fresh water thereby conserving the natural resource. Under expansion, additional wastewater generated from plant and colony to the tune of 64 m³/day will be used for Greenbelt development. Wastewater generated from the power plant is reused.

Energy conservation: With the installation of 6 stage pyro processing system for New Line, the thermal energy requirements will be restricted to 710 Kcal/kg instead of 740 Kcal/Kg, at present, and thereby savings of about 15% coal (optimum) will be achieved when compared to conventional dry process cement plants.

PCIL has designed Environmental Management plan as CPCB's Charter on Corporate Responsibility for Environmental Protection (CREP). The Compliance of the Charter on Corporate Responsibility for Environmental Protection is given in **Table - 4.1.**

TABLE - 4.1
COMPLIANCE TO THE CREP

S. No	CONDITION	COMPLIANCE STATUS
1.	Cement Plants which are not complying with notified standards shall do the following to meet the Standards Augmentation of existing Air pollution Control Devices - by July 2003. *No compliance units shall submit bank guarantee equivalent to 10% value of Pollution Control Equipment required.	PCIL is complying with the new standard as per as per GSR 612 (E). The new unit will be designed to meet the stipulated standard.

S. No	CONDITION	COMPLIANCE STATUS
2.	Cement plants located in critically polluted OR Urban area will meet 100 mg /Nm ³ limit of Particulate matter by December'2004.	PCIL is meeting the standard of 30 mg/Nm ³ . The new unit will be designed to meet 30 mg/Nm ³ as per GSR 612 (E).
3.	The new Cement Kiln to be accorded NOC / Environmental clearance will meet the Emission level of 50 mg/ Nm ³ .	-do-
4.	CPCB will evolve load based standards by December, 2003.	MoEF&CC has stipulated 0.125 kg/t of clinker as per GSR 612 (E).
5.	Cement Industry will control fugitive dust emission from all the Raw – material & product storage and Transfer Points.	All the fugitive dust emissions are controlled.
6.	CPCB, NCBM, BIS & Oil Refinery will jointly prepare a policy on use of Petroleum coke as a fuel in cement kiln by July 2003.	-
7.	Industry will install continuous monitoring system by December 2003 based on the feed – back on continuous monitoring equipment's performance.	PCIL has installed continuous emission monitoring system for the existing Unit – I. Continuous monitoring systems will be for the new unit – II in line with existing system.
8.	Industries will submit the target date to enhance the utilization of waste material.	PCIL is already consuming the solid Waste i.e., fly ash/slag in cement production.
9.	NCBM will carry out a study on hazardous waste utilization in cement kiln by December 2003.	-

Under the expansion scheme, PCIL proposes for modernization of existing line and installation of new Line, the clinker production capacity of the cement plant will increase from 1.5 to 4.0 MTPA of Clinker & 2.0 to 4.6 MTPA of Cement with increase of Waste Heat Recovery Power generation from 10 to 20 MW.

Details of the environmental impacts and management plan due to the modernization and new line is detailed below.

4.1 AIR ENVIRONMENT

The baseline concentrations monitored in the EIA study includes the emissions of the existing units of Cement Plant. Therefore, additional emissions are mainly due to expansion through modernization of existing line and installation of new Line.

Major pollutant emitted from expansion is Particulate matter.

- a. Kiln.
- b. Cooler
- c. Coal mill
- d. Cement Mill

Other sources of particulate system include ventilation systems from limestone weigh feeder, raw material storage silo, raw meal blending silo, raw coal hopper, clinker, clinker transport to cement mill and packing machines.

PCIL proposes to install Bag house for raw mill/kiln, bag filter for Cement mills and ESP for cooler. At all other ventilation systems, PCIL propose to install about 48 bag filters.

All the pollution control equipment in the proposed Unit is designed for an outlet particulate matter emission of 30 mg/Nm³. The dust collected from the various pollution control equipment is recycled in the cement manufacturing process.

The other pollutants generated from the cement plant are SO₂ and NO_x emissions from expansion through modernization of existing line and new line due to burning of coal of 1800 TPD. SO₂ emissions have been computed based on the new norm of 100 mg/Nm³.

4.1.1 METEOROLOGICAL DATA

The meteorological data recorded continuously during Winter Season, 2016-17 on hourly basis on wind speed, wind direction and temperature has been processed as per the guidelines of IMD

and MoEF & CC for application of AERMOD model. Stability classes are computed based on guidelines issued by CPCB on modeling. Mixing heights representative of the region have been taken from the available published literature.

The meteorological data inputs are enclosed as **Annexure - 4A**.

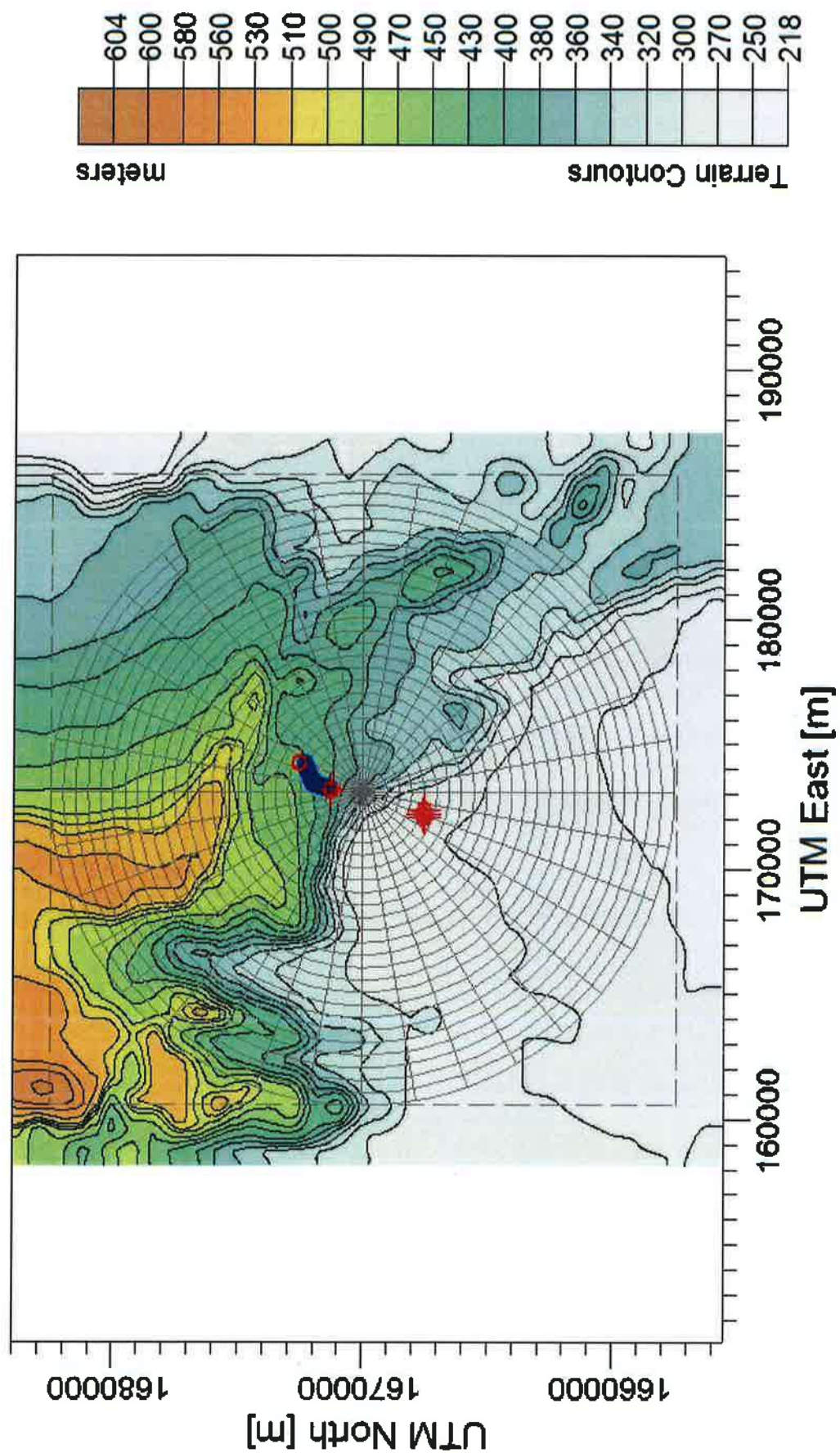
4.1.2 MODEL EMPLOYED

AERMOD Model version 9.1.0 (EPA recommended) with the following options has been employed to estimate the ground level concentrations and cumulative ground level concentrations due to emissions from the proposed expansion of cement plant and mine.

- a) Area being rural, rural dispersion parameters is considered.
- b) Ground level concentrations have been carried out to estimate concentration values over radial distance of 15 km around the sources.
- c) Polar receptor network has been considered.
- d) The terrain of 10 km radial extent of the project boundary being undulated with altitude ranging from 280 to 604 m amsl, elevated terrain has been considered.
- e) Emission rates from the point sources, line sources and area sources were considered as constant during the entire period.
- f) The ground level concentrations computed were as is basis without any consideration of decay coefficient.
- g) Calm winds recorded during the study period were also taken into consideration.
- h) Hourly meteorological data as per guidelines of CPCB was considered for winter season (December 2016 -February 2017) for estimation of ground level concentration.
- i) Estimated ground level concentrations are plotted as isopleths using **SURFER - 8** graphics package.

Map showing sources, receptors network along with terrain considered for modelling studies is shown in **Fig - 4.1**.

FIG - 4.1
TERRAIN, SOURCES AND RECEPTORS CONSIDERED FOR MODELING STUDY



4.1.3 ASSUMPTION MADE IN PREDICTION OF AIR POLLUTION IMPACTS

For the purpose of computation of rise in the ground level concentrations due to mining operations, the following assumptions have been considered.

Plant operations are considered that the emissions are continuous for 24 hours.

4.1.4 CUMULATIVE IMPACT DUE TO EXPANSION OF CEMENT PLANT AND LIMESTONE PRODUCTION AT ML AREA

Incremental cumulative ground level concentrations are estimated considering emissions from the expansion of cement plant and limestone mine. Emissions due to expansion of cement plant and limestone have been considered to estimate the cumulative impact. **Table - 4.2** shows the emission of the cement plant and mine considered for estimation of cumulative impact.

4.1.5 PREDICTED INCREMENTAL CUMULATIVE GROUND LEVEL CONCENTRATIONS

The baseline concentrations monitored in 10 km radius of the study area reflect the emissions from all the existing sources including emissions from other Cement plants and mines.

Incremental ground level concentrations estimated are discussed below:

MAXIMUM INCREMENTAL 24-HOURLY AVERAGE CUMULATIVE GROUND LEVEL CONCENTRATIONS ($\mu\text{g}/\text{m}^3$)

PM ₁₀	PM _{2.5}	SO ₂	NO _x
8.02	2.81	19.2	11.50

Fig - 4.2 - 4.5 shows the distribution of PM₁₀, PM_{2.5}, SO₂ and NO_x cumulative ground level concentrations in the study area.



TABLE - 4.2
EMISSION DETAILS

FOR CEMENT PLANT- UNIT - II

S.No	Source	Stack Ht	Diameter	Velocity	Temp	Emission, gm/sec		
		M	M	M/sec	C	PM	SO ₂	NOx
1	Kiln	120	5.1	15.0	120	6.95	23.17	162.1
2	Cooler	38	4.0	15.9	120	4.55	-	-
3	Cement mill-1	33	1.7	11.0	80	0.63	-	-
4	Cement Mill -2	33	1.7	11.0	80	0.63	-	-
5	Coal Mill	38	2.0	13.3	65	1.10	-	-
6	Crusher (Existing crusher (located at 4.1 km from plant will be used)	30	2.0	12.0	60	1.11	-	-

FOR LIMESTONE MINE

(BASIS - AP-42: EMISSION ESTIMATION TECHNIQUE MANUAL FOR MINING)

A. POINT SOURCE EMISSION

Drill - dust emission = 0.59 kg/hole = 0.020 gm/sec

B. AREA SOURCE - Excavation of Limestone

		INCREASED LIMESTONE
Quantity, MTPA		3.0
Emission of dust, g/t	PM ₁₀	*0.136
	PM _{2.5}	*0.0136
Emission of dust, g/year	PM ₁₀	408000
	PM _{2.5}	40800
Area of influence, m ²		625
Uncontrolled Emission rate, g/s/m ²	PM ₁₀	0.000025
	PM _{2.5}	0.0000025
Controlled Emission rate, g/s/m ²	PM ₁₀	0.0000025
	PM _{2.5}	0.00000025



C. AREA SOURCE - Excavation of Top soil & Low Grade Limestone

		INCREASED LIMESTONE
Quantity, MTPA		0.187
Emission of dust, g/t	PM ₁₀	*0.136
	PM _{2.5}	*0.0136
Emission of dust, g/year	PM ₁₀	25432
	PM _{2.5}	2543
Area of influence, m ²		625
Uncontrolled Emission rate, g/s/m ²	PM ₁₀	0.00000015
	PM _{2.5}	0.00000015
Controlled Emission rate, g/s/m ²	PM ₁₀	0.00000015
	PM _{2.5}	0.000000015

D. LINE SOURCE - Transport of Limestone - Working Pit to Crusher

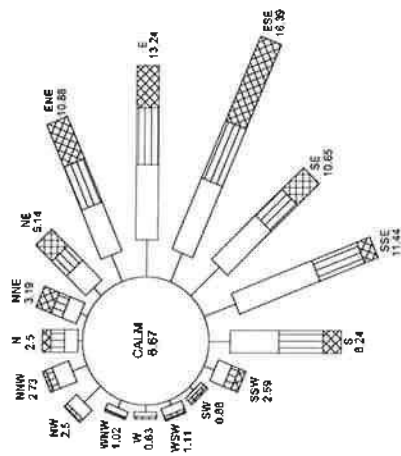
		INCREASED LIMESTONE
Quantity, MTPA		3.0
Capacity of each dumper		35
Total number of dumpers per year		85714
Lead length per trip, km		3.5 (two way)
Total VKT per year		299999
Emission kg/VKT	PM ₁₀	0.133
Total emission kg per year	PM ₁₀	39899.87
Uncontrolled Emission rate, g/sec/m	PM ₁₀	0.000000086
	PM _{2.5}	0.0000000086
Controlled emission rate, g/sec/m	PM ₁₀	0.0000000086
	PM _{2.5}	0.000000000086
Parameters considered : Vehicle Height : 2.5 m Vehicle width : 2.5 m		

D. LINE SOURCE - Transport of Topsoil & Low grade Limestone - Working Pit to dump

		Overburden
Quantity, MTPA		0.187
Capacity of each dumper		35
Total number of dumpers per year		5342
Lead length per trip, km		2.6 (two way)
Total VKT per year		13891
Emission kg/VKT	PM ₁₀	0.133
Total emission kg per year	PM ₁₀	1847.56
Uncontrolled Emission rate, g/sec/m	PM ₁₀	0.000039
	PM _{2.5}	0.0000039
Controlled emission rate, g/sec/m	PM ₁₀	0.0000039
	PM _{2.5}	0.00000039
Parameters considered : Vehicle Height : 2.5 m Vehicle width : 2.5 m		

Note * Emission factor computed based on wind speed of 2 m/sec and moisture of 10 %.
+ Emission factor computed based on silt content of 10 % and moisture content of 10%.





WINDROSE - WINTER, 16-17

ISOPLETH INTERVAL ($\mu\text{g}/\text{m}^3$)



SCALE (M)

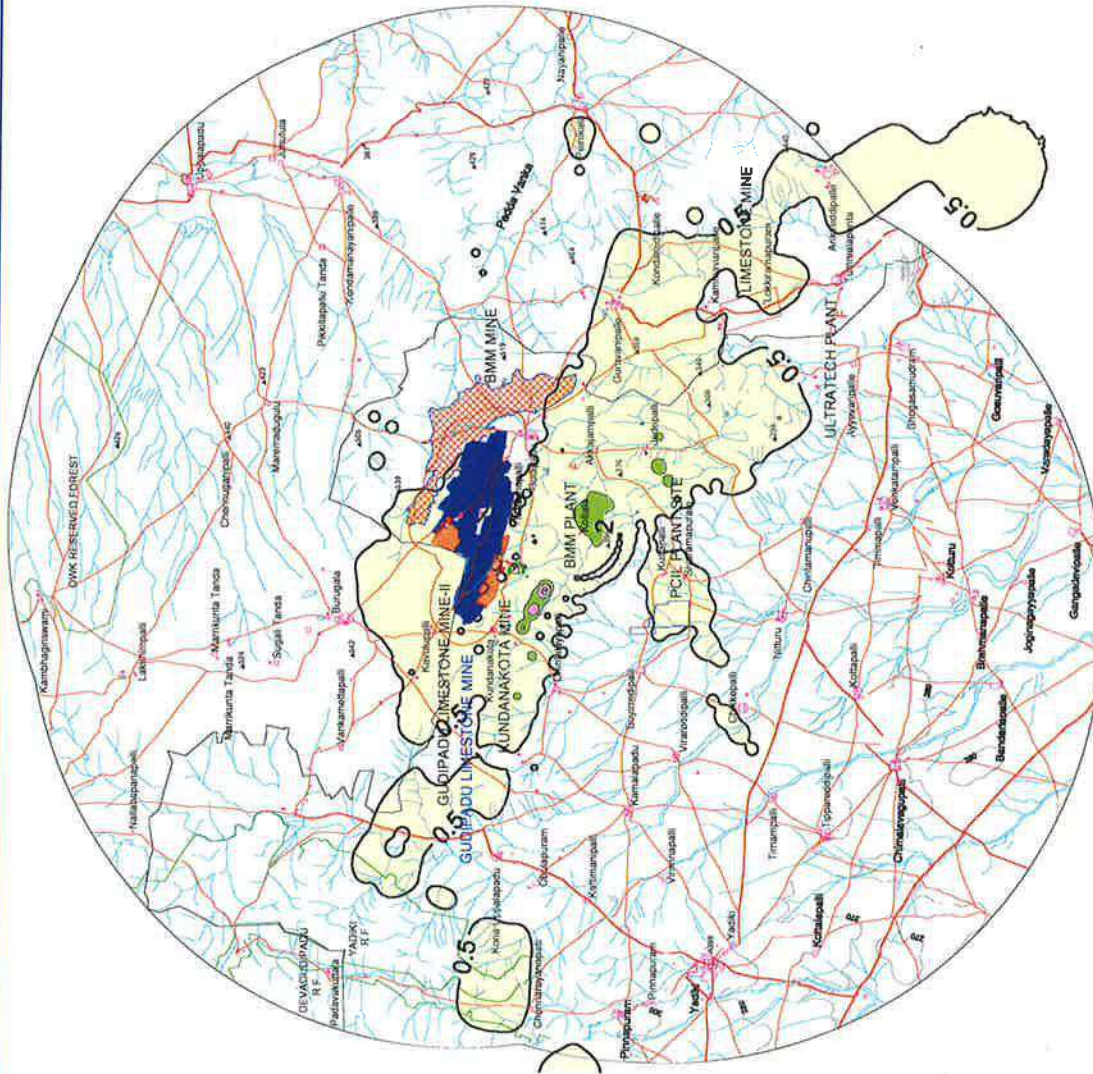


FIG - 4.2
PREDICTED CUMULATIVE GROUNDLEVEL CONCENTRATIONS OF PARTICULATE MATTER - PM10
DUE TO EXPANSION OF CEMENT PLANT AND CAPTIVE LIMESTONE MINE
CLINKER: 1.5 to 4.0 Million Tonnes per Annum
CEMENT: 2.0 to 4.6 Million Tonnes per Annum & LIMESTONE ; 2.3 TO 5.3 MTPA Million Tonnes per Annum

CLIENT : PENNA CEMENT INDUSTRIES LTD.,
 PROJECT : CEMENT PLANT AND GUDIPADU LS MINE



PREPARED BY
B.S. ENVI-TECH PVT. LTD., HYD.

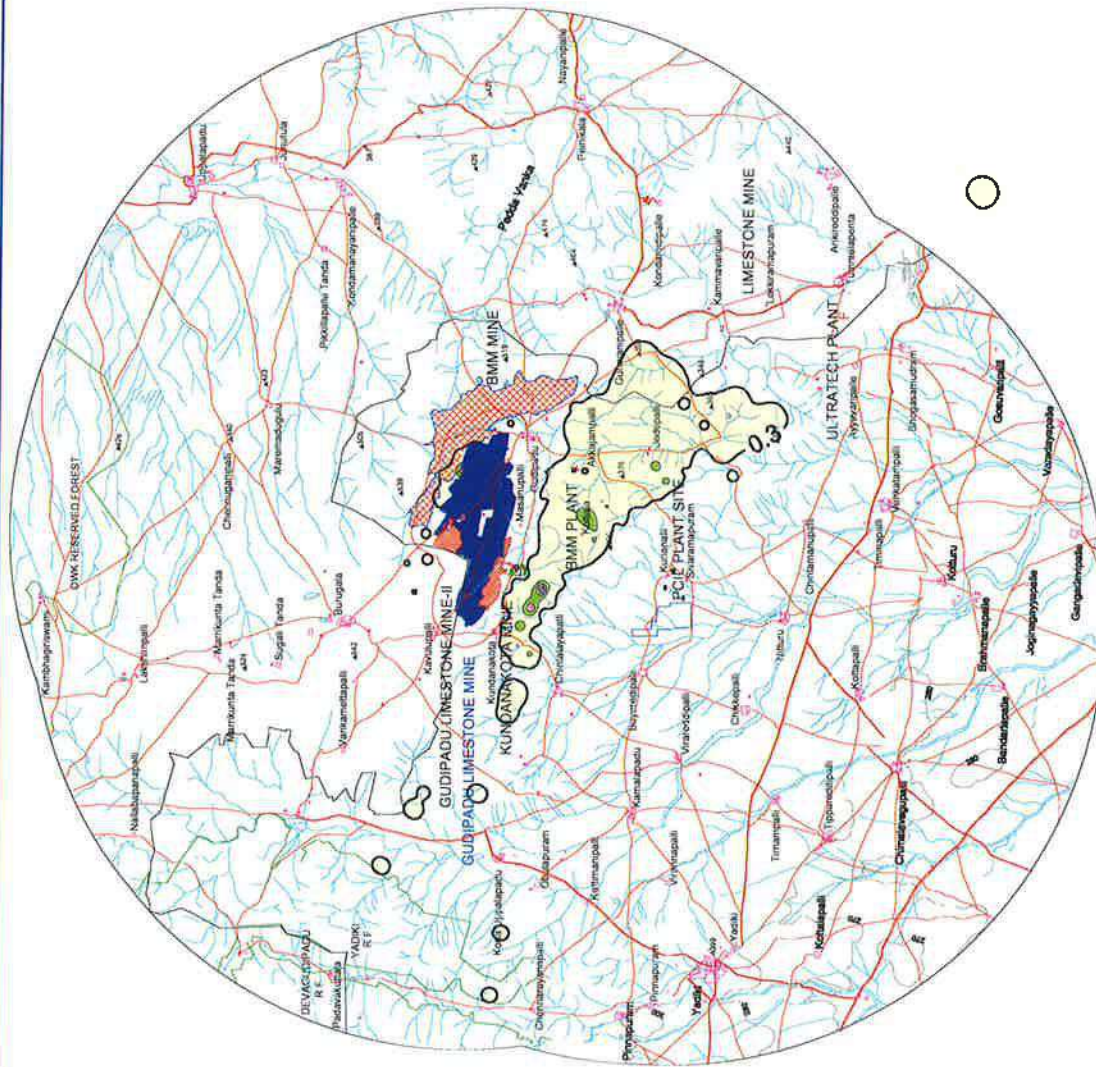
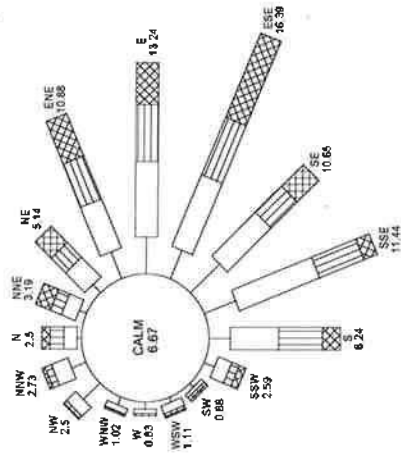


FIG - 4.3
PREDICTED CUMULATIVE GROUNDLEVEL CONCENTRATIONS OF PARTICULATE MATTER - PM2.5
DUE TO EXPANSION OF CEMENT PLANT AND CAPTIVE LIMESTONE MINE
CLINKER: 1.5 to 4.0 Million Tonnes per Annum
CEMENT: 2.0 to 4.6 Million Tonnes per Annum & LIMESTONE ; 2.3 TO 5.3 MTPA Million Tonnes per Annum



WINDROSE - WINTER, 16-17

ISOPLETH INTERVAL ($\mu\text{g}/\text{m}^3$)



SCALE (M)



CLIENT : PENNA CEMENT INDUSTRIES LTD.,
PROJECT : CEMENT PLANT AND GUDIPADU LS MINE



PREPARED BY
B.S. ENVI-TECH PVT. LTD., HYD.

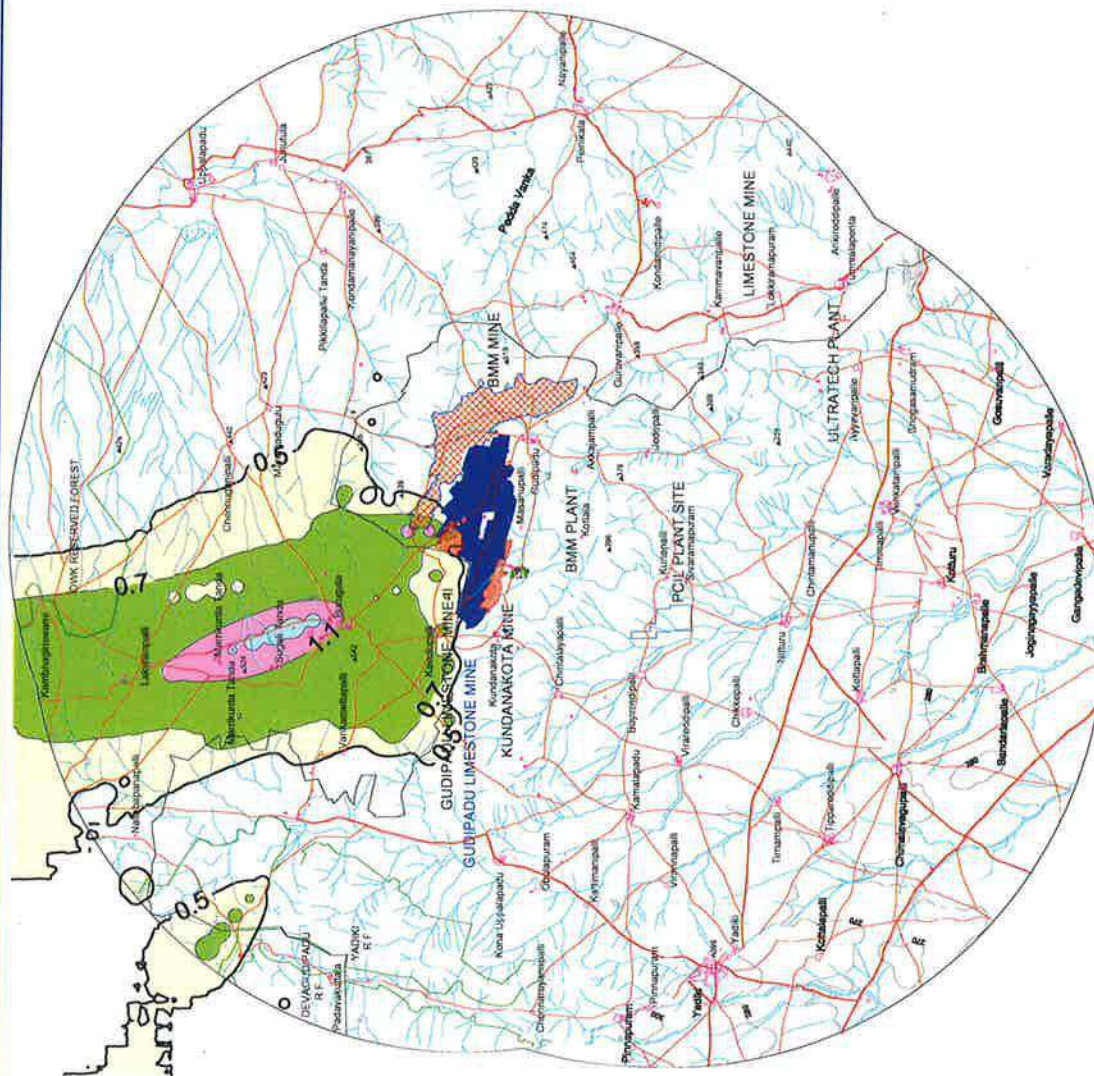
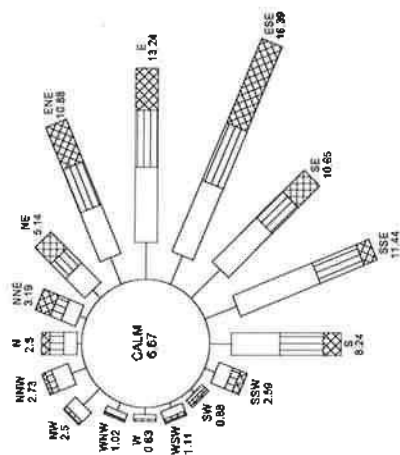


FIG - 4.4
PREDICTED CUMULATIVE GROUNDLEVEL CONCENTRATIONS OF
SULPHURDIOXIDE - SO₂
DUE TO EXPANSION OF CEMENT PLANT AND CAPTIVE LIMESTONE MINE
CLINKER: 1.5 to 4.0 Million Tonnes per Annum
CEMENT: 2.0 to 4.6 Million Tonnes per Annum &
LIMESTONE : 2.3 TO 5.3 MTPA Million Tonnes per Annum



WINDROSE - WINTER, 16-17

ISOPLETH INTERVAL (ug/m³)



SCALE (M)

CLIENT : PENNA CEMENT INDUSTRIES LTD.,
PROJECT : CEMENT PLANT AND GUDIPADU LS MINE



PREPARED BY
B.S. ENVI-TECH PVT. LTD., HYD.

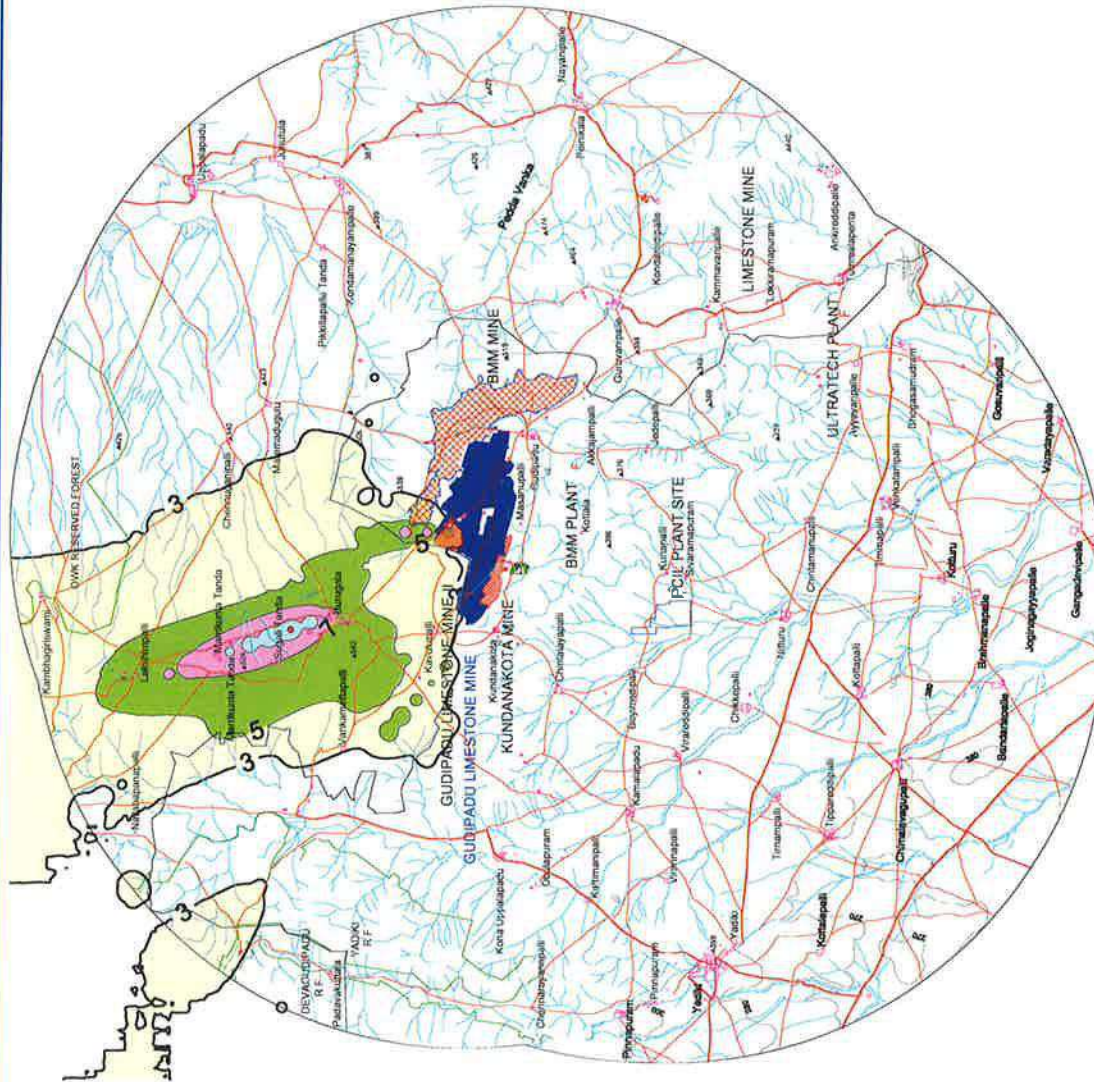
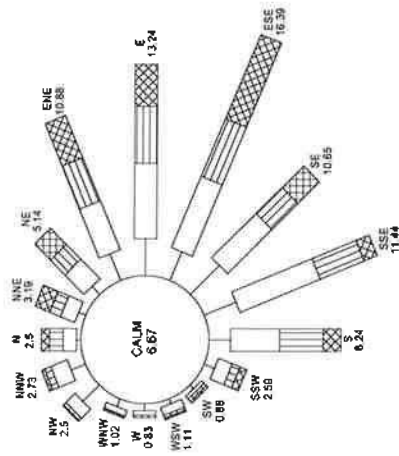


FIG - 4.5
PREDICTED CUMULATIVE GROUNDLEVEL CONCENTRATIONS OF
OXIDES OF NITROGEN
DUE TO EXPANSION OF CEMENT PLANT AND CAPTIVE LIMESTONE MINE
CLINKER: 1.5 to 4.0 Million Tonnes per Annum
CEMENT: 2.0 to 4.6 Million Tonnes per Annum &
LIMESTONE : 2.3 TO 5.3 MTPA Million Tonnes per Annum



WINDROSE - WINTER, 16-17

ISOPLETH INTERVAL (ug/m3)



SCALE (M)



CLIENT : PENNA CEMENT INDUSTRIES LTD.,
PROJECT : CEMENT PLANT AND GUDIPADU LS MINE



PREPARED BY
B.S. ENVI-TECH PVT. LTD., HYD.

Annexure-4B gives the 50 high 24-hourly average ground level concentrations of PM₁₀, PM_{2.5}, SO₂ and NO_x during Winter Season 2016 - 17.

OVERALL SCENARIO

Predicted maximum cumulative ground level concentrations obtained are superimposed on the following existing baseline concentrations to project the overall post scenario in the study area. The Overall Scenario with predicted concentrations over the base line are shown below.

PREDICTED CUMULATIVE GROUND LEVEL CONCENTRATIONS AND OVERALL SCENARIO, $\mu\text{g}/\text{m}^3$

24-Hourly Concentrations	Particulate Matter - 10 (PM ₁₀)	Particulate Matter - 2.5 (PM _{2.5})	Sulphur Dioxide (SO ₂)	Oxides Of Nitrogen (NO _x)
Baseline concentration, max	56.5	26	13	14.4
Predicted Ground level Concentration (Max)	8.02	2.41	1.92	11.50
Overall Scenario	64.52 {100}	28.41 (60)	14.92 {80}	25.90 {80}

NOTE: Values in parenthesis are National Ambient Air Quality (NAAQ) standard limits specified for Industrial, Residential, Rural and other areas.

The ambient air quality values are not exceeding the stipulated standards due to the expansion when the predicted values are superimposed on the baseline value i.e when the contribution of expansion is added to the background air quality.

4.1.6 AIR POLLUTION CONTROL MEASURES

The main pollutant emitted from the cement plant is particulate matter.

PCIL have invested Rs. 57.35 crores on pollution control equipments in the existing plant. An additional expenditure of Rs. 46,50,870 was incurred in the year 2016-2017 as an maintenance cost of pollution equipments

PCIL has integrated the Environmental management with the manufacturing process. Cement manufacturing at PCIL cement plant is a compound process with Vertical Roller Mill for Raw mill which helps in energy conservation. Additionally kiln operation is being controlled through fully automated, which takes action for coal firing based on various advanced information and also can take action by seeing the parameters in less than a minute time. By adopting this technology, PCIL has avoided tripping of ESP.

Bag houses, bag filters and Electro Static Precipitators have been installed in the plant to control the emissions from the chimneys and also to meet the emission norms.

High efficiency pulse jet type bag filters are installed in the crushing plant, raw mill hoppers, coal mill hoppers, blending silo, cement mill hoppers, cement silo and in all belt conveyor transfer towers to control the particulate emission less than 30 mg/Nm³.

LIST OF POLLUTION CONTROL SYSTEMS IN THE EXISTING PLANT

Process Unit	Pollution Control Equipment
Cement plant – Existing Unit	
Kiln	RABH
Cooler	ESP
Coal mill (existing mill will be used)	Bag filter
Cement Mill – 1 (VRM)	Bag filter
Cement Mill – 2 (Ball Mill)	Bag filter

All the flue gas outlets are provided with state of art air pollution control equipment with control efficiency of 99.8-99.9 % to maintain the particulate emission level below 30 mg/Nm³. The cement dust collected in the pollution control devices is recycled back to the cement manufacturing process.

PCIL is maintaining particulate matter below 50 mg/Nm³ and this is within the norms as per the A.P pollution control Board and also provided Inter locking system for all various bag filter units. Recently PCIL have received GSR 497 (E), 10th May 2016 notification the emission norms are 30 mg/Nm³. To comply with the new norm PCIL have replaced some bags in major stacks and maintaining particulate matter well within stipulated limits.

List of pollution control equipment installed in the existing Cement Plant are given in **Annexure-4C**.

43 no's of nucense bag filters are provided at various transfer points to control fugitive dust emissions and same dust is recycling within system. We are spraying water on cement roads to control fugitive dust emissions and it is continual process. Raw materials are stored in closed roof sheds and Clinker stock pile is closed roof shed with bag filters.

All the material handling systems are covered with aprons. Ventilation systems are provided with bag filters in the plant. All the pollution control equipment is designed to meet outlet particulate matter emission of less than 30 mg/Nm³ emission for particulate matter.

PCIL is continuously monitoring the status of various pollution control systems and upgrading them from time to time. PCIL has installed four number of continuous emission monitoring system at major stacks. Internal roads with Concrete Cement are in place. Regular watering of roads is being done to arrest the fugitive emissions due to vehicular movements.

NEW LINE

PCIL will provide one Bag House, two Bag filters and one ESP for main process units as given below:



**POLLUTION CONTROL EQUIPMENT-MAIN EQUIPMENT OF
NEW LINE**

Process Unit	Pollution Control Equipment
Kiln	RABH
Cooler	ESP
Coal mill	Bag filter
Cement Mill	Bag filter

A total of 48 bag filters will be provided at various locations in the process unit of new line apart from installation of above Bag house, Bag filters and ESP to control the dust emissions from dropping/transfer points of the belt and bucket conveyors.

PCIL will comply with the new norms issued by MoEF & CC vide Gazette Notification GSR 612 (E) dated 25th August, 2014 where emission concentration permitted is 30 mg/Nm³ for all the cement plants operating and proposed in the country.

The new line will be designed to firing hazardous waste in the Kiln.

4.1.7 CONTROL OF FUGITIVE EMISSIONS

Sources of fugitive dust in the plant are:

- Transportation activities within the cement plant
- Dropping/transfer points of the belt and bucket conveyors at transfer points
- Raw material stock piles
- Coal handling areas

Road sweeping with mechanized machine to sweep the concrete roads regularly and maintain minimum fugitive dust emissions on roads. Limestone is transported through closed roof conveyor from crusher to plant and fugitive emissions are controlled by water spray on Haul road and provided bag filters at all transfer points.

Adequate air pollution control systems are provided as details below to maintain SPM well within the prescribed limits.



Raw mill & Kilns	: Pulse Jet Bag House (PJBH)
Clinker Coolers	: Electro Static Precipitator (ESP)
Limestone crusher,	
Coal mill & cement/slag mills	: Bag Filters
All transfer points	: Dust Collectors
Limestone dump hopper	: Water spray system
Limestone conveyor	: Water spray system
Limestone stacker	: Water spray system

- All transfer points and storage silos are provided with dust collection and extraction systems for effective control of fugitive emissions. All the pollution control equipment will be designed for $\leq 30 \text{ mg/Nm}^3$.
- The dust collected from the pollution control equipment will be recycled back into the process.
- Clinker will be stored in clinker storage tanks to control fugitive emissions.
- Gypsum and additives will be stored in covered storage sheds
- Flyash will be stored in silos and is handled with pneumatic system.
- All raw material transfer conveyors will be covered with GI sheets.
- Water Spray system for coal yard

COAL YARD WITH WATER SPRINKLERS



WATER SPRINKLING ON PLANT ROADS



- All roads and open area in the plant are cement concreted.
- Road sweeping machine is employed to remove dust settled on roads.

MECHANISED SWEEPING MACHINE



To ensure and reduce impact of transport on the surrounding environment, railway line is already in place taking care of 75% of movement. The balance raw materials and cement is transported in trucks covered with tarpaulin.

Flyash is transported in bulk tankers only.

Transport vehicle will be periodically checked for Pollution under Control certificate from approved RTA agencies.

Truck mounted vacuum cleaner and road sweepers are proposed to be deployed to maintain good housekeeping.

4.2 NOISE ENVIRONMENT

4.2.1 IMPACT ON NOISE ENVIRONMENT

The major noise generating sources are Coal Mill, Kiln/Raw mill, packers of cement plant and compressors. These sources are located far off from each other. Under any circumstances the noise level at plant boundary will not exceed 75 dB (A) at day time and 70 dB (A) at night time.

The noise levels are being monitored and efforts are being made to maintain the noise levels within the prescribed limits.

Silencers are provided to all the Clinker Cooler fans to maintain the noise level well within the prescribed limits.

Noise levels generated in the cement plant are confined within the boundary and with attenuation after greenbelt and construction of boundary wall, the impact of noise levels on surroundings is negligible.

The spot noise levels monitored at the existing cement plant are in the range of 85-95 dB (A) (Lp total).

Noise levels are controlled in the mills by providing the enclosures with GI sheets and the noise levels are within the standards in and around the plant.

NEW LINE

During construction, no significant impact is envisaged as most of the construction equipment produce noise level below 90 dB(A). The noise generated is expected to be intermittent and of short duration.

Major noise generating sources are limestone crusher, coal mill, Kiln, Raw mill and packers of cement plant. These sources will be located far off from each other. Under any circumstances the noise level from each of these sources will not exceed 90 dB (A).



Noise levels generated in the cement plant are confined within the PCIL complex and are further reduced due to attenuation of greenbelt. Noise level at the plant boundary, calculated from the above equation, is expected to be less than 75 dB (A) without considering any attenuation factors. PCIL has developed an area of 16 ha within the cement plant complex including colony. Boundary plantation already developed will act as a barrier and further reduces the noise levels. Additionally 4.0 ha of greenbelt will be developed for the proposed expansion.

NOISE CONTROL MEASURES

Plant machinery like Cement Mill, Raw Mill, ID fans, Compressors & Crusher etc. are the major sources of noise pollution. The following are the noise control measures proposed to be undertaken in New Unit of the cement plant.

- Provision of acoustic dampeners in foundations and insulators in the interiors.
- Encasement of noise generating equipment wherever feasible.
- In addition personnel working near high noise level generating sources will be provided with ear muffs.
- Effective preventive maintenance and vibration measurement of all rotating equipment will help in the improvement of plant life and also noise reduction.
- Implementation of source control measures and occupational safety measures.
- Automatic door enclosures for control room and laboratory etc.
- Silencers will be provided at Clinker Cooler fan to maintain the noise level well within the prescribed limits.

4.3 WATER ENVIRONMENT

4.3.1 IMPACT ON WATER ENVIRONMENT

Cement will be manufactured by dry process technology. In the entire process water is used only at very few stages in the process



at Cement mill, coal mill and raw mill for cooling. Cooling include the circulating cooling water for bearings and gear boxes. The other areas of water consumption other than process is for domestic purposes in the plant canteen, colony and also for greenbelt development.

Water is required for cooling, dust suppression, Domestic use and gardening. The present water requirement of the plant is 930 m³/day. 700 m³/day for cement plant and colony is sourced from borewells within the plant site. Ground water withdrawal will not exceed 700 m³/day. 230 m³/day of water for existing waste heat recovery based power plant is met from mine pit. Additional water requirement for expansion of cement plant and WHRB power plant is 500 m³/day and the same will be met from Mine pit.

The water balance at cement plant is given below. Water balance diagram is shown in **Fig - 4.6**.

WATER CONSUMPTION IN THE CEMENT PLANT (m³/day)

S.NO	DESCRIPTION	PRESENT	AFTER EXPANSION	LOSS	WASTEWATER
1	Cement plant	580	800	800	-
2	Domestic (Plant & Colony)	150	230	46	184
3	Power Plant	200	400	320	80
Total		930	1430	1166	264

4.3.1.1 WASTEWATER GENERATION AND DISPOSAL

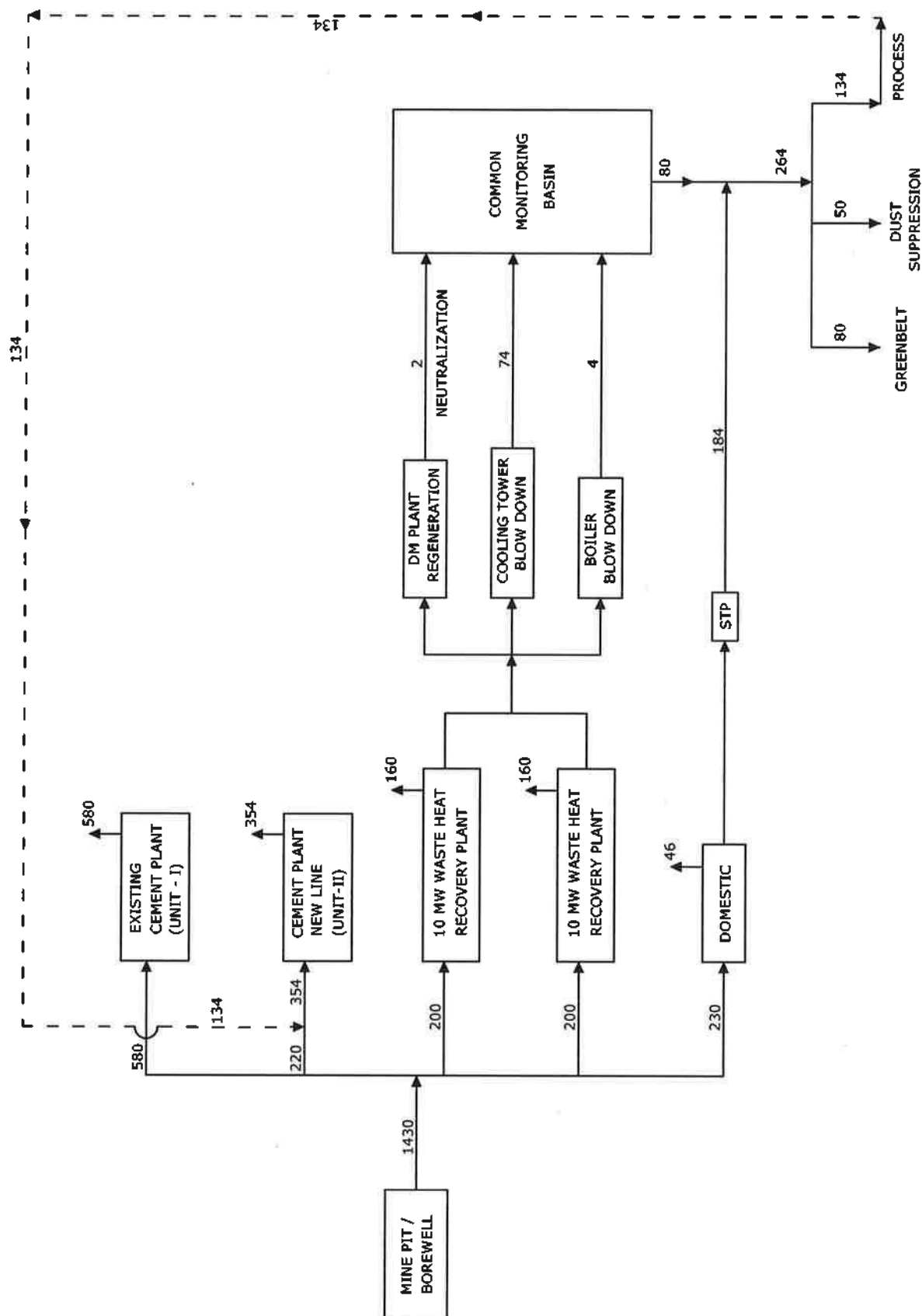
No wastewater is generated from cement plant process. Waste water is generated from Power Plant. Similarly, domestic sewage will be generated from plant& colony.

In order to treat the sewage generated from the colony a full-fledged sewage treatment plant (STP) is in operation. The STP is designed for a maximum load of 250 m³/day with an average BOD of 150 - 200 mg/L for raw sewage and after treatment less than 20 mg/L.



FIG - 4.6
WATER BALANCE DIAGRAM

All Quantities are Given in m³/day



From power plant, the waste water generation is 80 m³/day. About 184 m³/day of treated sewage is generated from Plant & Colony in post expansion scheme. The treated sewage and the power plant effluent are mixed to attain the Discharge water standards and used for green belt development.

WASTE WATER UTILIZATION

Source of generation	Quantity (m³/day)	End usage
Domestic wastewater (Plant & Colony)	184	Treated in sewage treatment plant and recycled for use in process, dust suppression and greenbelt development
Waste water from power plant	80	DM plant effluent is Neutralized and mixed with cooling tower blowdown. Treated water is reused in the process

SEWAGE TREATMENT PLANT

The project authorities have installed a 250 KLD sewage treatment plant and the treated water is being used for their green belt development and dust suppression purpose. No waste water is discharged to outside the plant premises and they are adopting a zero discharge concept.

SEWAGE TREATMENT PLANT



Treated water is used for greenbelt development. The inlet and outlet quality of STP waste water is given below

QUALITY OF WASTE WATER FROM STP BEFORE AND AFTER TREATMENT

S.No	Parameters	Results		GSR 422 (E) General Standards for Discharge of Effluents Inland Surface Water
		STP INLET	STP OUTLET	
1	Colour (Hazen Units)	24	10	See Note-1
2	Odour	Dis-Agreeable	Agreeable	See Note-1
3	pH	7.40	7.34	5.5- 9.0
4	Oil & Grease, mg/l	7	3	10
5	Total Suspended Solids, mg/l	80	34	100
6	Total volatile suspended Solids, mg/l	41	18	---
7	Total Dissolved Solids, mg/l	1103	974	2100
8	BOD for 3days at 270c, mg/l	48	11	30
9	COD mg/l	102	30	250
10	Chloride as Cl, mg/l	142	150	1000
11	Fluoride as F, mg/l	1.0	0.96	2.0
12	Dissolved Phosphate, mg/l	4.1	0.90	5.0
13	Percent Sodium,	45.6	48.1	---
14	Sulphide as S, mg/l	0.4	0.2	2.0
15	Boron as B, mg/l	0.12	0.17	2.0
16	Residual Sodium Carbonate	151	163	---
17	Sulphates as So ₄ , mg/l	49	43	1000
18	Iron as Fe, mg/l	0.13	0.09	3.0

Note 1: All efforts should be made to remove colour and unpleasant odour as far as practicable

STP sludge is being used as manure for their greenbelt development. No discharge of waste water either into surface body or into ground. Traps for desilting/removal of silt are provided for storm water drains.

4.3.2 RAIN WATER HARVESTING

Rain water collected from Plant & Colony are routed to a common storm water drain which has an outlet into rain water harvesting pit located at the lower level in the colony area.



PCIL has constructed 18 no's of rain harvesting pits along the road from main gate to the colony for the storm water recharge in to the ground and also roof tops.

PCIL has takenup De-silting and renovation of old water reservoir which is in NE of plant with capacity of 0.2 TMC for rainwater harvesting.

- The water conserved will be used to meet the plant water requirement.
- Rain water harvesting and groundwater recharge structures have been be constructed outside the plant premises at following villages
- Check dam near chintalayapalli for storing of rain water has been constructed and PCIL has initiated Checkdam construction at Kundanakota

CHINTARAYAPALLI – PERCOLATION TANK











4.3.3 WATER CONSERVATIONS AND RECHARGING OF THE GROUND WATER

The following water conservation measures are implemented in the plant.

- Treated waste water is used for greenbelt development.
- Greenbelt by drip irrigation covering an area of 85 acres within and outside the cement plant was developed PCIL.
- Water meters have been installed at various location of the cement plant to optimize the usage and leakages.

WATER METERS INSTALLED IN CEMENT PLANT

			
PLANT WATER TANK INLET	COOLING TOWER MAKEUP WATER	COLONY WATER	RAW MILL
			
COOLER WATER SPRAY	CEMENT MILL WATER SPRAY	CEMENT MILL WATER SPRAY	VRM SLAG WATER SPRAY

- Roof top rain water is harvested, led into a tank and is recycled.
- Paved roads lead result in proper channeling of rain water in to storage ponds.

4.4 LAND ENVIRONMENT

All the raw material is stored either in closed silos or in closed sheds and on lined surfaces. Hence there is no possibility of leachate taking place.

The dust collected in the air pollution control equipment in the cement plant is recycled back to the process. Hence no solid waste which requires disposal is generated from the plant.

Refractory bricks are one of the solid waste generated from the kiln section. Due to wear, PCIL will replace the refractory bricks once in a year. These bricks due to high recycling value are being disposed to outside agencies. No further solid waste is generated from the plant.

4.4.1 SOLID WASTE FROM COLONY AND SEWAGE TREATMENT PLANT

Solid waste generated from colony is disposed after segregating the waste into Bio- Degradable and Non Bio- Degradable. Bio- Degradable waste is being used as compost and Non- Bio- Degradable waste is land filled within the colony premises at identified areas.

Solid waste generated at STP is dried in the sand beds and is being used as compost for Green Belt development.

4.4.2 HAZARDOUS WASTE MANAGEMENT RULES

PCIL is storing Spent Oil from the gear boxes and automobile batteries and disposing to the authorized vendors as per the Hazardous Wastes (Management and Handling) Amendment Rules in a designated area which is isolated from the other utility areas.

Authorization for collection, treatment, storage, and disposal of hazardous wastes has been obtained for present operating units from APPCB.

PCIL has made provision for consuming high calorific liquid fuels. PCIL has consumed slag more than 1.12 lakhs tones in the year of 2016-17 and fly ash 1.235 Lakh tons. The sludge which is generated from STP is using as manure for plants. The dust collected from bag filters is recycling in process and it is continuous and inbuilt process system. Spent oil and waste grease

is fired in the kiln along with coal. Automotive batteries are keeping separately in designated area in stores and are disposed on buyback basis only.

Necessary provision for use of the high calorific value hazardous wastes in the Kiln of New Line will be made and application for grant of authorization will be submitted to APPCB, Hyderabad.

4.4.3 GREEN BELT DEVELOPMENT

PCIL has developed green belt in consultation with local Forest Department and planted as on 31.03.2017 36050 nos of saplings covering an area of about 67.15 Acres in plant premises, colony premises along the roads and other vacant areas. PCIL has incurred an amount of Rs. 33 lacks on green development in the year 2016-2017. About 9500 nos of different saplings were planted in the year 2016-17.

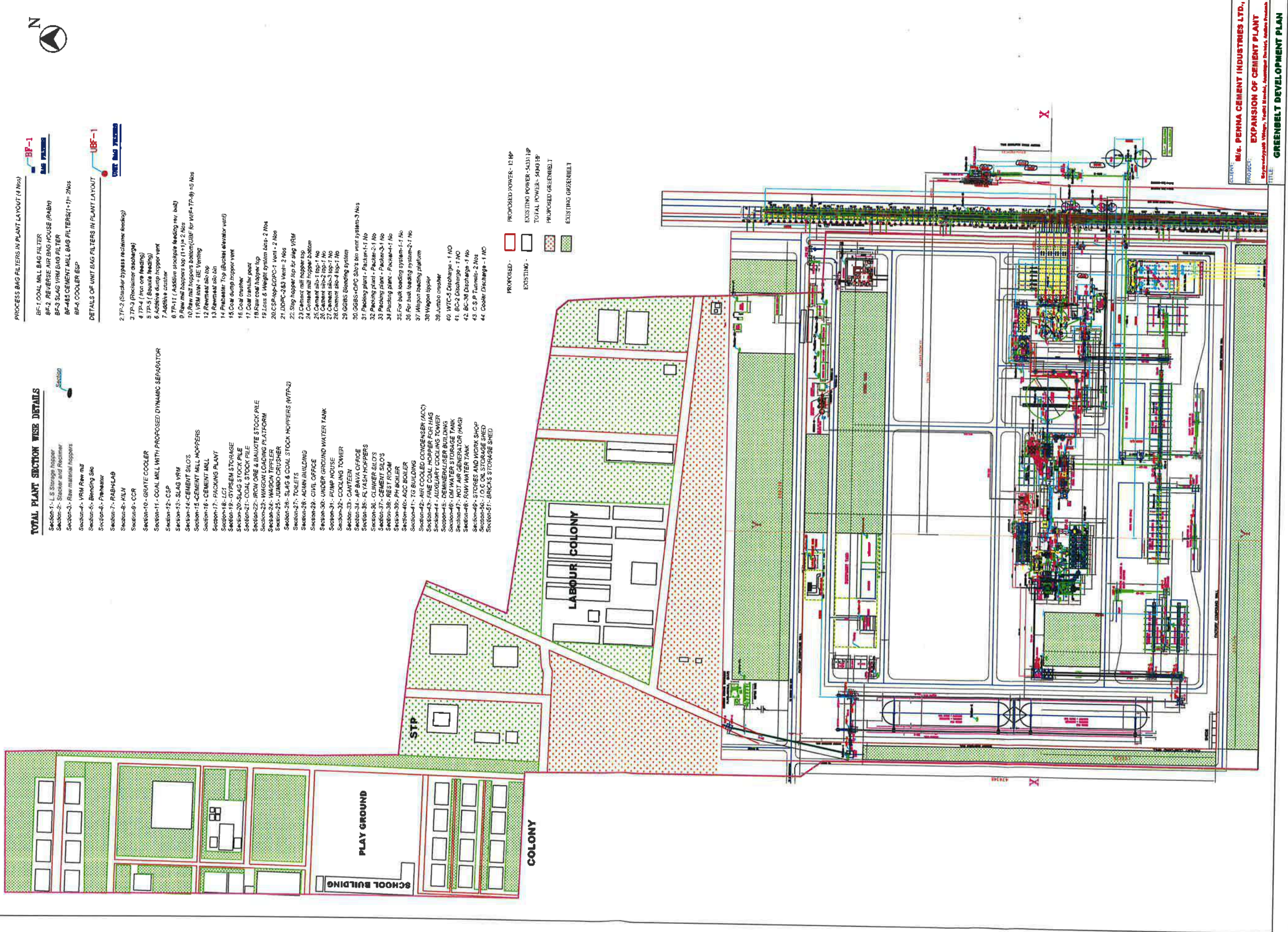
The cement plant is located in an area of 60 Ha. The required greenbelt as per norms is 33 % of the plant area. PCIL has already developed greenbelt in an area of 16 Ha and now proposes to develop the greenbelt in additional area of 4.0 Ha.

As per the point raised by EAC, additional green belt of 4 Ha in addition to the existing 16 Ha will be developed with native and broad leaved tree species

The list of broad leaved native species proposed for plantation is enclosed as **Annexure - 4D**.

Fig - 4.7 shows the revised greenbelt development plan. PCIL has takenup plantation outside the cement plant area in an area of about 11.17 Ha. The number of trees developed by PCIL within the plant area and outside the plant area since the year 2008 i.e commissioning of the plant are given below

FIG - 4.7



GREENBELT DEVELOPMENT - YEAR 2008-2017

Year	No.of Plants	Area (in Ha.)
2008-09	585	0.42
2009-10	1735	1.73
2010-11	3335	2.48
2011-12	4695	3.82
2012-13	6050	5.00
2013-14	4500	3.80
2014-15	3650	3.34
2015-16	2000	3.54
2016-17	9500	3.04

The list of the species planted along with number of saplings planted and survival rate are given below

LIST OF THE SPECIES PLANTED

Common Name	Scientific name	Saplings (Nos)	Survival Rate (%)
Peltophorum	<i>Peltophorum ferrugineum</i>	4695	100
Kanuga	<i>Pongamia Pinnata</i>	5125	100
Neem	<i>Azadirachta indica</i>	2150	100
Ganneru	<i>Nerium spp</i>	1650	100
Boganvillya	<i>Bougainvillea indica</i>	230	100
Dasani	<i>Hibiscus rosasinensis</i>	850	100
Kondavepa	<i>Melia dubia</i>	1050	98
Button wood	<i>Conocarpus lancifolius</i>	3950	100
Ravi	<i>Ficus religiosa</i>	200	100
Tapasvi	<i>Pongamia glabra</i>	4600	100
Flowering shrubs		1400	100
Ornamental plants		2000	100
Ornamental palms		135	98
Mango	<i>Mangifera indica</i>	5500	98
Coconut	<i>Cocos nucifera</i>	400	98
Sapota	<i>Acrus sapota</i>	500	98
Sarugudu	<i>Casuarina equisetifolis</i>	500	98
Cheemachinta	<i>Pithecellobium dulce</i>	15	100
Guava	<i>Psidium guajava</i>	400	98
Pomogranate	<i>Punica granatum</i>	50	100
Black jamun	<i>Syzygium cumini</i>	450	98
Devil Trees	<i>Alstonia scholaris</i>	200	98
Total		36050	99.18

PHOTOGRAPHS SHOWING THE GREENBELT DEVELOPMENT



PROPOSED GREENBELT DEVELOPMENT

PCIL will develop greenbelt in an additional area of 4.0 Ha in the next two years within the plant site. The greenbelt program for the next two years is given below

Year	Area (Ha)	Number of saplings	Estimated budget (Rs Lakhs)
2017-18	1.7	4250	2.5
2018-19	1.7	4250	2.5

PLANTATION BY PCIL OUTSIDE THE CEMENT PLANT

Drip irrigation employed by PCIL for raising plantation outside the cement plant area

NURSERY

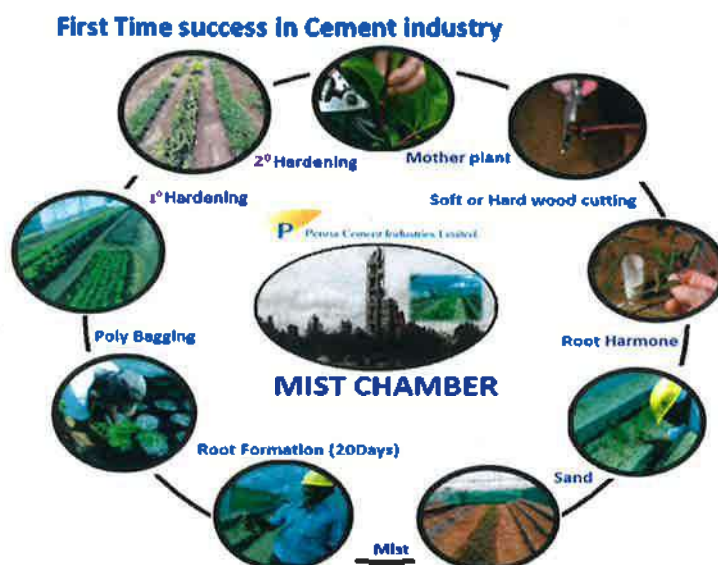
PCIL has developed nursery within the cement plant complex during the year 2016-17 to generate necessary seedling for plantation

PHOTOGRAPH OF NURSERY



PCIL has established mist chamber for propagation of seedlings

MIST CHAMBER



4.5 SOCIO ECONOMIC ENVIRONMENT

REHABILITATION AND RESETTLEMENT

No additional area is required for the expansion, hence the point of Rehabilitation and Resettlement does not arise. Thus no adverse impact is anticipated.

Socio Economic Status in the study area is found to be moderate with respect to livelihood, amenities etc., Transport and other infrastructural facilities such as market centers, business establishment, recreation etc., in the area were improved.

Employment potential both direct and indirect coupled with business opportunities and strong social commitment of the company in the form of better educational and medical facilities would result in enhancement in the status and standard of living of the local populace resulting in positive impact.

4.6 OCCUPATIONAL SAFETY & HEALTH MANAGEMENT

PCIL has qualified and experienced safety officer who is carrying out the safety patrols in the factory to observe unsafe practices and unsafe observations. Apart from this PCIL has a central safety committee which includes HODs of the department to workers level. The meeting is being conducted regularly and action plan of the meeting will be prepared and implemented.

PCIL has also established a training department to give the need based training to the staff and workers on safety. Training programs are conducted regularly as per training calendar based on training needs assessed by the concerned departments.

PCIL has prepared the trainer faculty list for imparting the training as and when required. Regular sponsorship of the employees for the external trainings/seminars/meetings is part of PCIL's activity. The safety slogans/cartoons are displayed at strategic places in the factory premises.

OCCUPATIONAL HEALTH SURVEY

There are no endemic health problems in the area due to waste water/air/soil borne diseases however stray cases of water borne diseases such as gastroenteritis and fever have been observed. PCIL has an established dispensary. The medicines are being provided free of cost to the patients.

Following health checkups are being carried out for the employees periodically apart from pre-examination at the time of joining:

- Periodic medical examination
- Lung function test
- Audiometry
- Chest X-ray
- Eye test

The first aid box is made available at every section of the department for immediate treatment. First aid training is imparted to the selected employees of all departments regularly. The list of first aid members is being displayed at strategic places.

4.6.1 OCCUPATIONAL HEALTH & SAFETY OF ALL CONTRACT AND SUB-CONTRACT WORKERS.

All workers are being evaluated for health status. The parameters which are monitored as per Occupational Health Checkup are Blood, Urine, Sputum, Stool, ECG, X-Ray (Tuberculosis & Silicosis), Eye Test, Audiometry and Lung Function Test (PFT) etc.

The health data of workers evaluated is enclosed as **Annexure-4E**.

PCIL is carrying out the Occupational Health survey for the all the workers including the contract and sub-contract workers. The fund allocation is part of the occupational health budget which is about 40 Lakhs per year.

The recommended threshold limit value (TLV) adopted by the American Conference of Governmental Industrial Hygienists (ACGIH) for nuisance respirable particulates is 10 mg/m³ and/or less than 1% silica and for silica TLV is 0.025 mg/m³ (ACGIH, 2007).

Personal Sampling Analysis was carried out for workman area using personal sampler to know the exposure of workman to dust levels. The results of air borne dust survey are given below

RESULTS OF AIRBORNE DUST SURVEY (By using Gravimetric Dust Sampler type 113 A, Casella, London)

S.No.	Locations	Dust Concentration [mg/m ³]	Threshold limit [mg/m ³]
1	Packing Plant	1.263	10.00
2	Raw Mill Hopper	1.339	10.00
3	Coal Mill Hopper	1.157	10.00
4	Crusher	1.291	10.00

Free silica in the work zone is carried out on regular basis. Audiometric tests are also being carried out to study the exposure and effect of personnel working in noise prone areas. All the exposure limits are well within the Permissible Exposure Levels (PEL).

The measures proposed to be adopted in case these are not within PEL are:

- a. Work breaks for the workman
- b. Shifting of workman to other work areas after imparting proper training

CHAPTER - 5

ANALYSIS OF ALTERNATIVES (TECHNOLOGY & SITE)



CHAPTER - 5 : ANALYSIS OF ALTERNATIVES (TECHNOLOGY & SITE)

5.1 ANALYSIS OF ALTERNATIVE TECHNOLOGY

The cement plant is already in operation and the proposed expansion is increase of clinker production by upgradation and modernization of existing Line & installation of new line with enhancement of waste heat recovery from 10 MW to 20 MW. No change in technology is proposed. No additional land is required.

5.2 ALTERNATE SITES

Cement plant already exists. New Unit i.e., new production line will be located within the existing cement plant complex for utilization of common infrastructure. Hence no alternative sites were studied.

CHAPTER - 6

ENVIRONMENTAL MONITORING PROGRAM



CHAPTER – 6 : ENVIRONMENTAL MONITORING PROGRAM

6.1 ENVIRONMENTAL MONITORING

Monitoring of various environmental parameters was carried out on a regular basis to ascertain the following:

- State of pollution within the plant and in its vicinity
- Generate data for predictive or corrective purpose in respect of pollution
- Examine the efficiency of Pollution Control Systems installed in the complex
- To assess and monitor environmental impacts

The following monitoring programme is implemented to monitor various environmental components.

A. METEOROLOGY

An automatic weather monitoring station is located within the plant premises for recording the meteorological parameters.

B. CONTINUOUS EMISSION MONITORING INSTRUMENTS

PCIL have installed 5 nos. Continuous stack monitoring facilities to the stacks attached to the raw mill/Kiln bag house, cooler ESP, coal mill bag house, cement mill bag house for monitoring of PM in stack emission commissioned real time data acquisition system for connectivity to PCB server under Existing Unit.

Report Type : Multi Station


Date	Time	Penna_Cements_Boyareddypalli_Stack01_Rabh	Penna_Cements_Boyareddypalli_Stack01_Rabh	Penna_Cements_Boyareddypalli_Stack01_Rabh	Penna_Cements_Boyareddypalli_Stack02_Cooler	Penna_Cements_Boyareddypalli_Stack03_Coal Mill	Penna_Cements_Boyareddypalli_Stack04_CementMill	Penna_Cements_Boyareddypalli_Stack05_Slag VRM
		PM	SO _x	NO _x	PM	PM	PM	PM
		mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3
21/04/2017	1:00	9.2	51.5	541	20.6	11	7.3	1
21/04/2017	2:00	9.3	51.4	539	19.9	11.4	5.7	1.5
21/04/2017	3:00	9.1	51.3	554.5	23.5	10.8	9.1	1.9
21/04/2017	4:00	8.8	51.2	536	23.8	9.8	11	2.3
21/04/2017	5:00	9.7	51.2	523.7	24.9	9.2	9.9	2
21/04/2017	6:00	9.2	51.7	533.4	22.7	3.9	7.8	2.6
21/04/2017	7:00	9.3	52.2	537.8	21.6	11.5	6.2	1.9
21/04/2017	8:00	9.8	51.9	482.1	22.4	10	4.2	1.4
21/04/2017	9:00	10.4	51.3	478.9	21.3	10	4.3	1.3
21/04/2017	10:00	10.7	51.2	481.8	21.5	10.3	7.2	1.3
21/04/2017	11:00	9.6	50.9	423.5	18.6	11	8.7	1.3
21/04/2017	12:00	10.9	51	429	14.8	10.5	8.7	1.3
21/04/2017	13:00	10.1	51	513.3	16.3	9.9	8.5	1.3
21/04/2017	14:00	9.4	50.9	539.7	16.2	4.1	7.5	1.1
21/04/2017	15:00	8.3	50.6	536.4	16.2	1.2	1.3	1.2
21/04/2017	16:00	9.6	50.7	529.7	16.3	13.5	1.3	1.2
21/04/2017	17:00	9.4	50.9	542.1	15.5	9.3	1.3	1
21/04/2017	18:00	9.1	50.7	537.3	16.7	9	1.2	1.1
21/04/2017	19:00	9.1	50.5	528.6	17	9.8	1	1.2
21/04/2017	20:00	9.3	50.3	513.3	17.3	7.5	1	1.4
21/04/2017	21:00	10.5	50.5	504.6	17	11.4	1	1.9
21/04/2017	22:00	10.2	50.4	495.1	17	6.4	1	2.1
21/04/2017	23:00	9.3	48.6	460.9	20.4	10.3	1	2.1
21/04/2017	24:00	9.3	73.4	211.1	18.5	3.3	1.6	2.3
Minimum		8.3	48.6	211.1	14.8	1.2	1	1
MinTime		15:00	23:00		12:00	15:00	19:00	1:00
Maximum		10.9	73.4	554.5	24.9	13.5	11	2.6
MaxTime		12:00		3:00	5:00	16:00	4:00	6:00
Avg		9.5	51.8	498.8	19.1	8.9	4.9	1.5
Num		24	24	24	24	24	24	24
Data[%]		100	100	100	100	100	100	100
STD		0.6	4.5	69.4	2.9	2.9	3.4	0.4

PCIL will install continuous stack monitoring for raw mill/Kiln bag house, cooler ESP, cement mill to monitor the outlet emissions of New Unit.

In addition to the above, PCIL is carrying out the stack monitoring through third party periodically.

C. AMBIENT AIR QUALITY MONITORING

Two Continuous Ambient Air Quality Monitoring System (CAAQMS) are installed and connected to APPCB and CPCB server.

Down Wind Direction AP Transco. (Station - 1)	Up Wind Direction Colony Gate (Station - 2)
	

CAAQMS data is given below:

Report Type : MultiStation

Date	Time	Penna_Cement_s_Boyar eddypal i_CAAQ MS01_N earAptransco	Penna_C ements_Bo yared dypali_C AAQMS0 1_NearA ptransco	Penna_Ce ments_Bo yared dypali_CAAQM S01_Near Aptransco	Penna_Cem ents_Boyar eddypali_C AAQMS01_ NearAptransco	Penna_Ce ments_Bo yared dypali_CAAQM S02_Colo nyGate	Penna_Cement s_Boyar eddypal i_CAAQ MS02_C olonyGate
		PM ₁₀	PM _{2.5}	SO ₂	NO _x	PM ₁₀	PM _{2.5}
		µg/m ³	µg/m ³	µg/m ³	µg/m ³	µg/m ³	µg/m ³
01/05/2017	1:00	34	25.5	2.6	5.1	115.8	49.4
01/05/2017	2:00	78.9	37.8	2.4	4.9		
01/05/2017	3:00	83	42.6	2.8	5.1	80	52
01/05/2017	4:00	81.1	36.7	2.3	6.3	80.9	43.7
01/05/2017	5:00	81	36.9	2.5	5.4	63.6	40.2
01/05/2017	6:00	85.5	21.7	2.2	5	104.5	27.1
01/05/2017	7:00	86	7.4	2.3	6.1	27.7	21.4
01/05/2017	8:00	58.5	8.7	2.2	5.7	29.8	15.5
01/05/2017	9:00	56	8.1	2.4	5.7	3.9	18.6
01/05/2017	10:00	36.7	7.1	2.4	5.4	29.1	21.7
01/05/2017	11:00	35	8.8	2.7	5.5	40.6	13.7
01/05/2017	12:00	24	10.8	2.3	5.5	13.9	11.1
01/05/2017	13:00	23	8.3	2.8	6.4	37.1	15.5
01/05/2017	14:00	3.7	5.3	2.8	8	43.8	20.5
01/05/2017	15:00	2	5.9	2.7	8.8	44	18.2
01/05/2017	16:00	23	7.8	2.8	7.6	46.9	16.1
01/05/2017	17:00	25	7.1	3.1	7.3	43.1	17.8
01/05/2017	18:00	34.1	7.9	2.8	5.6	39.1	11.5
01/05/2017	19:00	35	9.8	2.7	5.5	42.8	22
01/05/2017	20:00	63.4	9.1	2.4	5.4	33.3	20.2
01/05/2017	21:00	66	8.1	2.4	5.7	36.8	17.2
01/05/2017	22:00	40.3	7.1	2.4	5.5	48.6	13.3
01/05/2017	23:00	38	22.3	2.7	5.5	105	35.9
01/05/2017	24:00	95.7	24.9	2.4	5.3	80.9	29.7
Minimum		2	5.3	2.2	4.9	3.9	11.1
MinTime		15:00	14:00	6:00	2:00	9:00	12:00
Maximum		95.7	42.6	3.1	8.8	115.8	52
MaxTime			3:00	17:00	15:00	1:00	3:00
Avg		49.5	15.6	2.5	5.9	51.7	24
Num		24	24	24	24	23	23
Data[%]		100	100	100	100	95	95
STD		27	11.8	0.2	0.9	28.7	11.8

In addition to the above, PCIL is monitoring ambient air quality at the following four stations for AAQ parameters viz., PM_{2.5}, PM₁₀, SO₂ and NO_x as per the guidelines. The same will be continued.

- Near Plant Gate
- Colony Area
- Old Canteen-South west of the plant
- AP TRANSCO point-South side of the plant

Regular monitoring is also being carried out through an outside approved agency.

Ambient air Quality is being monitored from fixed monitoring stations by an approved third party on monthly basis for the parameters PM₁₀, PM_{2.5}, SO₂, NO_x, for 24 hours basis and the levels are well within the prescribed limits.

NOISE LEVEL MONITORING

Noise levels are monitored regularly at the following four locations and the same will be continued after expansion

- East Side of the Plant Site
- West Side of the Plant Site
- North Side of the Plant Site
- South Side of the Plant Site

D. GROUND WATER MONITORING

Ground water monitoring in and around the plant is being done once in a Season.

6.2 BUDGET FOR IMPLEMENTATION OF ENVIRONMENTAL MANAGEMENT PLAN

PCIL has budgeted an amount of Rs. 120 crores for implementation of environmental management plan for expansion.

**BUDGET FOR IMPLEMENTATION OF ENVIRONMENTAL
MANAGEMENT PLAN (IN CRORES)**

		Capital Cost	Recurring Cost
Air environment	Raw Mill / Kiln bag house	44.00	04.00
	Cooler ESP, Coal Mill and Cement Mill bag houses	49.00	
	Transfer point Bag Filters	20.00	
	Continuous Monitoring Equipment	02.00	
Greenbelt development	Plant and Colony	01.00	0.50
Rainwater Harvesting		04.00	---
Total		120.00	4.5

CHAPTER - 7

ADDITIONAL STUDIES



CHAPTER – 7: ADDITIONAL STUDIES

7.1 PUBLIC CONSULTATION

Public Hearing for the project was conducted on 02.08.2017 by Andhra Pradesh State Pollution Control Board. The details of Public Hearing Minutes are enclosed as **Annexure – 7A**.

7.2 DISASTER MANAGEMENT AND EMERGENCY PREPAREDNESS PLAN

The principal objective of the study was to work out On Site emergency plan for the unit at Boyareddypalli based on Hazards. The study covered:

- Identification of major Hazards.
- Existing safety measures, procedures and systems for controlling the hazards.
- Facilities available vs facilities needed for On Site emergency Plan.
- Recommending measures for improvement.
- Rendering training to key personnel for carrying out Mock Drill.
- Ensure effective utilization of the resources available in the short time possible to tackle emergency most efficiently.
- Review of the mock drill.

7.2.1 IDENTIFICATION OF MAJOR HAZARDS

Precisely the hazards are:

TOXIC HAZARDS

- Toxic hazards are possible in
- Acetylene storage area in stores(More a fire hazard)
- Oxygen storage area in stores(More a fire hazard being a supporter of fire)
- Nitrogen storage area in stores(Simple Asphyxiant)



FIRE HAZARDS

Possible fire Hazard locations are given below.

Scrap (Or) Gunney bags storage area in store

- Empty Cement bag storage area in packaging plant
- Coal storage yard and handling area
- Coal mill plant
- HSD storage area and day tank areas
- Kiln area
- Oxygen /Acetylene cylinder storage in stores department
- Lube Oil godown
- Oil in Transformers
- Transformer oil storage area
- LPG in canteens

EXPLOSION HAZARDS

Possible explosion hazards are identified in

- Coal mill bag filter areas
- Coal transporting area
- Electrostatic precipitator (ESP)
- Acetylene storage area in stores department
- Oxygen storage area in stores department
- Pressure vessels/piping(Air receivers)
- LPG in canteens
- Kiln
- Ammonium Nitrate storage area (mines area)

Explosive materials are not used in the process except in quarrying. Here explosion means, bursting of vessels under pressure due to various reasons.

Hazard identification and Risk Assessment (HIRA) along with proposed mitigation measures specific to the plant is given in the table below:

HAZARD IDENTIFICATION AND RISK ASSESSMENT (HIRA)
BOYIREDDIPALLI CEMENT PLANT, PCIL

S. No.	Area	Section	Hazard Description	Frequency/ Likelihood	Consequence	Risk Class	Vulnerable Exposure No Of Persons	Preventive Measures
1	Crusher	Lime stone Crusher	Choking of crusher with boulders	5	3	High	1	<ul style="list-style-type: none"> Permit to work system between mines and crusher. Red light indication to stop feeding of stone from mines. Chain railing is provided to restrict the dumping of material in hopper.
		Conveyor Belts	Entrapment in belt conveyor	5	2	Moderate	2	All conveyors belt are provided with trip wire system.
2	Raw material Handling	Stacker & Reclaimer (Lime Stone, Additives & Raw Coal)	Stacker & Reclaimer can overrun, which overturn the equipment	1	1	Low	2	Red light indication to stop feeding of stone
2	Raw Mill	Belt Conveyors	Entrapment in belt conveyor	2	2	Low	4	The area will be restricted Safety guards will be provided
		Vertical Roll Mill	Personnel can come in contact with Rotating parts	2	4	Moderate	1	
		Air Separator		2	4	Moderate	1	24 Volts D.C. hand lamps are used while working inside the separator. Appropriate work permits system taken prior to start



S. No.	Area	Section	Hazard Description	Frequency/ Likelihood	Consequence	Risk Class	Vulnerable Exposure No Of Persons	Preventive Measures
		Compressor house	Person can come in contact with drives	2	4	moderate	1	the work. Guards to be in place all the time.
		Silo Top	Person falling from top	2	5	moderate	3	Railing to be provided and Safety belts to be tied to the same.
3	Coal Handling	Coal Mill	Fire and explosion in the coal mill and Bag House. Bag house is used as pollution Control equipment and connected in hot gases path. The inlet temperature of bag house is not allowed to go beyond the safe limit otherwise fire or explosion may take place.	2	3	low	1	Red light indication to stop feeding of coal
		Coal Storage	Fire in coal storage	2	4	Moderate	2	Regular inspection, water spray, isolation from ignition sources
4	Kiln		Possibility of fire Burner Platform. Radiation in the vicinity	2 2	2 3	low Low	2 2	Continuous exposure to be avoided
5	Clinker cooler	Clinker cooler	Spill of hot clinker	2	4	Moderate	2	Wearing Safety shoes all the time
		Clinker Pan conveyors	Entrapment in pan conveyor – overflow of hot clinker	2	3	Low	2	Thermal protection aprons to wear



S. No.	Area	Section	Hazard Description	Frequency/ Likelihood	Consequence	Risk Class	Vulnerable Exposure No Of Persons	Preventive Measures
6	Cement Mill		Personnel can come in contact with Rotating parts	2	4	Moderate	2	Training, proper supervision, PPE's
7	Wagon loader		Trip of bag slider	2	4	Moderate	2	
8	Waste Heat Recovery Based Power Plant		Explosion in boiler due to over pressure and temperature	2	5	Moderate	2	Continuous monitoring, safety valves proper maintenance
			Exposure to the hot surface of pipeline or machineries	2	4	Moderate	1	Regular inspection, maintenance
9	Generator & Turbine hazard		Explosion in turbine due to cooling system failure	2	4	Moderate	2	Regular inspection, maintenance
			Damage on generator due to lack of lubrication in coupling shaft	2	4	Moderate	2	Continuous monitoring
	Switch yard		Fire on transformer	2	4	Moderate	2	Regular inspection, maintenance
			Electric shock and electric burn routine work, maintenance or inspection of electrical panels in switch yard	2	5	Moderate	2	Training, PPE's should provided
10	Mines		Explosion hazard in explosive storage room. Outbreak of fire in oil storage room. Any accident due to explosives.	2	5	Moderate	2	Fire extinguisher, eliminate the possible ignition source



RATING CRITERIA CONSIDERED FOR HIRA

Frequency/likely hood

Frequency	Score	Definition
High	5	Failure that occur on monthly basis
Probable	4	Failure that occur on yearly basis
Occasional	3	Facility had previous experience of similar failure
Remote	2	Possible to occur and had occurred in similar facility elsewhere
Likely	1	Have not known to occur in the similar facility elsewhere

Consequence

Frequency	Score	Definition
Catastrophic	5	Failure results in occurrence that cause fatality
Major	4	Failure results in occurrence that cause injury
Moderate	3	Failure results in occurrence that cause damage to property
Minor	2	Failure results in occurrence that cause minor damage to property
Negligible	1	Failure results in occurrence cause damage to nearby property

HIRA equation: Risk = Frequency * Consequence

Frequency	Consequence/Severity				
	1	2	3	4	5
	5	10	15	20	25
	4	8	12	16	20
	3	6	9	12	15
	2	4	6	8	10
	1	2	3	4	5

	High
	Moderate
	Low

Type of Hazard	Area	Mitigation
<p>Dust</p> <ul style="list-style-type: none"> ➤ Respiratory Infection ➤ Bronchial Diseases ➤ Gastrointestinal Diseases ➤ Skin Allergy ➤ Pulmonary Disorder 	<ul style="list-style-type: none"> ➤ Material Yard ➤ Crushers ➤ Stacker - Reclaimer ➤ Storage Silos ➤ Grinding Mills ➤ Packing Plant 	<ul style="list-style-type: none"> ➤ Continuous Water Spraying ➤ Sealed Silos ➤ Storing in Covered Areas & Bins ➤ Adequately Designed Bag Filters & Pollution Control Equipment ➤ Periodic Medical Check-ups ➤ Adequate Medical Facilities ➤ Continuous Medical Surveillance
<p>Noise</p> <ul style="list-style-type: none"> ➤ Nausea ➤ Head Aches ➤ Loss of Hearing 	<ul style="list-style-type: none"> ➤ Mines ➤ Crushers ➤ Grinding Mills ➤ Packing Plant 	<ul style="list-style-type: none"> ➤ Provision of Insulation ➤ Use of Damping Material ➤ Shock Absorption Techniques will be adapted ➤ Ear Muffs will be provided ➤ Greenbelt Corridor will be developed along the periphery of the Plant

COMMON ACCIDENTS

- Slip, Trip and fall on the same level
- Fall from the height
- Unguarded Machinery
- Falling Objects
- Work in confined space
- Moving Machinery, on-site Transport, Fork lifts & Cranes
- Inhalable agents (Dust)
- Electric burns & electric shocks

PREVENTIVE MEASURES

- Suitable guarding of machineries

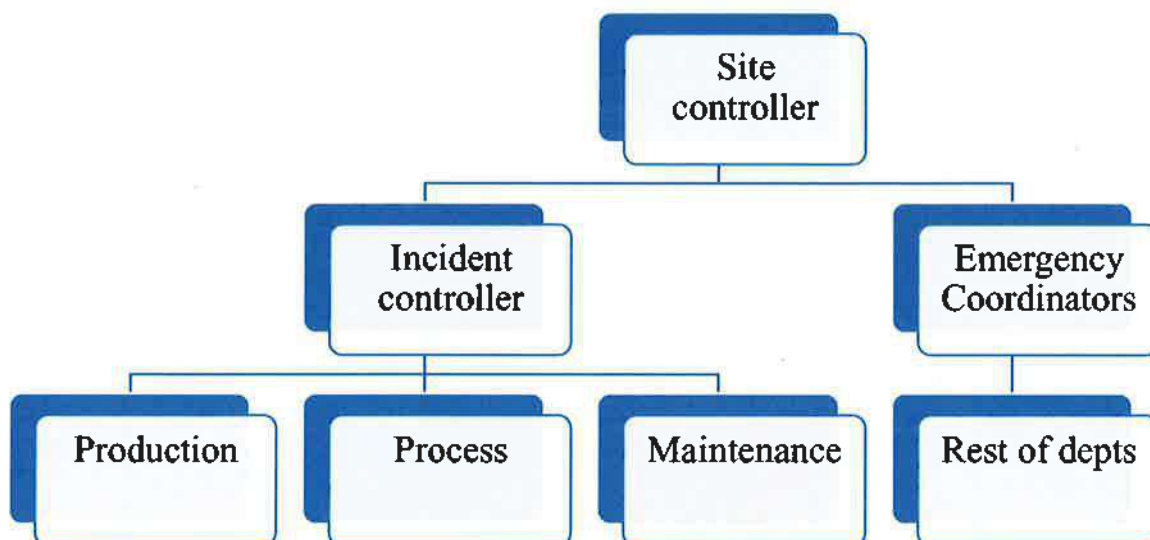
- Providing safety interlocking arrangements
- Examination & testing of all the lifting machines & tackles
- Maintaining good housekeeping & dust free environment
- Preventive Maintenance of all the equipment
- Fencing of all the working platforms, pits & sumps
- Providing safe working platforms, safety belts & other PPEs
- Providing ELCBs using approved & use correct cables
- All workers will be provided with necessary PPEs like Helmet
- Goggles, Respirators, ear muffs, Safety Shoes etc.
- Safety Committee headed by Plant Head with equal representations
- by Workers and Management Staff and has to meet regularly and to
- organise Safety & Occupational Health related Programs regularly

7.2.2 EMERGENCY FACILITIES

7.2.2.1 EMERGENCY ORGANIZATION

Considering each of the emergency, an action plan is developed assigning various duties to key personnel under OSEP. The plan provides for establishing an Emergency Control Centre (ECC), Alternate Emergency Control Centre (AECC), Shift Emergency Control Centre (SECC) with necessary equipments, facilities etc. Training of the personnel and rehabilitation is also included in the plan. Emergency facilities like emergency alarm/siren, public address system etc is considered. Emergency Organization chart is given below.

Emergency Organisation Chart



Site Controller CGM and in his absence I/C Unit Head		
Incident Controller (Departmental Head, where emergency arose)	Emergency Coordinators(EC)	Essential Personnel
	EC (Mechanical)	Firstaiders
	EC (Electrical)	Fireguards (Security)
	EC (Instrumentation)	Fire Squad
	EC (Civil)	Shift In charges
	EC (Materials)	Shift Operators
	EC (Fire & Security)	Contract Supervisors
	EC (Medical)	Shift Electricians
	EC(Administration)	Shift Technicians
	EC (Personnel)	
	EC (Finance)	
	EC (Safety)	

Key persons have been identified and designated as given below. Their responsibilities in the event of an Emergency are listed below

SITE CONTROLLER

CGM (Works) and in his absence site in charge will be the Site Controller.

INCIDENT CONTROLLER

The Head of the department and in his absence In charge of the Plant, where an emergency is likely to develop, is designated as Incident Controller for that area.

EMERGENCY COORDINATORS

All the Heads of Departments, other than Incident Controller who can render emergency help in carrying out the emergency operations, in various fields, like transportation, medical, rescue, rehabilitation, Mechanical maintenance, electrical maintenance, instrument maintenance etc. are designated as Emergency Coordinators.

ESSENTIAL PERSONNEL (CATEGORY C)

The following are Essential personnel.

- First aiders
- Fire squad members
- Security guards
- Pump house technician (Fire pump house)
- Shift technicians
- Shift fitters
- Shift Electricians
- All Shift Managers
- All Managers
- All Contractors
- All contractor supervisors

OTHER THAN ESSENTIAL AND NON ESSENTIAL PERSONNEL (CATEGORY B)

Those of the employees who do not fall category A and C. They are required to do minor jobs of one minutes duration before they leave to Assembly point once evacuation is advised



Non - Essential Personnel (Category A):

These are the group of personnel like

- visitors like representatives,
- contract workmen
- Trainees, apprentices etc
- Personnel specifically assigned to move to assembly point on siren

7.2.2.2 EMERGENCY CONTROL CENTER(ECC)/ALTERNATE ECC/SHIFT ECC

A room annexed to CGM's chamber, located in CCR, is designated as Emergency Control Centre. The Security room near main gate is designated as Shift Emergency Control Centre (SECC), which is manned round the clock. CGM's chamber in admin block is designated as Alternate Emergency Control Centre (AECC). The first information report is received in SECC, which is passed on to various Emergency Co-ordinators who will assemble in ECC. Until such time Security room will be ECC. The considerations included in identifying these rooms as ECC/SECC/AECC are

- Away from any of the hazardous zones
- Easy communication facility available
- Availability of persons to receive emergency calls round the clock.
- Being in the first floor, over all visibility of nearby areas, as well as of
- Inmates' protection from contamination.
- Shift Emergency Control Centre is manned 24 hours by Assistant
- Security Officer and Security guard.

7.2.2.3 FACILITIES AT ECC:

- Inter com. Telephone
- Internal telephone directory



- Walkie-Talkie
- Canister masks suitable for CO
- Fire suit/gas tight goggles/gloves/helmets
- 6. Hand tools, wind direction/velocity indication
- Megaphone, hand-bell
- Factory layout plan, site plan.
- Emergency lamp/torch light/batteries
- Plan indicating locations of hazard inventories, plant control room,
- Ambulance and assembly points, rescue location, ECC/AECC/SECC,
- Vulnerable zones, escape routes.
- Hazard chart
- Emergency shut-down procedure for each plant
- Nominal roll of employees
- List of key personnel with pre assigned duties in emergency
- Addresses with telephone numbers
- Important addresses and telephone numbers including Govt. agencies, neighboring industries and sources of help, outside experts
- MSDSs
- Population details around the factory.

7.3 ASSEMBLY POINTS

The following are identified as Assembly points.

- Near Time office
- Near Laboratory
- Near LC 1(Load Centre)

7.4 WIND SOCK

Windsock, to indicate the wind direction, is erected above CCR building.

7.5 RESCUE AND REHABILITATION

Canteen is rehabilitation centre. Water, Snacks, Seating facility is available here. It is outside but very near to Security gate and administrative office.

7.6 TRANSPORT FACILITY

Transportation facility during an On Site Emergency is used for

- Transporting key personnel/essential workers/experts
- Transporting essential material/equipment for emergency
- Control/relief.
- Shifting injured/affected persons/persons awaiting rescue
- For any other specified job.

For this purpose two emergency vehicle (Sumo) and one ambulance are available. Senior officials' cars also could be pressed into service. Mutual assistance and governmental assistance would be so used for. Contractor's tractors incoming and outgoing vehicles transporting raw materials, coal, cement trucks etc. can also be pressed into service in utmost emergency.

7.7 FIRST AID/MEDICAL FACILITIES

A qualified Physician and a male nurse are posted in Occupational Health Centre. The male nurse has adequate experience and work in shifts, while the doctor works in general shift. They reside in the colony annexed to the factory and thus are accessible round the clock. Apart from it 10 persons are trained in First Aid by St Johns' Ambulance Association and organisation has plans to organize refresher programs periodically. Personnel are trained by St Johns' Ambulance Association and designated as First aiders

First aid boxes are provided in the following locations in the factory and are maintained well.

- Time Office
- CCR Building



- Stores
- Workshop
- LC - 1
- Laboratory
- Packing Plant
- Shift Engineer room(Kiln Room)
- Mines Office
- Cement Mill
- Raw Mill

Occupational Health Centre is equipped and the list of equipment specifically available in OHC are given below

Facilities in OHC and Details of ambulance

Infrared Lamp,	
Anti Snake Venom	
Rabbais Vaccine	
Oxygen unit	: 2 Nos
IV Fluids	
Nebuliser	
Name of doctor	: Dr .H.K.Anantha Padmanabha Rao
Name of Medical Assistant	: D.Ahmad Basha
Name of sweeper	: Chennamma
Working hours	Morning: 9.00 AM TO 1.00 PM
	Evening :4.00 PM TO 8.00 PM
Emergency cases	: 24 hours
Ambulance No	: AP 09 Y 7861
Name of Ambulance Driver	: M.RAJA
License No.	: DLRAP004528111

Ambulance van with driver is available round the clock. Details of medical facilities available at Boyareddypalli/Tadipatri/Anantapur/Hyderabad town are separately given below

Medical Facilities at Tadipatri/Anantapur/Hyderabad

Tadipatri: Govt.Hospital Medical Officer Sri Pullaiah : 9949828445
Kanchani Hospital : 9440566269
Anantapur: District Medical & Health Officer :08554-277058,9849902397
KK.Nursing home, Kamala Nagar:08554-222133
DR.K.Kondaiah:9440288288
Aasha Hospital:08554-274194
Dr.Jagan Mohan Reddy Ms(Ortho) : 9440288788

7.8 FIREFIGHTING FACILITY

To meet firefighting requirements fire squad is proposed and the organisation have plans to train them systematically in fire chemistry, using portable fire extinguishers, fire hose reels, fire hydrants and water spray system etc.

Fire hydrant line provided for the following areas.

- Coal tunnels
- Coal yard
- HDPE bag Gowdown
- Packing plant
- Stores
- Coal conveying belt conveyors
- Coal mill
- Explosive vents for coal bins and coal mill bag filters
- Wagon tippler conveyors and Yard
- Scrap yard



P.C.I.L. Boyareddypalli

7.9 SECURITY SYSTEMS

A full-pledged Security System is available in Factory. Head of Security is assisted by a group of ASOs covering all the three shifts. Apart from this Security Supervisors and guards are supplied by Radiant Security Agencies to keep surveillance round the clock. All the incoming employees/managers/contract workers apart from the visitors are monitored and tracked from the time of entry until the time of exit. Similarly all incoming and outgoing materials are tracked and strict vigilance is maintained round the clock on all the incoming and outgoing vehicles, transporters, drivers, cleaners etc.

7.10 MANPOWER

Operating personnel, Shift in charges and essential workers under the charge of Incident Controller and under over all charge of Site Controller form the core group to take care of an On Site Emergency and to perform various operations detailed. Operating personnel and shift in charges of respective areas have detailed understanding of process operations, abnormalities, rectification procedures, emergency shut down and start up procedures. They have an understanding of situation that can lead to an On Site Emergency and measures to be taken to limit the consequences and in affording rescue and relief. The incident controllers are experts in process with long operation and administrative experience. Essential workers identified also have long experience and are accustomed to severe working conditions.

7.11 COMMUNICATION FACILITIES

Entire factory is connected by internal telephones. In addition all Senior Managers and some of the managers are also provided with group cellular phones based on need. Most of the Managers have residential internal/ mobiles apart from personal phones. Electronic Mailing System using Lotus Notes is provided to all HODs and important Centers, which facilitate easy communication between them as well as to and from corporate / divisional headquarters. One No. portable mega phone is available

for communication, which is placed in shift security office. To notify Emergency with a specified pattern, emergency siren is being installed with wobbler arrangement. In order to have effective communication, all calls to ECC are to be made on 631. All calls going out of ECC are to be made on a separate unlisted number. Unless it is very essential, telephones will not be used during an emergency. This is being envisaged to avoid blocking of important telephones during emergency. For the same reason uni-flow is also envisaged. Communication by runners will be used where necessary or if the telephones are out of order. Since the colony is very close by, communications reach very quickly through the siren itself. Telephone Nos of various government officials, fire tenders, police, HoDs are displayed at Factory

7.12 PERSONAL PROTECTIVE EQUIPMENT

Personnel Protective Equipment for regular usage is issued as an ongoing process as per the rules of the company. However, for emergency situations, suitable and special protective equipment are identified and provided. All the protective wear conforms to Indian Standards. The responsibility of ensuring availability of the above said protective wear is that of the concerned departmental heads.

7.12.1 EMERGENCY SIREN

Pattern of Emergency siren proposed is waxing and waning sound i.e., _____ 2 Minutes. This is different from regular siren. Further, no other such communication by siren is prevalent in nearby area.

7.12.2 ALL CLEAR SIREN

When normalcy is restored, all clear siren can be given. The pattern is continuous siren.

_____ 2 Minutes

7.13 MAKING KNOWN TO ALL CONCERNED IN THE FACTORY ABOUT EMERGENCY

On receiving instructions from Site Controller emergency siren is operated or megaphone is used to make the emergency known to all. If necessary, such person would be provided with suitable personnel protective equipment. The mega phone is placed in Shift Security Office. The pattern of emergency and all clear siren is proposed to be familiarized among all.

7.13.1 DECLARATION OF ON SITE EMERGENCY

On the advice of the concerned head of department about the development of a situation and its seriousness, Site Controller would declare emergency.

7.14 DECLARATION OF RESTORATION OF NORMALCY

After satisfying that normalcy is restored, the Site Controller, in consultation with Incident Controller and Emergency Coordinators, would order for an all clear siren to indicate normalcy is restored.

SOURCES OF EXTERNAL HELP

While the infrastructure available in the plant/factory is adequate to meet an OSE, it may sometimes be necessary, to seek assistance from outside agencies. Apart from the Civil Administration, nearby industries are the potential sources of help with infrastructure and technical manpower. Accordingly, a survey of such industries, who could come to the rescue in the need of hour, is made. The managements of nearby industries have been approached and their help is sought in respect of

- Technical Manpower
- Medical Aid like medical crew, ambulance
- Transport for Rescue & Rehabilitation
- Shelter for Rehabilitation

- Fire Fighting crew, Fire tender, Portable fire extinguishers etc
- Additional/special protective wear etc.

The following is the list of such nearby industries.

S No	Organisation	Distance from Unit	Area of help
1	Penna Cement Industries Ltd, Talaricheruvu	30 KM	Ambulance Doctors Firecrew First aiders Transport
2	Ultratech Cement Plant	18 KM	Ambulance Doctors Firecrew First aiders Transport Fire tender
3	Gerdau (SJK) Steel Plant	15 KM	Ambulance Doctors Firecrew First aiders Transport Fire tender

The company is having an informal understanding with neighbouring industries on reciprocal basis as of now. The unit is proposing to enter into documented Mutual aid with them shortly.

Emergency Coordinator (Security & Fire) maintain liaison with factory managements, during non-emergency/emergency times so that he can muster their help. He will be responsible for keeping track of any changes in information about the factory who have agreed to render medical aid or the contact person or the facilities they can afford etc.

These contact persons would be informed about the nature of emergencies, the details of help that would be required. Similarly, as an additional resource, state revenue and police authorities located at Tadipatri would be informed. Emergency Coordinator (Security & Fire) is designated as Coordinator for mutual aid.

Emergency coordinator (HR) is designated to coordinate with district revenue administrator and police for emergency help.

Incidentally it may be noted that there is a railway-crossing between the unit and PCIL – Talaricheruvu & Ultratech Cement, Bhogasamudram etc.

7.15 HELP REQUIRED FROM CIVIL ADMINISTRATION

There could be an occasion where help from Civil Administration, in respect of transport, medical, law & order, rehabilitation etc. is required. The civil administration (revenue officials and police) is informed in advance about the contingency requirements and the help is sought. The expertise and the help of civil defense organization of the civil administration will be sought through the good offices of MRO, Yadiki, DSP of Tadipatri & District Collector, Anantapur.

TRAINING

Training plays a pivotal role in all activities including safety and particularly so when it comes to handling of an emergency. It helps in conditioning the minds of the various personnel to act promptly without panic, as the individual knows what need to be done in an emergency. No time is lost in pondering over the issue as to what to be done. Recognizing this aspect, the Management has conducted a series of training programmes covering Emergency Coordinators, HODs, Second level Managers, Managers, Employees, Contract Supervisors and workers etc. apart from Emergency Squad Members and is continuing to do so for fresh recruits, while refresher programmes will be conducted in future.

7.16 MOCK DRILLS AND FOLLOW-UP

After restoration of normalcy after an Emergency, the Incident Controller/Emergency Coordinators of the sections concerned and the Site Controller would furnish a report of the account of working of On Site Emergency Plan chronologically. This would be

helpful information when the On Site Emergency Plan is taken up for review.

In spite of detailing objectives and scope of On Site Emergency Plan, Types and nature of emergencies that can arise, subjecting the persons to mock or (notional) simulated conditions would help in conditioning the concerned to gear up to situation. The objectives of such an Exercise is

- To Evaluate the understanding of roles and responsibilities by the Concerned
- To identify any inadequacies/difficulties in executing On Site Emergency Plan.
- To see the effectiveness of On Site Emergency Plan.
- To estimate the responses.
- To assess the capability of OSEP in situations like Public holiday, shift change, night shift, festival day etc.
- To acquaint the personnel with respective roles.

All the employees will be educated about the likely emergencies in the factory and emergency actions to be taken by various persons and how to proceed for Safety etc.

The effectiveness of emergency communication would be tested during mock drills to be organized.

Training and mock drills are conducted for employees, supervisory staff and management staff. Those who are not connected with execution of On Site Emergency Plan also will be given an orientation about their role in an emergency to infuse organized intended behavior in such situations. Mock drills are proposed to be conducted quarterly until everyone is familiarised and subsequently periodicity will be reviewed.

7.17 REVIEW

A provision is made for review or revision of OSEP based on discussions reevaluation of hazards, additional guidance,

experience gained etc. Factory Occupier, Manager, Site Controller, Incident Controller, Emergency Coordinators would meet for reviewing the adequacy of On Site Emergency Plan. Such situations warranting review may be

- To incorporate any changes in process.
- Modification in operation.
- Installation of additional equipment of hazardous nature etc,
- In the light of any emergency that might have arisen.
- Changes in top management personnel or Site Controller.
- As and when required by law or otherwise.

All the copies of On Site Emergency Plan are numbered, with updating printed on the cover. Only soft copy is the controlled copy and edition is possible by the authorised representative. Whenever, there is transfer or change among Incident Controller of any section, or transfer of shift in charges from one section to other section or whenever there is a change in role assigned to any Key Personnel or Essential Personnel, such personnel should furnish declaration that their new responsibilities towards On Site Emergency Plan are noted. Such declaration would be kept on record with Site Controller. Similarly, whenever, there is a change of Site Controller, the new incumbent would record that he has perused OSEP and understood his functions clearly.

Localised Mock Drills conducted: 3 localised mock drill have been conducted with advance information after formal training involving people of that area to basically familiarise them. Once this is done in other areas on similar lines, extensive mock drill covering total area will be conducted ie total integration will be done.

7.18 FUGITIVE EMISSIONS

Sources of fugitive dust in the plant are:

- Transportation activities within the cement plant
- Dropping/transfer points of the belt and bucket conveyors at transfer points
- Raw material stock piles
- Coal handling areas



Adequate air pollution control systems are provided as detailed below to maintain PM well within the prescribed limits.

Raw mill & Kilns	: Pulse Jet Bag House (PJBH)
Clinker Coolers	: Electro Static Precipitator (ESP)
Limestone crusher,	
Coal mill & cement mills	: Bag Filters
All transfer points	: Dust Collectors
Limestone dump hopper	: Water spray system
Limestone conveyor	: Water spray system
Limestone stacker	: Water spray system

All transfer points and storage silos are provided with dust collection and extraction systems for effective control of fugitive emissions. All the installed pollution control equipment's are designed for < 30 mg/Nm³.

- The dust collected from the pollution control equipment will be recycled back into the process.
- Clinker will be stored in clinker storage tanks to control fugitive emissions.
- Gypsum and additives will be stored in covered storage sheds
- Cement will be stored in silos
- All raw material transfer conveyor are covered with non-asbestos sheets.
- All roads and open area in the plant to be cement concreted.
- To ensure and reduce impact of transport on the surrounding environment, raw materials and cement is transported in trucks covered with tarpaulin.
- Fly ash is transported in bulk tankers only.
- Transport vehicles are periodically checked for Pollution under Control certificate from approved RTA agencies.
- Truck mounted vacuum cleaner and road sweepers are proposed to be deployed to maintain good housekeeping.
- All the above listed measures will be implemented under New Unit for control of fugitive dust.

7.19 FUGITIVE DUST

PROCESS EQUIPMENT MONITORING

The following monitoring programme as per the CPCB guidelines is being implemented.

- A "U"-tube manometer (of minimum 400 mm length) was fixed at all bag filters. It was connected with inlet and outlet side of the bag filter through flexible rubber tubes. Coloured water is filled to zero level mark for proper visibility of the pressure drop across bag filter.
- The minimum dust extraction volume was designed based on the guidelines for ventilating various sources as per industrial ventilation hand book guidelines.
- Un-interrupted supply of dry compressed air at desired pressure should be always ensured for pulsejet cleaning type bag filter.
- The flow rate and static pressure at the bag filter inlet is being monitored quarterly to ensure appropriate functioning of the bag filter installed.
- The details such as bag house specifications, layout drawing, operation and maintenance guidelines were maintained.

7.19.1 MONITORING OF FUGITIVE DUST

AMBIENT AIR QUALITY MONITORING

The dust from the fugitive sources is monitored by using the following equipment

- Respirable dust samplers
- Fine Dust Samplers
- Gravimetric dust samplers
- Personal Samplers

Monitoring is being carried out as per the frequency specified by the SPCB/MOEF.



7.19.2 FUGITIVE DUST PROTECTION FOR WORKERS

PCIL will employ all the dust reduction measures for the process units to meet the environmental standards.

The following measures for workers from fugitive dust will be taken up:

- Pre-Employment medical examination of all the workers,
- assessment of fitness for the particular type of work with due regard for adaption of work place to the worker taking into account individual susceptibility.
- Provision of dust masks, goggles, safety shoes and helmet.
- Review of health status of workers by maintaining the health record & their occupation.

7.19.3 IMPACT DUE TO TRANSPORTATION

TRAFFIC STUDY

Traffic study has been carried out on road connecting Cement plant and Venkatampalli Gate with monitoring point at PCIL gate.

TRAFFIC OBSERVATIONS

Timing	2 Wheelers	3 Wheelers	4 Wheelers (Cars, Jeeps, Vans)	Buses/ Lorries	Total
8:00-9:00 am	240(120)	22(22)	50(50)	37(81)	349(270)
9:00-10:00 am	228(114)	17(17)	38(38)	39(86)	322(255)
10:00-11:00 am	166(83)	20(20)	29(29)	36(79)	251(211)
11:00-12:00 pm	120(60)	25(25)	15(15)	40(88)	200(188)
4:00-5:00 pm	218(109)	34(34)	31(31)	38(84)	321(258)
5:00-6:00 pm	196(98)	30(30)	26(26)	35(77)	287(231)
6:00-7:00 pm	150(75)	12(12)	23(23)	39(86)	224(196)
7:00-8:00 pm	124(62)	8(8)	14(14)	36(79)	182(163)

Note: The highest peak observed is 270PCUs/hr as per IRC-106:1990 during 08:00-09:00 am as per IRC, the traffic count is taken for both the side together. Values reported in brackets are PCUs.

Major quantity of transportation for the cement plant is limestone and finished product. The total material transport from the cement plant before and after expansion is given below:

**DETAILS OF RAW MATERIAL AND FINISHED PRODUCT
(MTPA)**

	Before Expansion	After Expansion	Additional
Raw material			
Coal	0.26	0.56	0.3
Iron ore	0.02	0.05	0.03
Laterite	0.08	0.18	0.1
Gypsum	0.10	0.23	0.13
Flyash	0.10	0.23	0.13
Slag	0.50	1.14	0.64
Finished Product			
Cement	2.0	4.6	2.6
Clinker	1.5	4.0	2.5
Total	3.06	6.99	3.93

*Note transport of limestone is not considered for impact on transport as conveyors are used

Transportation of the limestone is by closed conveyor of 4.5 km length from crusher to cement plant

The maximum raw material and finished product will be transported by rail. However for computation, worst case impact due to road transport is considered as 20 % of the material is transported by road.



The additional material which will be transported by road is 0.79 MTPA. Hence impact due to vehicular pollution has been estimated for the total additional quantity of 0.79 MTPA

The following is the estimation of trucks for transport of the raw material and finished products.

ESTIMATION OF TRUCKS FOR TRANSPORT

	ADDITIONAL MATERIAL TRANSPORT BY ROAD
Total Quantity, Million TPA	0.79
Capacity of each dumper, tonnes	20
Number of trucks for total quantity	39300
Operational days	330
Total operational hours for trucks	24
Number of trucks per hour	5

PCIL has laid a dedicated road of 7.5 km length from Venkatampalli Gate to the cement plant with culverts by incurring an amount of Rs 5.37 crores. PCIL is taking up regular maintenance of the road laid

7.5 KM DEDICATED ROAD DEVELOPED BY PCIL



ROAD MAINTAINANCE BY PCIL



PARKING ARRANGEMENTS

PCIL has provided concreted parking facility for about 100 vehicles in the parking yard located just outside the main security gate. The area occupied by parking facility is about 1.0 Ha. All facilities, such as canteen, toilets, rest rooms, etc. are provided for truck drivers. Separate office building equipped all communication and other infrastructure has also been provided to the transporters.

7.20 NEED BASED ASSESSMENT

A summary of the results of the sample survey and Focussed Group Discussions conducted in the villages are given below.

The local state level and the central governments have many existing / on-going development programmes for up-lift of village communities. In such cases the project need not duplicate the efforts, rather the community development programme can be dovetailed into the ongoing programmes.

The Micro level plan should be able to yield long-term benefits to the community members. Therefore, these programmes have to be sustainable even beyond company's involvement. This is possible by building the capacities of the local communities to manage such programmes and develop strong partnerships with other organizations.

Under the skill schemes, the local educated unemployed persons to be trained, nearby ITI or any other Training institutues, the tie up programmes to be established.

The main requirement of the villagers is Drinking water on priority basis. Community RO plants are preferred to help in providing safe drinking water and also generate rural employment to educated youth.

Individual toilets are preferred by most villagers. Community toilets are not preferred by the villagers, due to lack of running water, and maintenance.

Access to Health facilities is the biggest concern of all the villages.

Burugula is having the Primary health center, where as the services are not proper. In other villages some medical help has been extended by the BMM Cements to Gudipadu, Kovallipalli.

The villagers feel that a mobile medical van with all the paramedical staff and medicines may be made available or frequent medical camps to be taken up.

Medical camps to be conducted in a cluster of villages, once in three months, by a Private organization chartiable hospital so that people can get assured medical aid.

Drainage system to be improved so that health problems can be solved. Under Swatch Bharat scheme, or Central Government schemes can be converge to sensitize the people and make the drainage so that contiguous disease can prevail.

In all the villages, the Burial ground is there, but there is no proper road to that, Development of road is very essential in all the villages.

Sheep rearing scheme is catching up as an alternative employment opportunity for the people in all the villages.

Construction of school boundary walls and providing toilets is one area which had been highlighted. This will improve the attendance in Government run schools.

Road network in required villages to be taken up on priority basis.

Last but not the least is Transport facility to all the villages, i.e, frequency of bus services should be improved.

7.21 VILLAGE WISE NEED BASED ASSESSMENT

Based on the sample survey and focused group discussions, information on existing facilities and need based facilities were collected. Identified needs are assessed and recommended to PCIL.

KOVALAPALLI VILLAGE

S. No	Need Based facilities required	Recommended to PCIL
1	Connecting road from Kovalapalli to Burugula the main road.	Kovalapalli to Burugula upto Bus stop
2	Protected Water to the villagers of Kovalapalli	Drinking water/Mineral water
3	Medical facility to be provided	Medical camps like, ear, eye ,noise(ENT) to be organized
4	Compound wall to the existing school, and other infrastructural facilities	Compound wall, and Facilities like toilets, and benches, tables, sports material to the existing school to be provided.
5	Individual toilet facilities	Individual toilets needed only 10 to 12 households are having individual toilets
6	Tailoring machines to the women group	Tailoring machines to the women group
7	Mainly internal roads in Kovalapalli	Village beginning to Burugula bus stop
8	Temple construction is very much demand in the village	Sri Rama temple is necessary. As per their calculations it needs Rs. 5.0 Lakhs to develop
9	Employment Opportunities to the educated unemployed youth	In the village 10 B.Tech, 5 Diploma, 15 ITI people along with Degree people are there

Source: FGD Discussions with the villagers personally

BURUGULA VILLAGE

SL No	Need Based facilities required	Recommended to PCIL
1	Drinking water	Providing Mineral water plant. Providing drinking water to B.C. colony
2	Drinage facility.	Construction of Side drains
3	Medical facility	Hospital is there, but the services of the doctors are not there. Providing medical camps to be taken care
4	Providing of facilities and proper approachable road to Burial ground	Under CSR budget Burial ground facilities to be taken care.
5	Individual toilets	People are habituated to construct Individual toilets, but some financial assistance to be given. Modern toilets either financial or construction may be made from the PCIL
6	Innternal roads to be laid	1.Road from village begginingi to urvabavi 2.S.C. colony BP Transformer 150 to 200 meters
7	Employment opportunities to be educated uneducated persons of the villages	Local technical people can be given assistance or ITI training may beprovided.

Source: Discussions with the Villagers, local leaders and educated persons in the village.

KUNDANKOTA VILLAGE

SL No	Need Based facilities required	Recommended to PCIL
1	Medical facility	Medical camps or a sub-center to be provided.
2	Bus services	
3	Construction of Anganwadi center	Financial help to be provided for construction of Anganwadi center



4	Individual toilet facilities	Construction of Individual toilets can be taken up phase wise.
5	Drainage Facility to be provided	Drainage facilities to be provided
6	Compound wall to the school	Compound wall

Source: Discussions with the Villagers, local leaders and educated persons in the village

GUDIPADU VILLAGE

SL No	Need Based facilities required	Recommended to PCIL
1	Bus facility	PCIL authorities can have a dialogue with the RTC and see the bus service can be extended
2	Road from main road to inside of the road	Road near to the temple to be renovated Renovation has been taken place ,but the other side of the road to be developed.
3	Medical camps are needed	PCIL authorities can send ambulance on call. Information board like mobile no to be contacted to be displayed in the village.
4	Employment opportunities to be provided for the educated unemployed persons.	Ancillary works if any the local people can be absorbed, or a technical self-employment training to be extended to the needy people.
5	Extension of School from 7 th to 10 th	Local leaders can be encouraged to have a discussions with the higher authorities and small financial extension of providing additional class rooms under CSR budget

Source: Village elders

BOYAREDDIPALLE VILLAGE

S.No	Need Based facilities required	Recommended to PCIL
1	Drinking water	Providing of Mineral water/Penna is supplying drinking water. But the requirement for a mineral water
2	Individual toilets are needed	PCIL should take up the construction of Individual toilets on a phased manner
3	Employment Opportunities to the local educated unemployed	As the lands has been purchased by PCIL authorities and promised to employ local people, Providing the employment opportunities to the needy persons
4	Renovation and performance of Ramalayam and providing financial help for the Poojari, and Kalyanam	Under CSR budget PCIL should give importance for providing Kalyanam and others in Boyareddipalli temple.

Source: Village elders

CHINTALAYALPALLI VILLAGE

S.No	Need Based facilities required	Recommended to PCIL
1	Drinking water	Drinking water/Mineral water
2	Individual toilets	50% of the households are not having Individual toilets, .
3	Burial ground	Burial Ground
4	Street lights	Supply of Bulbs.
5	Veterinary doctor with medicines	Veterinary Asst.can be taken up on consultantancy
6	PHC sub-center	Mobile medical van can go around the villages daily or once in two days with all medical facility/Medical camps to be organized.
7	Employment opportunities for the educated unemployed	Self-employment opportunities service can be hired from the

	youth	Syndicate Bank Kurnool
8	Drainage facilities to be taken up	Drainage facilities to be taken up

Source: Village elders

KAMALAPADU VILLAGE

S.No	Need Based facilities required	Recommended to SJCL
1	Drinking water sufficiently but the pipe lines are out of order and lot of wastage is there.	A control points and laying new pipe lines in the existing pipe line
2	Pucca Building of Anganwadi center	Providing financial help under CSR budget
3	Burial ground to be renovated and providing road facility to that place from the village	Providing funds under CSR budget
4	Compound walls to the existing school	Providing funds under CSR budget
5	Employment opportunities to the educated unemployed	Training for the needy people under Self employment schemes, Providing budget under CSR

Source: Village elders

VEERAREDDIPALLI VILLAGE

S No	Need Based facilities required	Recommended to PCIL
1	BT Road from the main road to the village. Great Demand from the entire village. Due to lack of road, people has to walk 2 km to reach the main road for connectivity	Providing budget under CSR. PCIL has taken up a culvert work near the village. On the same basis the road work to be taken up
2	Individual toilets	Providing Individual toilets under CSR budget on a phased manner. PCIL has started works in Veerareddipalli, so it

		will be better to fulfill the needs of the people.
3	Medical facility	PCIL is providing medical facility on phone call instead of that an ambulance can go around the villages and take care of the needs of the people.

Source: Village elders, FGD Discussions photos also can be seen

VENKATAMPALLY VILLAGE

S No	Need Based facilities required	Recommended to PCIL
1	Drinking water(Mineral water plant) is there	Due to erratic supply of electricity and lack of sufficient quantity of water Mineral water plant is closed. So an alternative arrangements to be made.
2	Medical facility, The existing building collapsed so Medical department personal are supplying medicines on every Wednesday.	Construction of One room building is necessary and PCIL can allot budget under CSR.
3	Existing temple to be renovated	Providing financial help under CSR budget.
4	Construction of One community hall for the local people	Financial help under CSR budget.

Source: Village elders

CHAPTER - 8

PROJECT BENEFITS



CHAPTER – 8 : PROJECT BENEFITS

8.1 PROJECT BENEFITS

Any industrial activity will help in improving the socio-economic benefits in areas like employment, communication, educational etc.,

8.2 EMPLOYMENT POTENTIAL

100 additional employees will be required for plant for direct employment. There is indirect employment to many more people in the form of contractual jobs, business opportunities, service facilities etc. This will enhance the economic status.

Apart from the jobs, the company had provided medical and educational facilities to the employees which can also be availed by the people around the plant & mine. The company has also constructed a full-fledged colony.

8.3 SOCIAL WELFARE MEASURES

PCIL believes that the responsibility of PCIL is to positively impact the society and make it a better place to live in. PCIL believes that even small improvements add up in building a better world.

PCIL endeavours towards imparting the basics of livelihood to surrounding villages and the community – food, water, shelter and education. PCIL is proud of the fact that it is able to significantly increase quality of lives in all the villages surrounding the plant.

PCIL continuously undertake health camps to improve the lives of the villagers and is actively involved in the improvement of roads and other infrastructure. PCIL has provided free education and vocational training to hundreds of kids since inception.

As responsible corporate citizens PCIL have always given top most priority for Corporate Social Responsibility in PCIL vision and philosophy. Today, taking its iconic shape, PCIL became a



formidable brand and this mission is accomplished with the support of great people and their values.

Boyareddypalli Cement Plant has become operational in the year 2008. Since inception of Boyaredipalli Cement Plant, PCIL has taken up various community Development Measures. PCIL has incurred an amount of Rs. 2.00 crores till date since 2008 for implementing various community developmental measures listed in the following table.

CSR MEASURES IMPLEMENTED - 2008-2016

S.No	YEAR	DESCRIPTION OF WORK	EXPENDITURE (Rs)
1	2011	Digging of Bore and fixing of hand pump at Sri Kotha Venkataramanaswamy temple for providing Drinking water facility to the pilgrims	40000
2	2011	1000 bags of cement concession given for take-up Sri JC Nagi Reddy Water supply scheme to the surrounding villages of our factory by M.L.A. Tadpatril.	80000
3	2011	Digging of Bore & fixing of submersible pump with accessories for providing Drinking water facility to the villagers of Boyareddypalli village	100,000
4	2012	Digging of Bore and fixing of Submersible pump at Chinthalayapalli village	115,200
5	2012	Digging of Bore for providing water facility to pilgrims visiting to Sri Gomeswaraswamy Temple, Kundanakota	51,200
6	2012	Drinking Water supplied by hired water tanker in Gudipadu village for 3 months April, May and June, 2012	84,000
7	2013	Digging of borewell and fixing of hand pump for providing drinking water facility at Kundanakota village near Sri Gomeswaraswara swamy temple	68930
8	2013	Digging of borewell and fixing of submersible motor for providing of drinking water to the villagers of Chickepalli	99610
9	2013	Cost of Fixing of submersible pump and laying of pipe line to Gudipadu village for supply of water	663,796
10	2013	Cost of GI pipe to borewell at Boyareddypalli for extracting water	6,460
11	2013	Cost of arranging Internal water pipeline in the village of Kundanakota	3,775
12	2013	Digging of Borewell and fixing of hand pump near Sri Ramalayam, Boyareddypalli	43,710

S.No	YEAR	DESCRIPTION OF WORK	EXPENDITURE (Rs)
13	2014	Digging of Borewell at Boyareddypalli village	62900
14	2014	Digging of Borewell at Chintalayapalli village	61400
15	2015	Gudipadu G.I.Pipeline for arranging door to door taps in Gudipadu village	1132826
16	2015	Supply of drinking water to Kowlapally by engaging Tractor & Tanker .	264000
17	2015	Supply of drinking water to Chintalayapalli by engaging Tractor & Tanker for the months of Apr,May, Jun-15	18000
18	2015	Installation of single phase submersible motor to the existing bore well at Chikkepalli near school	27500
19	2015	Installation of single phase submersible motor to the existing bore well at Boyareddypalli	33000
20	2016	Construction of Room to install R.O. plants in Nittur & Chikkepalli village	1120159
21	2016	Supply of drinking water to Kowlapally by engaging Tractor & Tanker from	133403
22	2016	Supply of drinking water to Chintalayapalli by engaging Tractor & Tanker from	49890
23	2016	Repairing of submersible pump which is provided by us for supply of drinking water to Gudipadu villagers	15000
24	2006	Laying Of CC Road at Chintalayapalli Village	25000
25	2010	Laying Of CC Road at Chintalayapalli Village	500000
26	2011	Donated 100 bags of cement for laying of CC road near school, Gudipadu village	25,000
27	2011	Donated 100 bags of cement to Veerareddypalli village, Kamalapadu panchayat for development works of CC road	25,000
28	2012	Formation of C.C. Road at Kundanakota	139,656
29	2012	Formation of Approach Road for Nittur villagers by using earth moving machine and construction of Culvert	88,500
30	2014	Donation of 100 bags cement to Nittur Gram panchayats towards contribution of share for laying of CC road in their village	24000
31	2010	Free Medical camp for surrounding villages by getting medical team from Tadipatri	15000
32	2013	Contribution for organising Free Eye camp by Lions Club, Yadiki	20000
33	2015	Medical camp organised at Gudipadu	35000

S.No	YEAR	DESCRIPTION OF WORK	EXPENDITURE (Rs)
34	2016	Free Medical camp conducted during Bramhostavams at Kotharayuniswamy temple	9253
35	2011	Donated 100 bags of cement for construction of Drainage at Chikkepalli village	25000
36	2012	Formation of Drainage and C.C. Road at Boyareddypalli village	179,053
37	2014	Construction of Bath rooms at Sri Sivalayam Temple, KundanaKota for the convenience of the Pilgrims	69,035
38	2014	Providing of Iron pull cart to Nittur Village for shifting of garbage from village to out side	3000
39	2015	Construction of culvert on drainage in Chintalayapalli village	24000
40	2008	Anatha Animuthyalu Educational Society Organized by the District Collector, Anantapur	500000
41	2008	Land Cost paid for Construction of School at kamalapadu	80000
42	2010	Providing of Iron Main gate and Wicket gate to primary School Nittur Village.	25000
43	2015	Supply of note books to the children of Nittur & Chintalayapalli village schools	32315
44	2016	Construction of Compound wall and providing of gates to Boyareddypalli School	83756
45	2016	Supply of note books on free of cost to the children studying in 6 Govt.Schools & our company school	120365
46	2016	Carriedout development works ie., laying of flooring, construction of 5 Nos. Toilets & 5 Nos. Bath rooms, raising of compound wall at B.C.Hostel for college girls, Gooty	632558
47	2011	Construction of damaged culvert at Nittur Village	300000
48	2014	Construction of culvert and road for approach of veerareddypalli from Yadiki	219336
49	2014	Sludge removal in the reservoir with EX100 for 10 hours work at Veerareddypalli village	14000
50	2015	Re-construction of Bund and also deepen the pond at Sivarampuram cheruvu, Kamalapadu panchayat	5996216
51	2016	Road levelling and Removing of bushes from Chintalayapalli village to Kothavenkataramana swamy temple for the benefit of the ryots and fixing of Iron ladder to the Overhead tank at Chintalayapalli	135225
52	2015	Anantapur dist Govt.departmental sports & Games 2015 meet	250000
53	2016	Donation for Thalassemia and Sickle Cell Society, Hyderabad	50000

S.No	YEAR	DESCRIPTION OF WORK	EXPENDITURE (Rs)
54	2007	Donated iron gate& iron safe to sri Lakshmi Chennakesava swamy temple, Nittur	15000
55	2009	Cost of Provision of Street Lighting Village Of Nittur	10000
56	2009	Donated 300 bags of cement For Construction of Sri sai baba Temple, Yadiki	69000
57	2010	Cost of Renovation Of Sri Chennarayudu Temple near our Factory	75000
58	2010	Donated 200 bags of cement For Consting Sri Rajarajeswary Temple, Proddatur	46000
59	2010	Donated 50 bags of cement for renovation Work of sivalayam temple at Chikkepalli	11000
60	2011	Contribution paid to the District Collector for organising 33rd Senior National Softball Tournament at Anantapur.	50,000
61	2011	Development works of Ground leveling and filling of soil by using our Heavy machineries taken at Sri Kotha Venkataramana swamy temple, Chintalayapalli	200,000
62	2011	Donation of cement and cement bricks for construction of compound wall to Sri Anjaneyaswamy temple at Kamalapadu village	120000
63	2011	Contribution for construction of TTD Kalyanamantapam at Yadiki	400,000
64	2011	Contribution paid to the District Collector for organising Rayala Utstavalu at Penugonda	500,000
65	2012	Construction of platform for sitting pilgrims visiting at Kotha venkataramana swamy temple, Chinthalayapalli	34,370
66	2012	Expenses for renovation of Peddamma Temple at Nittur village, Yadiki Mandal	43,150
67	2012	Contribution paid to Sri Shirdi Sai Baba Temple for performing Gurupournami Pooja at Yadiki	30,000
68	2013	Contribution paid for performing Peddamma Jathara at Boyareddypalli village	25,000
69	2013	Contribution paid for Sri Gomeswara swamy temple development works at Kundanakota	4620
70	2013	Contribution paid to Govt. on behalf of Village for arranging 10 Nos. Solar Street lights in Kundanakota village	22378
71	2013	Sri Kothavenkata Ramana swamy temple renovation works at Chintalayapalli village	38,455
72	2013	250 bags of cement donated to Yadiki Police Station for constructing New Police station	70,000
73	2013	Contribution paid to Sri Shirdi Sai Baba Temple for performing Gurupournami Pooja at Yadiki	10,000

S.No	YEAR	DESCRIPTION OF WORK	EXPENDITURE (Rs)
74	2013	Cost of Construction of Sri Ramalayam temple at B.R.Palli	2,600,000
75	2014	Community hall construction at Venkatampalli Village	291,770
76	2014	Mobilisation of JCB for ground cleaning at Chikkepalli near Sri Rama Temple	7,500
77	2014	Supply of 30 cement bags to Nittur village for construction of Racha Banda	6,600
78	2014	Development works like ground levelling hiring JCB, re-construction of selling platforms etc., taken at Daily market at Yadiki	48,268
79	2014	Expenses for providing of Ex-100 machine & 3 (Trucks) for getting soil and levelling in ground of daily markert, Yadiki	157,000
80	2016	First Aid Programme & Sri Venkataramana Swamy Temple	9253
81	2016	School Compound wall brick Work &Plasting	68756
82	2016	Submersible Pump Repair Cost, Gudipadu	15000
83	2016	5 MT Used For CSR Works April and May-16	15000
84	2016	Water Tanker Bill 14.04 TO 29.04,16	22500
85	2016	Supplying of water (Kowlapalli tractor)	21823
86	2016	Supplying of Drinking water (Kowlapalli tractor)	21774
87	2016	Tractor & Water tanker Rent	22403
88	2016	Rent For Water tanker and tractor for Kowlapalli	22500
89	2016	Rent For Water tanker and tractor for	49890
90	2016	Note books for Penna school Children	29451
91	2016	Supplying of Drinking water (Kowlapalli tractor)	22403
92	2016	Note books for students studying in village Children	90914
93	2016	Maintenance work at Govt BC College Girls	632558
94	2016	Door & windows Supply Of Gudipadu	40422
95	2016	Vigilence shed at Tadipatri roads	26000
96	2016	Annadatha Dairies for villagers	8500
97	2016	Lighting Arrangement for Gudipadu	15050
98	2016	Mike set for Nittur village	25000
99	2016	Supply of cement for CC road at Kundanakota 300 free of cost 200 Concessional Price	56000
100	2017	Supply of cement for Kamalapadu Panchayat 50 bags	17500
101	2017	Yadiki PHC Center Vehicle cost for 3 Days Pulse polio Programme which was on 29.1.2017	6000
Total			20043835

CSR MEASURES YEAR 2016-17

The status of CSR measures implemented for the year 2016-17 is given below in Table.

COMPLETED CORPORATE SOCIAL RESPONSIBILITY ACTUAL EXPENDITURE FOR THE YEAR OF 2016-17

S.No	Amount (Rs)	Text	Status
1	9,253	Conducted first aid training programme at sri venkataramana swami temple	Completed
2	68,756	School compound wall brick work & plastering at boyareddypalli	Completed
3	89,177	supplying of water for kowlapalli village Because of water scarcity in the village	Completed
4	49,890	Rent for Tractor and water tanker at chintalayapalli	Completed
5	15,000	submersible pump repair cost at Gudipadu village	Completed
6	29,451	Issued note books for Penna school children	Completed
7	90,914	Note books for students studying in villages, (Nittur, Boyareddypalli, Kamalapadu, Chintalayapalli, Chikaypalli)	Completed
8	26000	Constructed Vigilance shed at tadipatri roads near bugga	Completed
9	15,000	5 MT Cement used for Ramalayam temple which is at Boyareddypalli village	Completed
10	632,558	Maintenance work at Govt. BC college Girl hostel at Goothy.	Completed
11	300,000	provided 6nos Sewing machines at gudipadu village for train the ladies for motivating the self-welfare groups	Work progress
12	8,500	Annadatha Dairy's for villagers	Completed
13	15,050	Street Lights Arrangement for Nittur village	Completed
14	25,000	Mick set arranged for temple in Nittur village	Completed
15	56,000	Supply of cement for laying of CC road at Kundanakota village 200 bags Free of cost	Completed
16	17,500	supply of Cement for Kamalapadu panchayat for construction of mini water tanks 50 Bags	Completed
17	6,000	Provided vehicle for Yadiki PHC Centre . Vehicle cost for 3 days Pulse polio Programme which is on 29.01.2017	Completed
18	3,500	Supply of PPC cement 10 bags for Boyareddypalli drainage work	Completed
19	150,000	Laying of CC roads along with drainage at burgula village	Completed
20	1,500,000	Reconstruction of pond at Sivarampuram village with support of RDT	Completed

S.No	Amount (Rs)	Text	Status
21	2,500,000	Reconstruction of pond at chintalayappalli village with support of RDT	Completed
22	1,514,000	Reconstruction of pond at kundanakota village which is our mining area location with support of RDT	Work progress
23	49,430	Provided of street light at Boyareddypalli, chintalayappalli, Chikaypalli , villages	Completed
	7,170,979	Total amount as on date 31.04.2017	

FUTURE CSR ACTIVITIES - ENTERPRISE SOCIAL COMMITMENT

The capital cost of proposed expansion is Rs. 800 Crores. PCIL has budgeted an amount of Rs 20.0 crores for implementation of various measures listed based on the Need based assessment study. The measures listed under the various heads are given below in table alongwith budget

ESR BUDGET PROPOSAL (Worked Out Based On Need Based Study)

PROPOSED ACTION PLAN FOR CSR - 2017- 22 (Amount in Rs. In Lakhs)						
ACTIVITY	2017-2018	2018-2019	2019-2020	2020-2021	2021-2022	Total
Education						
Promotion of Higher educational facilities to all the boys & girls	3	3	3	3	3	12
Contribution to colleges and hostels outside (10 years)	20	20	20	20	20	200
Renovation, scholarship, books infrastructural facilities for all the schools	5	2	2	2	1	12
Skill development Centre for the villagers	100	200	100	0	0	400
Skill centre Hostel for the students And maintenance (10 years)	40	60	50	50	50	500
Technical training for employability	5	5	5	5	5	25
Infrastructure & Society Demands						
Construction of check dams and Rainwater harvesting structures	100	100	100	100	0	400
Internal Roads at Burugula, Kovalapalli, Chintalayapalli, and other two villages	10	10	10	10	10	50
Development of Road facility	10	10	10	10	10	0.5
Individual Toilet Facilities	5	5	5	5	5	25
Boundary wall & Burial grounds in three village and renovation of roads to burial ground.	2	2	2	2	2	10
Laying of pipeline to villages for drinking water supply	50	50	20	0	0	120
Drinking water RO Plant	10	10	10	10	10	0.5
Improvement in the Drainage (Side Drains)	3	3	3	3	3	15



PROPOSED ACTION PLAN FOR CSR - 2017- 22 (Amount in Rs. In Lakhs)						
ACTIVITY	2017-2018	2018-2019	2019-2020	2020-2021	2021-2022	Total
Education						
Social causes	3	2	2	2	3	12
Renovation of temples and Masjids	3	2	2	2	2	11
Contribution for performing Peddamma Jathara at Boyareddypalli village	2	2	2	2	2	10
Contribution for Sri Gomeswara swamy temple development works at Kundanakota	5	5	0	0	0	10
Contribution to Govt. on behalf of Village for arranging 10 Nos. Solar Street lights in in each and every village	5	5	0	0	0	10
Sri Kothavenkata Ramana swamy temple renovation works at Chintalayapalli village	5	5	0	0	0	10
Construction of culvert on drainage in Veerareddipalli, and road work upto main road village(10 years)	20	20	20	20	20	200
Health						
Health / Medical Camps	15	10	10	10	5	50
Medical camps every year (10 years)	10	10	10	10	10	100
Veterinary camps	2	2	2	2	1	9
Unforeseen expenditure from the villages	10	10	10	10	10	50
Total	443	553	330	278	172	2000

As per TOR issued by MoEF & CC, PCIL earmarked an amount of Rs 20 crores i.e., 2.5 % of the project cost towards the Enterprise Social Commitment.

CHAPTER - 9

ENVIRONMENTAL COST BENEFIT ANALYSIS



CHAPTER - 9: ENVIRONMENTAL COST BENEFIT ANALYSIS

Not applicable as it is not recommended at the Scoping stage.



CHAPTER - 10

ENVIRONMENTAL MANAGEMENT CELL



CHAPTER - 10 : ENVIRONMENTAL MANAGEMENT PLAN

10.1 ENVIRONMENTAL MANAGEMENT PLAN

The present proposal pertains to obtaining Environmental Clearance of cement plant for the increase of clinker production from 1.5 to 4.0 MTPA & cement production from 2.0 to 4.6 MTPA and increase of Waste Heat Recovery Power Plant from 10 MW to 20 MW.

The potential impact due to the project is on air quality which is mainly dust from mining operations. Chapter - 4, Paragraph 4.2 details the measures implemented by PCIL to comply with the NAAQ standards.

Domestic sewage and workshop effluents are the source of waste water generation. Chapter 4.3.1.1 narrates the measures for management of the same.

Impact due to noise is negligible and confined to the work zone of mine area where all personnel working are provided with Personal Protection Equipment.

Impact due to vibration is negligible and confined to the work zone of the mine area.

Impact on water impact is mentioned in chapter 4.3.1.

Impact on land environment and control measures are highlighted in chapter 4.4.

Chapter - 6, Paragraph 6.1 details the monitoring programme to ensure compliance with relevant standards.

Chapter - 6, Paragraph 6.2 details the allocation of budget for plan implementation of Environmental Management Plan.

PCIL is accredited with ISO: 9001- 2008, IS: 18001:2007 and ISO: 14001:2004. It is a professionally managed and well established cement manufacturing company enjoying the confidence of consumers because of its superior quality product and excellent customer service. PCIL is running cement plants and mine with



latest eco-friendly technology.

10.2 ENVIRONMENT POLICY

Revised Corporate Environment Policy alongwith approval of Board of Directors is given below



At Penna Cement Industries Limited, we believe the environment, climate protection and sustainable resource conservation to be the foundation for our future development. Recognising the environmental implications of every action; we seek to minimize the consumption of natural resources, generation of waste and its adverse impact by incorporating sustainability at every stage of our business decisions.

OUR COMMITMENT

- Conduct our operations in full compliance with applicable national, state, and local laws and regulations.
- Promote the efficient use of energy, alternate fuels and raw materials
- Reduction of waste, thereby contributing to the conservation of natural resources
- Strive to prevent pollution at the source through continual improvement programmes.
- Implement Environment Management System (EMS) in all our operations to manage the overall responsibilities and performance.
- Employ safe technologies and operating procedures to reduce exposure of our employees and our communities to Environmental, Health and Safety risks.
- Communicate and disseminate this policy through induction, education and training to all stakeholders.
- Monitor the implementation of the policy by carrying out periodic audits, reporting to the Board of Directors, the findings, Non compliances, corrective and preventive actions and incorporate the remedial measures with the consent of the Management.
- Review this policy and re-issue, if required.


DIRECTOR (Technical)



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 : U26942AP1991PLC011159



B.S. Envi-Tech (P) Ltd., Sec bad

Standard Operating Procedure for reporting of non-compliances to the Board of Directors is enclosed as **Annexure – 10A**.

10.3 PROCEDURE FOR HANDLING NON CONFORMITIES

PCIL procedure for handling non conformities is detailed below

- If a non-conformance is identified, it is reviewed and investigated to decide about the action to be initiated to mitigate immediate impact.
- Non-compliance with respect to the legal & other requirements - investigation, disposition corrective actions are as per the procedure monitoring compliance to environmental legal requirements
- After emergency situations - investigation, disposition, corrective actions are as per
- Procedure Emergency Preparedness and Response Plan.
- Spillage/leakage/Emission due to improper handling/improper maintenance/deviation from work instructions and procedures for all kinds of leaks, the details are recorded in a register for spillage control and to ensure corrective action.
- Employees report on field non conformances for incident, accident, near miss is reviewed and respective control measures are taken after investigating. The same control measures are communicated to all and will be update in work instructions to create safe working environment.

The nonconformance are identified in different situation as mentioned below

- Deviations from Process/ product requirements
- Spillage/leakage/emission due to improper handling/improper maintenance/episodic emissions Concerns from interested parties
- Incidents, accidents noted during operation.
- Noncompliance with respect to the Legal & other requirements
- After emergency situations
- Management System audit



- Deviation from OCP/SOPs/Work Instructions, procedures, non-implementation of the management programme, after their approval.

REPORTING OF NONCONFORMANCE:

All non-conformances are reported in the specified format, the analysis for the cause of the non-conformance carried out to decide corrective action required to eliminate the causes and potential non-conformities, and is implemented. All proposed corrective actions are reviewed prior to implementation.

- In case the results of corrective actions need amendment in the documented procedures, it is carried out as per procedure for Control of documented information.
- All the non - conformance, corrective actions status is recorded and consolidated department wise. The copy of the same is sent to MR as input for management in the management review.
- The confirmation on effectiveness of corrective action on resolution of non- conformance is presented to the management in the management review meetings.

The following records pertaining to non-conformities will be maintained

- Non Conformance Report
- Corrective Action Form
- List of Accidents, Incidents
- Accident Investigation report

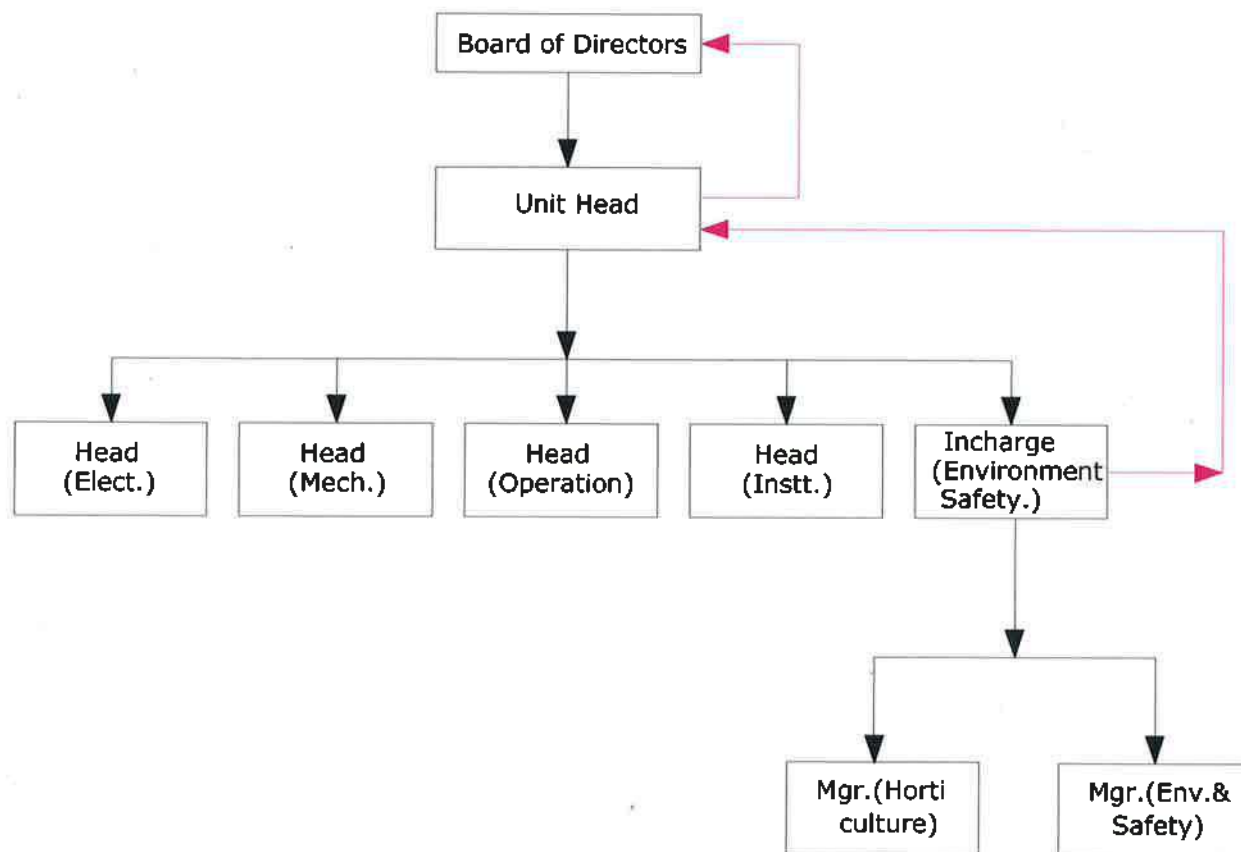
10.4 ORGANISATION STRUCTURE FOR ENVIRONMENTAL MANAGEMENT

PCIL has established the Environmental Cell. The cell is headed by experienced Environmental Engineer and he is supported by an Environmental Scientist.



The hierarchical system /Administrative order to deal with the environmental issues for ensuring compliance with the environmental clearance conditions are given below:

ORGANISATION STRUCTURE



CHAPTER - 11

SUMMARY & CONCLUSIONS



CHAPTER - 11 : SUMMARY AND CONCLUSIONS

11.1 PROJECT DESCRIPTION

PENNA CEMENT INDUSTRIES LTD., (PCIL), is operating a Cement Plant at Boyareddypalli Village, Yadiki Mandal, Anantapur District, Andhra Pradesh with the following production capacities

- 1.5 MTPA Clinker production capacity
- 2.0 MTPA Cement production and
- 10 MW Waste Heat Recovery based captive Power Plant

PCIL now proposes to increase the production capacity of the cement plant by implementing the following

- Increase of Clinker production capacity from : 1.50 MTPA to 4.0 MTPA
 - Increase of clinker production from 1.5 MTPA to 1.65 MTPA by upgradation of existing Unit – I
 - Installation of a new line i.e Unit – II with clinker production capacity of 2.35 MTPA.
- Increase of Cement production capacity from : 2.00 to 4.6 MTPA
- Power generation from Waste Heat Recovery Power Plant: 10 to 20 MW.

The proposal was appraised by Expert Appraisal Committee (EAC), MOEF & CC on 13.11.2017. EAC has advised to submit Revised EIA Report incorporating the clarifications points raised by EAC for further consideration of the Proposal. The subject report is revised EIA Report prepared incorporating the clarification points raised by EAC.

REQUIREMENTS OF THE PROJECT

The major raw material for manufacture of cement is Limestone. Limestone requirement of 5.30 MTPA for proposed expansion will



be sourced from existing captive limestone mine located at Gudipadu village.

PCIL Cement Plant is spread over an area of 60 ha and the land is owned by PCIL. Vacant area within the existing plant premises will be utilized for new line. No additional area will be required for expansion. No R&R is required.

Water is required for cooling, dust suppression, Domestic use and gardening. The present water requirement of the plant is 930 m³/day. 700 m³/day for cement plant and colony is sourced from borewells within the plant site. Ground water withdrawal will not exceed 700 m³/day. 230 m³/day of water for existing waste heat recovery based power plant is met from mine pit.

Additional water requirement for expansion of cement plant and WHRB power plant is 500 m³/day and the same will be met from Mine pit.

The peak power consumption of the Cement plant at present is 25 MW. This requirement is met from Grid and WHRB Power Plant. Additional power required is about 35 MW and the same will be sourced from Grid and proposed WHRB Power plant.

The manpower requirement of the project (Cement Plant and Mines) is given below:

MANPOWER REQUIREMENT

	Regular	Contract	Total
Present	150	600	750
Additional for Expansion	150	300	450
Total	300	900	1200

PCIL has constructed a full-fledged colony consisting of 120 houses in an area of 4.0 Ha. for the benefit of employees. All the necessary infrastructure facilities are provided in the colony. Additional 72 houses will be constructed in an area of 1.0 ha. Adjacent to the existing colony.

A full-fledged water supply and drainage system is already in place and the wastewater generated from the colony is treated in the Sewage Treatment Plant to meet the on land discharge standards. The treated sewage is used for greenbelt development within plant and colony.

11.2 DESCRIPTION OF ENVIRONMENT

- The predominant wind directions during this period were from ENE-E-ESE-SE-SSE sector accounting to about 62.6% of the total time. Average wind speeds during this period were varying between 1.01-15 kmph and during most of the time the winds were more than 15 kmph. The wind of less than 1.01 kmph was treated as calm, about 6.67% of the time the winds were under calm condition.
- Ambient air quality monitored at eight locations showed all values well within the limits of NAAQ standards specified for Industrial, Rural, Residential & Other areas.

Air Quality in the study area (All the values are in $\mu\text{g}/\text{m}^3$)

S. No	Pollutant	Range of values (98 th percentile)	NAAQ Standards for Residential areas
1	PM ₁₀	50.9 - 56.5	100
2	PM _{2.5}	21.2 - 26.0	60
3	SO ₂	11.7 - 13.0	80
4	NO _x	12.8 - 14.4	80

Note: CO values are observed less than 1 ppm during study period.

- Noise levels were monitored at eight locations at villages and were found to be well within the limits.
- Water samples collected from eight locations within the study area. All the samples showed compliance of all parameters with the drinking water standard of IS 10500. No surface water body exists within 10 km of the Study area.

- Soil samples collected showed low to medium fertility.
- Socio economic status of the study area is found to be moderate.
- There are no endangered species of Schedule -1 category reported in 10 km radius.

11.3 ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

11.3.1 AIR ENVIRONMENT

The baseline concentrations monitored in 10 km radius of the study area reflect the emissions from all the existing sources including emissions from other cement plant and mines. The additional emissions are mainly from the PCIL's cement plant due to additional production from New Line.

The Overall Scenario with predicted concentrations over the baseline is shown below.

PREDICTED GROUND LEVEL CONCENTRATIONS AND OVERALL SCENARIO, $\mu\text{g}/\text{m}^3$

24-HOURLY CONCENTRATIONS	Particulate Matter - 10 (PM_{10})	Particulate Matter - 2.5 ($\text{PM}_{2.5}$)	Sulphur Dioxide (SO_2)	Oxides Of Nitrogen (NO_x)
Baseline Concentration (Max)	56.5	26	13	14.4
Predicted Ground Level Concentration (Max)	8.02	2.41	1.92	11.50
Overall Scenario	64.52 {100}	28.41 (60)	14.92 {80}	25.90 {80}

NOTE: Values in parenthesis are National Ambient Air Quality (NAAQ) standard limits specified for Industrial, Residential, Rural and other areas.

The ambient air quality values are not exceeding the stipulated standards due to the expansion when the predicted values are superimposed on the baseline value i.e when the contribution of expansion is added to the background air quality.

11.3.2 AIR ENVIRONMENT – ENVIRONMENTAL MANAGEMENT PLAN

PCIL will provide one Bag House, one Bag filters and one ESP for main process units as given below:

POLLUTION CONTROL EQUIPMENT-MAIN EQUIPMENT OF NEW LINE

Process Unit	Pollution Control Equipment
Kiln	Bag house
Cooler	ESP
Coal mill	Bag filter
Cement Mill	Bag filter

A total of 48 bag filters will be provided at various locations in the process unit of new line apart from installation of above Bag house, Bag filters and ESP to control the dust emissions from dropping/transfer points of the belt and bucket conveyors.

The new line will be designed to firing hazardous waste in the Kiln.

11.3.3 NOISE ENVIRONMENT

Noise levels generated in the cement plant are confined within the PCIL complex and is further reduced due to attenuation of greenbelt. Noise level at the plant boundary, calculated from the above equation, is expected to be less than 75 dB (A) without considering any attenuation factors.

PCIL has developed an area of 16 ha within the cement plant complex including colony. Boundary plantation already developed will act as a barrier and further reduces the noise levels. Additionally 4.0 ha of greenbelt will be developed for the proposed expansion.

11.3.4 WATER ENVIRONMENT

Water is required for cooling, dust suppression, Domestic use and gardening. The present water requirement of the plant is 930



m³/day. 700 m³/day for cement plant and colony is sourced from borewells within the plant site. Ground water withdrawal will not exceed 700 m³/day. 230 m³/day of water for existing waste heat recovery based power plant is met from mine pit.

Additional water requirement for expansion of cement plant and WHRB power plant is 500 m³/day and the same will be met from Mine pit.

No wastewater is generated from cement plant process. The wastewater generation from the cement plant is mainly from domestic consumption.

In order to treat the sewage generated from the colony a full-fledged sewage treatment plant (STP) is in operation. The STP is designed for a maximum load of 250 m³/day with an average BOD of 150 - 200 mg/L for raw sewage and after treatment less than 20 mg/L.

From power plant, the waste water generation is 80 m³/day. About 184 m³/day of treated sewage is generated from Plant & Colony in post expansion scheme. The treated sewage and the power plant effluent are mixed to attain the Discharge water standards and used for green belt development.

11.3.5 SOLID WASTE MANAGEMENT

No solid waste is generated from proposed Line.

11.3.6 GREENBELT DEVELOPMENT

The cement plant is located in an area of 60 Ha. The required greenbelt as per norms is 33 % of the plant area. PCIL has already developed greenbelt in an area of 16 Ha and now proposes to develop the greenbelt in additional area of 4.0 Ha with broad leaved native species.

11.4 ENVIRONMENTAL MONITORING PROGRAMME

CONTINUOUS EMISSION MONITORING INSTRUMENTS

PCIL have installed 5 nos. continuous stack monitoring facilities to the stacks attached to the raw mill/Kiln bag house, cooler ESP, coal mill bag house, cement mill bag house for monitoring of PM in stack emission commissioned real time data acquisition system for connectivity to PCB server under Existing Unit.

PCIL will install continuous stack monitoring for raw mill/Kiln bag house, cooler ESP, cement mill to monitor the outlet emissions of New Unit.

In addition to the above, PCIL is carrying out the stack monitoring through third party periodically.

AMBIENT AIR QUALITY MONITORING

Two Continuous Ambient Air Quality Monitoring System (CAAQMS) are installed and connected to APPCB and CPCB server.

In addition to the above, PCIL is monitoring ambient air quality at the four stations for AAQ parameters viz., PM_{2.5}, PM₁₀, SO₂ and NO_x in the surrounding villages as per the guidelines. The same will be continued.

Regular monitoring is also being carried out through an outside approved agency.

Ambient air Quality is being monitored from fixed monitoring stations by an approved third party on monthly basis for the parameters PM₁₀, PM_{2.5}, SO₂, NO_x, for 24 hours basis and the levels are well within the prescribed limits.

11.5 ENVIRONMENTAL MANAGEMENT PLAN

PCIL has budgeted an amount of Rs. 120 crores for implementation of environmental management plan for expansion.



Recurring expenditure of Rs. 4.5 crores is being spent for operation and maintenance for pollution control equipment in the existing unit.

11.6 PROJECT BENEFITS

Indirect employment may be generated, supporting auxiliary units and small business may develop in the region.

PCIL is continuously contributing toward welfare & community development activities under its CSR programs.

The capital cost of proposed expansion is Rs. 800 Crores. PCIL has incurred an amount of Rs. 2.0 crores till date since 2008 for implementing various community developmental measures.

FUTURE CSR ACTIVITIES

As per TOR issued by MoEF & CC, PCIL will earmark an amount of Rs. 20 crores i.e., 2.5 % of the project cost towards the Enterprise Social Commitment as detailed in Chapter-8.

CHAPTER - 12

DISCLOSURE OF CONSULTANTS



CHAPTER - 12 : DISCLOSURE OF CONSULTANTS

Environmental Impact Assessment (EIA) of Penna Cement Industries Ltd., (PCIL) at Boyareddypalli Village, Yadiki Mandal, Anantapur District, Andhra Pradesh for increase of Clinker production from 1.5 to 4.0 MTPA by enhancing the Unit-I production capacity from 1.5 to 1.65 MTPA & by installing a new line of 2.35 MTPA and Cement Production from 2.0 MTPA to 4.6 MTPA and Waste Heat Recovery Power Plant from 10 MW to 20 MW has been prepared by B.S. Envi-Tech (P) Limited, Secunderabad.

B. S. Envi-Tech (P) Limited is accredited as Category "A" Consultant by National Accreditation Board for Education and Training (NABET), Quality Council of India (QCI).

B. S. Envi-Tech (P) Ltd extends the Consultancy Services in the following fields:

- Environmental Impact Assessment studies for Environmental Clearance
- Obtaining Consent For Establishment / Operation from SPCB's
- Monitoring of Environmental Parameters as per statutory requirements.
- Environmental Audits
 - (1) Third Party Environmental Audit
 - (2) Environmental Statement (Form - V)
- Preparation of Mining Plans (Registered as Qualified Person (RQP) by Indian Bureau of Mines (IBM))
 - (1) Preparation of Mining Plans
 - (2) Monitoring Of Environmental Parameters for Mines as Per IBM and DGMS Guidelines.
- Providing Analytical services through NABL accredited and MOEF & CC recognized Laboratory

NABET Accreditation of B.S.Envi-Tech (P) Limited is enclosed as **Annexure - 12A.**



ANNEXURES



Government of India

Ministry of Environment, Forest and Climate Change

(I.A. Division)

Indira Paryavaran Bhawan

Jor Bagh Road, Aliganj,

New Delhi - 110003

E-mail: sharath.kr@gov.in

Tel: 011-24695319

To

Dated: 27th March, 2017**M/s. Penna Cement Industries Ltd**

Village Boyareddypalli, Kamalapadu Panchayath,

Yadiki Mandal, District Anantapur, Andhra Pradesh.

Subject: Expansion of Cement Plant with increase in production of Clinker from 1.5 MTPA to 4.0 MTPA & Cement from 2.0 MTPA to 4.6 MTPA of M/s. Penna Cement Industries Ltd located at Village Boyareddypalli, Kamalapadu Panchayath, Yadiki Mandal, District Anantapur, Andhra Pradesh- prescribing of ToRs regarding.

Sir,

This has reference to your online application IA/AP/IND/59430/2016 dated 4th October, 2016 along with the application in prescribed format (Form-I), copy of pre-feasibility report and proposed TORs for undertaking detailed EIA study as per the EIA Notification, 2006 for the project mentioned above. The proposed project activity is listed at S.No. 3(b), under category 'A' of the Schedule of EIA Notification, 2006 and appraised at the Central level.

2.0 M/s. Penna Cement Industries Ltd (PCIL) proposes to increase clinker production capacity from 1.50 to 4.0 MTPA and cement production from 2.00 to 4.6 MTPA by enhancing the Unit-I production capacity from 1.5 to 1.65 MTPA and by installing a new line of 2.35 MTPA. Earlier clearance provided vide letter dated J-11011/351/2006-IA.II(I). The proposed unit will be located at Boyareddypalli Village, Yadiki Mandal, Anantapur District, Andhra Pradesh. PCIL complex is located in an area of 60 Ha out of which 19 Ha (16 Ha already developed) land will be used for green belt development. The new unit will be located within the existing cement plant. Total capital cost of expansion is Rs. 800 crores. Proposed employment generation from expansion will be 100 persons. The capacity of the cement plant before and after expansion is given below:

Unit		Present approved Capacity as per MoEF EC (MTPA)		Proposed enhancement (MTPA)		Capacity after proposed expansion (MTPA)	
		Clinker	Cement	Clinker	Cement	Clinker	Cement
Cement Plant	Unit -I	1.5	2.0	0.15	-	1.65	2.0
	Unit -II (new unit)	-	-	2.35	2.6	2.35	2.6
	Total	1.5	2.0	2.50	2.6	4.00	4.6
Waste Heat Recovery based Power Plant, MW		10		10		20	

3.0 The peak power consumption in the PCIL Cement plant complex including mine is 25 MW. Power requirement is met from grid. An additional power of 35 MW is required for the proposed expansion project, totalling to 60 MW. Internal Power generation from WHR will be 20MW (10 MW already installed).

4.0 With increase of clinker production capacity, the limestone requirement increases from 2.30 to 5.30 MTPA. PCIL proposes to meet the additional limestone requirement from same captive limestone mining lease. Fuel consumption is mainly coal / petcoke sourced from Singareni Collieries Company Ltd/ Imported Coal/Petcoke from USA.

5.0 The present water requirement of the plant is 930 m³/day and is sourced from borewells & mine pit within the plant site. Additional Water requirement for the proposal is 500 m³/day which will be met from mine pit. Domestic waste water is treated in full-fledged sewage treatment plant (250 m³/day). Treated domestic wastewater is reused for greenbelt development within PCIL cement plant complex.

6.0 The proposal was considered by the Expert Appraisal Committee (Industry-I) during its 12th meeting held on 27th – 28th October, 2016 for prescribing TORs for undertaking detailed EIA/EMP study and recommended prescribing following specific TORs for undertaking detailed EIA and EMP study in addition to the generic TOR enclosed at Annexure I read with additional TORs at Annexure-2.

- i. Public Hearing to be conducted by the Andhra Pradesh Pollution Control Board.
- ii. The issues raised during public hearing and commitment of the project proponent on the same along with time bound action plan to implement the commitment and financial allocation thereto should be clearly provided.
- iii. The project proponent should carry out social impact assessment of the project as per the Office Memorandum No. J-11013/25/2014-IA.I dated 11.08.2014 issued by the Ministry regarding guidelines on Environment Sustainability and CSR related issues. The social impact assessment study so carried out should form part of EIA and EMP report.
- iv. Compliance report issued by the Regional Office of the Ministry should be submitted along with the EIA report and the compliance status should be presented before the Committee.
- v. Project proponent will optimise the consumption of water and energy, and reduce use of water and electricity per unit of production.

7.0 The undersigned is directed to inform that the Ministry of Environment, Forest and Climate Change (MoEFCC) after accepting the recommendation of the EAC (Industry-I), hereby decided to accord ToRs for the above project.

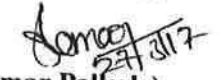
8.0 It is requested that the draft EIA Report may be prepared in accordance with the above mentioned specific TORs and enclosed generic TORs and additional TORs and thereafter further necessary action including conduct of public consultation may be taken for obtaining Environment Clearance in accordance with the procedure prescribed under the EIA Notification, 2006 as amended.

9.0 The TORs are valid for a period of three years from today i.e. 27.03.2017 and will expire on 26.03.2020. However, this period could be further extended by a maximum period of one year provided an application is made by the project proponent at least three months before the expiry of the validity period, together with updated Form-I, based on proper justification.


(Sharath Kumar Pallerla)
Scientist 'F'

Copy to:-

1. The Secretary, Department of Environment, Government of Andhra Pradesh.
2. The Additional Principal Chief Conservator of Forests (C), Ministry of Environment, Forest and Climate Change, Regional Office (SEZ), 1st and IInd Floor, Handloom Export Promotion Council, 34, Cathedral Garden Road, Nungambakkam, Chennai – 600034.


(Sharath Kumar Pallerla)
Scientist 'F'

GENERIC TERMS OF REFERENCE (TOR) IN RESPECT OF INDUSTRY SECTOR

1. **Executive Summary**
2. **Introduction**
 - i. Details of the EIA Consultant including NABET accreditation
 - ii. Information about the project proponent
 - iii. Importance and benefits of the project
3. **Project Description**
 - i. Cost of project and time of completion.
 - ii. Products with capacities for the proposed project.
 - iii. If expansion project, details of existing products with capacities and whether adequate land is available for expansion, reference of earlier EC if any.
 - iv. List of raw materials required and their source along with mode of transportation.
 - v. Other chemicals and materials required with quantities and storage capacities
 - vi. Details of Emission, effluents, hazardous waste generation and their management.
 - vii. Requirement of water, power, with source of supply, status of approval, water balance diagram, man-power requirement (regular and contract)
 - viii. Process description along with major equipments and machineries, process flow sheet (quantative) from raw material to products to be provided
 - ix. Hazard identification and details of proposed safety systems.
 - x. Expansion/modernization proposals:
 - a. Copy of all the Environmental Clearance(s) including Amendments thereto obtained for the project from MOEF/SEIAA shall be attached as an Annexure. A certified copy of the latest Monitoring Report of the Regional Office of the Ministry of Environment and Forests as per circular dated 30th May, 2012 on the status of compliance of conditions stipulated in all the existing environmental clearances including Amendments shall be provided. In addition, status of compliance of Consent to Operate for the ongoing /existing operation of the project from SPCB shall be attached with the EIA-EMP report.
 - b. In case the existing project has not obtained environmental clearance, reasons for not taking EC under the provisions of the EIA Notification 1994 and/or EIA Notification 2006 shall be provided. Copies of Consent to Establish/No Objection Certificate and Consent to Operate (in case of units operating prior to EIA Notification 2006, CTE and CTO of FY 2005-2006) obtained from the SPCB shall be submitted. Further, compliance report to the conditions of consents from the SPCB shall be submitted.
4. **Site Details**
 - i. Location of the project site covering village, Taluka/Tehsil, District and State, Justification for selecting the site, whether other sites were considered.
 - ii. A toposheet of the study area of radius of 10km and site location on 1:50,000/1:25,000 scale on an A3/A2 sheet. (including all eco-sensitive areas and environmentally sensitive places)
 - iii. Co-ordinates (lat-long) of all four corners of the site.
 - iv. Google map-Earth downloaded of the project site.

- v. Layout maps indicating existing unit as well as proposed unit indicating storage area, plant area, greenbelt area, utilities etc. If located within an Industrial area/Estate/Complex, layout of Industrial Area indicating location of unit within the Industrial area/Estate.
- vi. Photographs of the proposed and existing (if applicable) plant site. If existing, show photographs of plantation/greenbelt, in particular.
- vii. Landuse break-up of total land of the project site (identified and acquired), government/private - agricultural, forest, wasteland, water bodies, settlements, etc shall be included. (not required for Industrial area)
- viii. A list of major industries with name and type within study area (10km radius) shall be incorporated. Land use details of the study area
- ix. Geological features and Geo-hydrological status of the study area shall be included.
- x. Details of Drainage of the project upto 5km radius of study area. If the site is within 1 km radius of any major river, peak and lean season river discharge as well as flood occurrence frequency based on peak rainfall data of the past 30 years. Details of Flood Level of the project site and maximum Flood Level of the river shall also be provided. (mega green field projects)
- xi. Status of acquisition of land. If acquisition is not complete, stage of the acquisition process and expected time of complete possession of the land.
- xii. R&R details in respect of land in line with state Government policy

5. **Forest and wildlife related issues (if applicable):**

- i. Permission and approval for the use of forest land (forestry clearance), if any, and recommendations of the State Forest Department. (if applicable).
- ii. Landuse map based on High resolution satellite imagery (GPS) of the proposed site delineating the forestland (*in case of projects involving forest land more than 40 ha*).
- iii. Status of Application submitted for obtaining the stage I forestry clearance along with latest status shall be submitted.
- iv. The projects to be located within 10 km of the National Parks, Sanctuaries, Biosphere Reserves, Migratory Corridors of Wild Animals, the project proponent shall submit the map duly authenticated by Chief Wildlife Warden showing these features vis-à-vis the project location and the recommendations or comments of the Chief Wildlife Warden thereon.
- v. Wildlife Conservation Plan duly authenticated by the Chief Wildlife Warden of the State Government for conservation of Schedule I fauna, if any exists in the study area.
- vi. Copy of application submitted for clearance under the Wildlife (Protection) Act, 1972, to the Standing Committee of the National Board for Wildlife

6. **Environmental Status**

- i. Determination of atmospheric inversion level at the project site and site-specific micro-meteorological data using temperature, relative humidity, hourly wind speed and direction and rainfall.
- ii. AAQ data (except monsoon) at 8 locations for PM10, PM2.5, SO2, NOX, CO and other parameters relevant to the project shall be collected. The monitoring stations shall be based CPCB guidelines and take into account the pre-dominant wind direction, population zone and sensitive receptors including reserved forests.
- iii. Raw data of all AAQ measurement for 12 weeks of all stations as per frequency given in the NAQPM Notification of Nov. 2009 along with - min., max., average and 98% values for each of the AAQ parameters from data of all AAQ stations should be provided as an annexure to the EIA Report.
- iv. Surface water quality of nearby River (60m upstream and downstream) and other surface drains at eight locations as per CPCB/MoEF&CC guidelines.

- v. Whether the site falls near to polluted stretch of river identified by the CPCB/MoEF&CC.
- vi. Ground water monitoring at minimum at 8 locations shall be included.
- vii. Noise levels monitoring at 8 locations within the study area.
- viii. Soil Characteristic as per CPCB guidelines.
- ix. Traffic study of the area, type of vehicles, frequency of vehicles for transportation of materials, additional traffic due to proposed project, parking arrangement etc.
- x. Detailed description of flora and fauna (terrestrial and aquatic) existing in the study area shall be given with special reference to rare, endemic and endangered species. If Schedule-I fauna are found within the study area, a Wildlife Conservation Plan shall be prepared and furnished.
- xi. Socio-economic status of the study area.

7. Impact Assessment and Environment Management Plan


- i. Assessment of ground level concentration of pollutants from the stack emission based on site-specific meteorological features. In case the project is located on a hilly terrain, the AQIP Modelling shall be done using inputs of the specific terrain characteristics for determining the potential impacts of the project on the AAQ. Cumulative impact of all sources of emissions (including transportation) on the AAQ of the area shall be well assessed. Details of the model used and the input data used for modeling shall also be provided. The air quality contours shall be plotted on a location map showing the location of project site, habitation nearby, sensitive receptors, if any.
- ii. Water Quality modelling – in case, if the effluent is proposed to be discharged in to the local drain, then Water Quality Modelling study should be conducted for the drain water taking into consideration the upstream and downstream quality of water of the drain.
- iii. Impact of the transport of the raw materials and end products on the surrounding environment shall be assessed and provided. In this regard, options for transport of raw materials and finished products and wastes (large quantities) by rail or rail-cum road transport or conveyor-cum-rail transport shall be examined.
- iv. A note on treatment of wastewater from different plant operations, extent recycled and reused for different purposes shall be included. Complete scheme of effluent treatment. Characteristics of untreated and treated effluent to meet the prescribed standards of discharge under E(P) Rules.
- v. Details of stack emission and action plan for control of emissions to meet standards.
- vi. Measures for fugitive emission control
- vii. Details of hazardous waste generation and their storage, utilization and disposal. Copies of MOU regarding utilization of solid and hazardous waste shall also be included. EMP shall include the concept of waste-minimization, recycle/reuse/recover techniques, Energy conservation, and natural resource conservation.
- viii. Proper utilization of fly ash shall be ensured as per Fly Ash Notification, 2009. A detailed plan of action shall be provided.
- ix. Action plan for the green belt development plan in 33 % area i.e. land with not less than 1,500 trees per ha. Giving details of species, width of plantation, planning schedule etc. shall be included. The green belt shall be around the project boundary and a scheme for greening of the roads used for the project shall also be incorporated.
- x. Action plan for rainwater harvesting measures at plant site shall be submitted to harvest rainwater from the roof tops and storm water drains to recharge the ground water and also to use for the various activities at the project site to conserve fresh water and reduce the water requirement from other sources.
- xi. Total capital cost and recurring cost/annum for environmental pollution control measures shall be included.
- xii. Action plan for post-project environmental monitoring shall be submitted.

- xiii. Onsite and Offsite Disaster (natural and Man-made) Preparedness and Emergency Management Plan including Risk Assessment and damage control. Disaster management plan should be linked with District Disaster Management Plan.

8. Occupational health

- i. Details of existing Occupational & Safety Hazards. What are the exposure levels of above mentioned hazards and whether they are within Permissible Exposure level (PEL). If these are not within PEL, what measures the company has adopted to keep them within PEL so that health of the workers can be preserved,
- ii. Details of exposure specific health status evaluation of worker. If the workers' health is being evaluated by pre designed format, chest x rays, Audiometry, Spirometry, Vision testing (Far & Near vision, colour vision and any other ocular defect) ECG, during pre placement and periodical examinations give the details of the same. Details regarding last month analyzed data of abovementioned parameters as per age, sex, duration of exposure and department wise.
- iii. Annual report of health status of workers with special reference to Occupational Health and Safety.
- iv. Plan and fund allocation to ensure the occupational health & safety of all contract and casual workers.

9. Corporate Environment Policy

- 
- i. Does the company have a well laid down Environment Policy approved by its Board of Directors? If so, it may be detailed in the EIA report.
 - ii. 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.
 - iii. 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.
 - iv. Does the company have system of reporting of non compliances / violations of environmental norms to the Board of Directors of the company and / or shareholders or stakeholders at large? This reporting mechanism shall be detailed in the EIA report

10. Details regarding infrastructure facilities such as sanitation, fuel, restroom etc. to be provided to the labour force during construction as well as to the casual workers including truck drivers during operation phase.

11. Enterprise Social Commitment (ESC)

- i. Adequate funds (atleast 2.5 % of the project cost) shall be earmarked towards the Enterprise Social Commitment based on Public Hearing issues and item-wise details along with time bound action plan shall be included. Socio-economic development activities need to be elaborated upon.

12. Any litigation pending against the project and/or any direction/order passed by any Court of Law against the project, if so, details thereof shall also be included. Has the unit received any notice under the Section 5 of Environment (Protection) Act, 1986 or relevant Sections of Air and Water Acts? If so, details thereof and compliance/ATR to the notice(s) and present status of the case.

13. 'A tabular chart with index for point wise compliance of above TORs.

14. The TORs prescribed shall be valid for a period of three years for submission of the EIA-EMP reports along with Public Hearing Proceedings (wherever stipulated).

The following general points shall be noted:

- i. All documents shall be properly indexed, page numbered.
- ii. Period/date of data collection shall be clearly indicated.
- iii. Authenticated English translation of all material in Regional languages shall be provided.
- iv. The letter/application for environmental clearance shall quote the MOEF file No. and also attach a copy of the letter.
- v. The copy of the letter received from the Ministry shall be also attached as an annexure to the final EIA-EMP Report.
- vi. The index of the final EIA-EMP report must indicate the specific chapter and page no. of the EIA-EMP Report
- vii. While preparing the EIA report, the instructions for the proponents and instructions for the consultants issued by MOEF vide O.M. No. J-11013/41/2006-IA.II (I) dated 4th August, 2009, which are available on the website of this Ministry shall also be followed.
- viii. 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. Name of the Consultant and the Accreditation details shall be posted on the EIA-EMP Report as well as on the cover of the Hard Copy of the Presentation material for EC presentation.
- ix. TORs' prescribed by the Expert Appraisal Committee (Industry) shall be considered for preparation of EIA-EMP report for the project in addition to all the relevant information as per the 'Generic Structure of EIA' given in Appendix III and IIIA in the EIA Notification, 2006. Where the documents provided are in a language other than English, an English translation shall be provided. The draft EIA-EMP report shall be submitted to the State Pollution Control Board of the concerned State for conduct of Public Hearing. The SPCB shall conduct the Public Hearing/public consultation, district-wise, as per the provisions of EIA notification, 2006. The Public Hearing shall be chaired by an Officer not below the rank of Additional District Magistrate. The issues raised in the Public Hearing and during the consultation process and the commitments made by the project proponent on the same shall be included separately in EIA-EMP Report in a separate chapter and summarised in a tabular chart with financial budget (capital and revenue) along with time-schedule of implementation for complying with the commitments made. The final EIA report shall be submitted to the Ministry for obtaining environmental clearance.

ADDITIONAL TORs FOR CEMENT INDUSTRY

1. Limestone and coal linkage documents along with the status of environmental clearance of limestone and coal mines
2. Quantum of production of coal and limestone from coal & limestone mines and the projects they cater to;
3. Present land use shall be prepared based on satellite imagery. High-resolution satellite image data having 1m-5m spatial resolution like quickbird, Ikonos, IRS P-6 pan sharpened etc. for the 10 Km radius area from proposed site. The same shall be used for land used/land-cover mapping of the area.
4. If the raw materials used have trace elements, an environment management plan shall also be included.
5. Plan for the implementation of the recommendations made for the cement plants in the CREP guidelines must be prepared.
6. Energy consumption per ton of clinker and cement grinding
7. Provision of waste heat recovery boiler
8. Arrangement for co-processing of hazardous waste in cement plant.
9. Trace metals in waste material especially slag.

Executive Summary

Executive summary of the report in about 8-10 pages incorporating the following:

- i. Project name and location (Village, Dist, State, Industrial Estate (if applicable))
- ii. Products and capacities. If expansion proposal then existing products with capacities and reference to earlier EC.
- iii. Requirement of land, raw material, water, power, fuel, with source of supply (Quantitative)
- iv. Process description in brief, specifically indicating the gaseous emission, liquid effluent and solid and hazardous wastes.
- v. Measures for mitigating the impact on the environment and mode of discharge or disposal.
- vi. Capital cost of the project, estimated time of completion
- vii. Site selected for the project – Nature of land – Agricultural (single/double crop), barren, Govt/private land, status of its acquisition, nearby (in 2-3 km.) water body, population, within 10km other industries, forest, eco-sensitive zones, accessibility, (note – in case of industrial estate this information may not be necessary)
- viii. Baseline environmental data – air quality, surface and ground water quality, soil characteristic, flora and fauna, socio-economic condition of the nearby population
- ix. Identification of hazards in handling, processing and storage of hazardous material and safety system provided to mitigate the risk.
- x. Likely impact of the project on air, water, land, flora-fauna and nearby population
- xi. Emergency preparedness plan in case of natural or in plant emergencies
- xii. Issues raised during public hearing (if applicable) and response given
- xiii. CSR plan with proposed expenditure.
- xiv. Occupational Health Measures
- xv. Post project monitoring plan

ANNEXURE – 1A1

Clarification points raised by EAC, MOEF & CC vide EAC Minutes of Meeting dated 13th to 15th Nov, 2017 and ADS raised vide 17-11-2017

S. No	Points	Reply	Reference in the Revised EIA Report
1	Possibility of recovering more heat from the kiln and cooler	PCIL has carried out a detailed technical study for recovering more heat from the kiln and coolers.	Chapter - 2 Para - 2.9.3 Page - 32 to 35
2	No Use of Pet coke in power generation	PCIL has not installed any power plant which is based on solid fuel. The existing and proposed power plants are based on waste heat recovery system. No pet coke will be used in power generation.	Chapter - 2 Para - 2.9.3.2 Page - 35
3	The emission levels within 25 mg/Nm ³	PCIL will comply with the new norms issued by MoEF & CC vide Gazette Notification GSR 612 (E) dated 25 th August, 2014 where emission concentration permitted is 30 mg/Nm ³ for all the cement plants operating and proposed in the country.	Chapter - 4 Para - 4.1.6 Page - 117 to 120
4	The additional green belt of 4 Ha in addition to the existing 16 Ha with native and broad leaved tree species	PCIL will develop additional area of 4 Ha (own land) under greenbelt in addition to existing 16 Ha	Chapter - 4 Para - 4.4.3 Page - 132 to 137
5	Establishment of the environmental cell with qualified person as head-environment with requisite support staff;	PCIL has established the Environmental Cell. The cell is headed by experienced Environmental Engineer and he is supported by an Environmental Scientist.	Chapter - 10 Para - 10.4 Page - 198 to 199
6	Revised Corporate Environment Policy including its approval in the Board of directors; SoPs for reporting of non-compliances to the board	PCIL has Revised Corporate Environment Policy and it is approved by Board of Directors. SoPs for reporting of non-	Chapter - 10 Para - 10.2 Page - 196 Chapter - 10

S. No	Points	Reply	Reference in the Revised EIA Report
	of directors; hierarchical system to deal with the environmental issues and for ensuring compliance with the environmental clearance conditions;	compliances to the board of directors & Hierarchical system to deal with the environmental issues and for ensuring compliance with the environmental clearance conditions are enclosed in Revised Final EIA Report.	Annexure - 10A Chapter - 10 Para - 10.4 Page - 199
7	Soil quality representing the various land uses in the area;	<p>The various landuses in 10km radius of the cement plant are given below</p> <ul style="list-style-type: none"> a. Barren Land - S1 b. Agriculture crop land - S2 c. Agriculture Fallow Land - S3 d. Forest Land - S4 e. Water Bodies f. Builtup Area g. Other Mines/quarries <p>Four soil samples from the above locations have been collected.</p> <p>Soil Quality of the samples collected at the above locations are enclosed in Revised Final EIA Report.</p>	Chapter - 3 Para - 3.4.1 Page - 55 to 57
8	Hazard identification and Risk Assessment (HIRA) along with proposed mitigation measures specific to the plant;	Hazard identification and Risk Assessment (HIRA) specific to the cement plant operations along with proposed mitigation measures is included in Revised Final EIA Report.	Chapter - 7 Para - 7.2.1 Page - 148 to 155
9	The hydrogeological report based on GEC methodology;	Hydro Geology report based on GEC methodology is prepared.	Chapter - 3 Para - 3.4 Page - 55
10	Enterprise Social commitment shall be revised with addressing the issues raised during	CSR plan under Enterprise Social commitment addressing the issues raised during the public hearing and	Chapter - 8 Para - 8.3 Page - 185 to 193

S. No	Points	Reply	Reference in the Revised EIA Report
	the public hearing and need based assessment for creation of facilities in CAPEX mode and implemented in concurrence with expansion proposal; and	need based assessment has been revised.	
11	Ground water withdrawal should not exceed 700 m ³ /day and maximize the use of rainwater harvested	Ground water withdrawal will not exceed 700 m ³ /day and balance water requirement of the plant will be met from harvested rainwater	Chapter - 2 Para – 2.6.3 Page - 22

MOEF file

(file with V-P(P)).

F. No. J-11011/351/2006-IA-II (I)
Government of India
Ministry of Environment & Forests
 (IA Division)

Paryavaran Bhawan
 CGO Complex, Lodhi Road
 New Delhi - 110 003

E-mail : pb.rastogi@nic.in
 Telefax : 011-24367668
 Dated 18th May, 2007

To, ✓
 Shri U.R. Rao *U.R. Rao*
 Vice President (Project) *12/11*
 M/s Panna Cement Industries Ltd.
 Sanghi Nagar
 Ranga Reddy - 501511
 Andhra Pradesh

Fax No. : 040-23365941/2336395

E-mail : project@pannacement.com / panna@silfy.com

Subject : Cement Plant (2.00 MTPA) and Clinker Production (1.50 MTPA) at Kamakapadu & Nittur, Yadiki, Anantpur, A. P. by M/s Panna Cement Industries Ltd.

Sir,

This has reference to your letter no. PCIL/MOEF/REIA/Plant/2006 dated 18th October, 2006 alongwith project documents including Application form, Questionnaire and EIA/EMP seeking environmental clearance and subsequent clarifications furnished vide communications dated 8th December, 2006 regarding the above mentioned project.

2.0 The Ministry of Environment and Forests has examined your application. It is noted that the proposal is for environmental clearance for the Cement Plant at Kamakapadu & Nittur, Yadiki, Anantpur, A. P. Total land acquired is 60 ha. Yadiki R.F. and Devagudipada R.F. are located at a distance of 7.2 and 9.8 km. respectively. No forest land and R & R is involved.

3.0 Pre-calciner technology will be used for manufacturing cement. ESP to clinker cooler, bag filters to kiln, coal mill and cement mill and bag house to raw mill/kiln will be provided to control air emissions from various sources within 50 mg/Nm³. Fugitive dust in material handling areas will be controlled by providing closed clinker stockpile system, cemented roads, sprinkling water in the stockyard and loading / unloading areas and transporting limestone from Captive mine to the plant site by the belt conveyors. Total ground water requirement will be 700 m³/day. All the treated wastewater will be recycled / reused in the process or for green belt development. No effluent will be discharged outside the premises and 'Zero discharge' will be adopted. Slag will be used in the cement plant. The dust collected from APCS in the cement plant will be recycled and reused in the process.

4.0 Public hearing meeting was held on 30th August 2006. 'Consent for Establishment' has been accorded by the Andhra Pradesh Pollution Control Board vide letter no. 97/PCB/CFE/RO-RO-KNL/HO/2006 dated 4th October 2006. Total cost of the project is Rs. 400.00 Crores.

5.0. The Ministry of Environment and Forests hereby accords environmental clearance to the above project under the provisions of EIA Notification dated 14th September, 2006 subject to strict compliance to the following specific and general conditions:

A. Specific Conditions :

- i. The gaseous and particulate matter emissions from various units shall conform to the standards prescribed by the A.P. Pollution Control Board. At no time, the particulate emissions from the cement plant shall exceed APPCB limit. Interlocking facility shall be provided in the pollution control equipment so that in the event of the pollution control equipment not working, the respective unit(s) is shut down automatically.
- ii. ESP to clinker cooler, bag filters to kiln, coal mill and cement mill and bag house to raw mill/kiln shall be provided to control air emissions from various sources within 50 mg/Nm³. Bag filters and ventilation system shall be provided to control fugitive dust in material handling areas. The dust collected from the pollution control equipments shall be recycled back into the process. Continuous on-line monitoring system to monitor gaseous emissions shall be provided and on-line monitoring data shall be submitted to the APPCB and CPCB regularly.
- iii. One ambient air quality monitoring station shall be installed in downwind direction. Ambient air quality including ambient noise levels shall not exceed the standards stipulated under EPA or by the State authorities. Monitoring of ambient air quality and stack emissions shall be carried out regularly in consultation with APPCB and report submitted to the APPCB quarterly and to the Ministry's Regional Office at Bangalore half-yearly.
- iv. The company shall install adequate dust collection and extraction system to control fugitive dust emissions at various transfer points, raw mill handling (unloading, conveying, transporting, stacking), vehicular movement, bagging and packing areas etc. Asphaltting/concreting of roads and water spray all around the stockyard and loading / unloading areas shall be carried out to control fugitive emissions. Storage of raw material shall be in closed roof sheds. A closed clinker stockpile system shall be provided. Limestone shall be transported from Captive mine to the plant site by the belt conveyors to control spillage of dust and fugitive emission.
- v. Total water requirement from the ground water source shall not exceed 700 m³/day. All the treated wastewater shall be recycled and reused in the process and/or for dust suppression, green belt development and other plant related activities etc. No process wastewater shall be discharged outside the factory premises and 'zero' discharge shall be adopted. Domestic effluent treated in Sewage Treatment Plant (STP) shall be used for green belt development within the plant and colony area.
- vi. Prior permission for the drawl of ground water from the Water Works Department / State Ground Water Board / Central Ground Water Authority shall be obtained and compliance to all the recommendations mentioned in the Ground Water Survey Report of Water Works Department shall be ensured.
- vii. The company must harvest the rainwater from the rooftops and storm water drains to recharge the ground water and use the same water for the various activities of the project to conserve fresh water.
- viii. Green belt shall be developed in at least 20 ha. (33%) out of total 60 ha. land in consultation with the local DEO as per the CPCB guidelines.
- ix. High calorific hazardous waste shall be used as fuel in the cement kiln. Accordingly, provision shall be made in the kiln. As proposed, slag shall be used in the cement plant. All the cement dust collected from pollution control devices shall be recycled and reused in the process. Bio-degradable and non-degradable waste generated from the colony and

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STP shall be incinerated in the incinerator and incinerator ash shall be disposed off in identified areas. Hazardous waste viz. Spent oil from gear boxes and automotive batteries etc. shall be properly stored in a designated area and sold to authorized recyclers/ reprocessors.

- x. The company shall undertake eco-development measures including community welfare measures in the project area.

- xi. All the recommendations of the Corporate Responsibility for Environment Protection (CREP) shall be strictly followed.

B. General Conditions :

- i. The project authority must adhere to the stipulations made by A. P. State Pollution Control Board (APPCB) and State Government.

- ii. No further expansion or modification of the plant shall be carried out without prior approval of this Ministry.

- iii. At least four ambient air quality monitoring stations shall be established and one in the downward direction as well as where maximum ground level concentration of SPM, SO₂ and NO_x are anticipated in consultation with the APPCB. Data on ambient air quality and stack emissions shall be regularly submitted to this Ministry including its Regional Office at Bangalore and APPCB once in six months.

- iv. Industrial wastewater shall be properly collected, treated so as to conform to the standards prescribed under GSR 422 (E) dated 19th May, 1983 and 31st December, 1983 or as amended from time to time. The treated wastewater shall be utilized for plantation purposes.

- v. The overall noise levels in and around the plant area shall be kept well within the standards (85 dBA) by providing noise control measures including acoustic hoods, silencers, enclosures etc. on all sources of noise generation. The ambient noise levels shall conform to the standards prescribed under Environmental (Protection) Act, 1986 Rules, 1989 viz. 75 dBA (day time) and 70 dBA (night time).

- vi. Proper housekeeping and adequate occupational health programmes must be taken up. Occupational Health Surveillance programme shall be done on a regular basis and records maintained. The programme must include lung function and sputum analysis tests once in six months.

- vii. The project proponent shall also comply with all the environmental protection measures and safeguards recommended in the EIA/EMP.

- viii. A separate environmental management cell with full-fledged laboratory facilities to carry out various management and monitoring functions shall be set up under the control of Senior Executive.

- ix. As mentioned in the EIA/EMP, Rs. 40.00 Crores earmarked towards the total cost and recurring cost/annum for implementing environmental pollution control measures shall be judiciously used to implement the conditions stipulated by the Ministry of Environment and Forests as well as the State Government. The funds so provided shall not be diverted for any other purposes.

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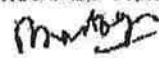
- x. The Regional Office of this Ministry at Bangalore / Central Pollution Control Board / A. P. Pollution Control Board shall monitor the stipulated conditions. A six monthly compliance report and the monitored data along with statistical interpretation should be submitted to them regularly.
- xi. The Project Authorities should inform the Regional Office as well as the Ministry, the date of financial closure and final approval of the project by the concerned authorities and the date of commencing the land development work.
- xii. The Project Proponent shall inform the public that the project has been accorded environmental clearance by the Ministry and copies of the clearance letter are available with the A. P. Pollution Control Board / Committee and may also be seen at Website of the Ministry of Environment and Forests at <http://envfor.nic.in>. This shall be advertised within seven days from the date of issue of the clearance letter at least in two local newspapers that are widely circulated in the region of which one shall be in the vernacular language of the locality concerned and a copy of the same should be forwarded to the Regional office.

6.0 The Ministry or any competent authority may stipulate any further condition(s) on receiving reports from the project authorities. The above conditions will be monitored by the Regional Office of this Ministry located at Bangalore.

7.0 The Ministry may revoke or suspend the clearance if implementation of any of the above conditions is not satisfactory.


8.0 Any other conditions or alteration in the above conditions shall have to be implemented by the project authorities in a time bound manner.

9.0 The above conditions will be enforced, inter-alia under the provisions of the Water (Prevention and Control of Pollution) Act, 1974 the Air (Prevention and Control of Pollution) Act, 1981 the Environment (Protection) Act, 1986 and the Public Liability Insurance Act, 1991 alongwith their amendments and rules.


(Dr. P. B. Rastogi)
Additional Director

Copy to :

1. The Secretary, State Department of Environment and Forests, Govt. of Andhra Pradesh, Mantralaya, Hyderabad, A.P.
2. The Chairman, Central Pollution Control Board Parivash Bhavan, CBD-cum-Office Complex, East Arjun Nagar, New Delhi - 110032.
3. The Chairman, Andhra Pradesh State Pollution Control Board, 2nd Floor, HUDA Complex, Maitrivarman, S.R. Nagar, Hyderabad - 500 038, A. P.
4. The Chief Conservator of Forests (Central), Ministry of Environment & Forest, Regional Office (SZ), Kendriya Sadan, IVth Floor, E&F Wing, 17th Main Road, Koramangla, Bangalore - 560 034, Karnataka.
5. JS (CCI-I), Ministry of Environment and Forests, Paryavaran Bhavan, CGO Complex, New Delhi - 110003.
6. Monitoring Cell, Ministry of Environment and Forests, Paryavaran Bhavan, CGO Complex, New Delhi-110003.
7. Guard file.
8. Record file
9. Monitoring file.


(Dr. P. B. Rastogi)
Additional Director



सत्यमेव जयते

भारत सरकार

GOVERNMENT OF INDIA

पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय

MINISTRY OF ENVIRONMENT, FOREST & CLIMATE CHANGE

Regional Office (South Eastern Zone),

1st & 2nd floor, HEPC Building, No.34, Cathedral Garden Road,
Nungambakkam, Chennai - 600034

No. EP/12.1/570/AP/0985

Dated: 27th June, 2017

To

✓ Shri D. Lakshmi Kanthan,
Director - Technical,
M/s Penna Cement Industries Limited,
Lakshmi Niwas - 705,
Road No.3, Banjara Hills,
Hyderabad - 500034
Telangana.

Subject: Cement Plant (2.0 MTPA) and Clinker production (1.50 MTPA) at Kamalapadu & Nittur villages, Yadiki Mandal, Anantapur District, Andhra Pradesh by M/s Penna Cement Industries Limited

Reference: MoEF&CC letter no. J-11011/351/2006-IA. II (I) dated 18/05/2007

Sir,

The aforesaid project was monitored by the undersigned on 1st June, 2017 and observed that stipulated EC conditions are not complied which inter-alia includes the following:

- Statistical interpretation of the monitored environmental data has not been submitted to the Regional Office of the MoEF&CC (General condition no. x).
- Date of financial closure and final approval of the project by the concerned authorities and the date of start of the project has not been informed to the Regional Office (General condition no. xi).

A copy of the monitoring report is enclosed herewith. You are requested to take necessary corrective action to comply with the above and send action taken report on the implementation within a month.

This is approved by the Addl.PCCF (Central), RO-Chennai vide diary no.837 dated 27/06/2017.

Yours faithfully,

R. Ramanathan
(Sundar Ramanathan)
Scientist 'D'

Government of India
Ministry of Environment, Forest and Climate Change (MoEF&CC)
Regional Office – South Eastern Zone
Nungambakkam, Chennai – 600034.

MONITORING REPORT

PART I

DATA SHEET

EP/12.1/570/AP

- 1 Project Type : Industry (Cement Plant)
River valley / Mining /
Industry / Thermal / Nuclear /
Other Specify
- 2 Name of the project : Cement Plant (2.0 MTPA) and Clinker production
(1.50 MTPA) at Kamalapadu & Nittur villages, Yadiki
Mandal, Anantapur District, Andhra Pradesh by M/s
Penna Cement Industries Limited
- 3 Clearance letter(s) / OM No. : J-11011/351/2006-IA.II(I) dated 18/05/2007
and dated
- 4 Locations :
 - a. Taluk(s) : Kamalapadu & Nittur villages, Yadiki Mandal,
District Anantapur District
 - b. State (s) : Andhra Pradesh
 - c. Latitudes / : 15° 3' 35.70" N - 15° 3' 51.80" N
Longitudes : 77° 57' 12.50" E - 77° 56' 52.80" E
- 5 Address of correspondence
 - a. Address of concerned project : Shri D.Lakshmi Kanthan,
Chief Engineer (with Pin Director – Technical,
Code & telephone / telex / fax M/s Penna Cement Industries Limited,
numbers Lakshmi Niwas – 705,
Road No.3, Banjara Hills,
Hyderabad – 500034
Telangana.
 - b. Address of Executive Project : Shri G.Sudhakar Reddy,
Engineer/ Manager (with Pin Unit Head,
Code/fax numbers) M/s Penna Cement Industries Limited,
Kamalapadu & Nittur villages, Yadiki Mandal,
Anantapur District - 515408
Andhra Pradesh.
- 6 Salient features:
 - a. Salient features and present :
 - Project involves setting up of clinker production
status of the project (1.50 MTPA) and cement plant of 2.0 MTPA
capacity.
 - Project has been implemented and the unit is
manufacturing clinker of 1.50 MTPA and cement
of 2.00 MTPA capacity. Consent for Operation
(CFO) renewal has been obtained from the
Andhra Pradesh Pollution Control Board
(APPCB) vide order no.
APPCB/KNL/ATP/97/HO/CFO/2015-475 dated
22/04/2015 and is valid up to 28/02/2018.


b.	of the environmental management plans	:	<ul style="list-style-type: none">• Control equipment like bag houses are provided in the process areas of Kiln, raw mill, coal mill, cement mill & slag grinding mill to control the stack emission within the permissible limits.• Closed belt conveyor for limestone transportation.• Covered shed for raw materials storage.• Internal and external roads of factory were concreted to reduce the dust emission during vehicle movement.• Online stack monitor and continuous ambient air quality monitoring equipment installed to measure the pollution level.• Drip irrigation system for green belt development.• Monitoring of environmental parameters through third party (MoEF&CC recognized laboratory).
7	<u>Breakup of the project area:</u>		
	Project area	:	60 Ha
8	Break up of project affected population with enumeration of those losing houses / dwelling units only, agricultural land only, both dwelling units and agricultural land and landless labourers / artisans	:	Nil
	a SC,ST/Adivasis	:	Not Applicable.
	b Others	:	Not Applicable.
9	<u>Financial Details:</u>		
	a Project cost as originally planned and subsequent revised estimates and the years of price reference	:	Rs.400 Crores
	b Allocations made for environmental management plans, with item wise and year wise breakup	:	Rs.40 Crores
	c Benefit cost ratio / internal rate of return and the years of assessment	:	--
	d Whether (c) includes the cost of environmental management as shown in (b) above	:	—
	e Total expenditure on the Project so far	:	Rs.602.20 Crores
	f Actual expenditure incurred on the environmental management plans so far	:	Capital cost : Rs. 57.35 crores Recurring cost: Third party monitoring : Rs.0.20 crores/annum Pollution control equipment Maintenance charges : Rs.0.22 crores/annum Green belt development : Rs. 6 lakhs/annum
10	<u>Forest land requirement:</u>	:	NIL

- a The status of approval for a diversion of forest land for non-forestry use : Not Applicable
 - b The status of compensatory afforestation, if any : Not Applicable
 - c The status of clear felling : Not Applicable
 - d Comments on the viability and sustainability of compensatory afforestation programme in the light of actual field experience so far : Not Applicable
- 11 The status of clear felling in non-forest area (such as submergence area of reservoir, approach road), if any, with quantitative information : Not Applicable
- 12 Status of construction:
- a. Date of commencement : October, 2006
 - b. Date of completion (actual and / or planned) : February, 2008
- 13 Reasons for the delay if the project is yet to start. : Nil
- 14 Date of site visit:
- a The dates on which the project was monitored by the Regional Office on previous occasions, if any : 07.07.2010
 - b Date of site visit for this monitoring report : 01.06.2017

The above project was monitored by the undersigned on 01.06.2017 along with the representatives of the M/s Penna Cement Industries Limited [M/s PCIL - herein after referred as Project Proponent (PP)].

The status of compliance on the stipulated conditions contained in the Environmental Clearance cited above is given below in Part II & Part III.

This is approved by the Addl.PCCF (Central), RO-Chennai vide diary no.837 dated 27/06/2017.


(Sundar Ramanathan)
Scientist 'D'

PART II & III

DESCRIPTIVE REPORT ON STATUS OF COMPLIANCE TO THE CONDITIONS OF THE ENVIRONMENTAL CLEARANCE AND ENVIRONMENTAL MANAGEMENT

Subject: Cement Plant (2.0 MTPA) and Clinker production (1.50 MTPA) at Kamalapadu & Nittur villages, Yadiki Mandal, Anantapur District, Andhra Pradesh by M/s Penna Cement Industries Limited

Reference: MoEF&CC letter no. J-11011/351/2006-IA. II (I) dated 18/05/2007

A. SPECIFIC CONDITIONS:

S.No.	Specific conditions	Compliance status										
i.	<p>The gaseous and particulate matter emissions from various units shall conform to the standards prescribed by the A.P. Pollution Control Board .At no time, the particulate emissions from the cement plant shall exceed APPCB limit.</p> <p>Interlocking facility shall be provided in the pollution control equipment so that in the event of the pollution control equipment not working, the respective unit(s) is shut down automatically.</p>	<p>Complied.</p> <p>For controlling particulate emissions following air pollution control systems have been installed:-</p> <table><tr><td>Kiln & raw mill</td><td>: RABH</td></tr><tr><td>Cooler</td><td>: ESP</td></tr><tr><td>Coal mill</td><td>: Bag House</td></tr><tr><td>Cement mill</td><td>: Bag House</td></tr><tr><td>Slag grinding mill</td><td>: Bag House</td></tr></table> <p>Total no. of chimneys in the cement plant are 7 Nos. Out of the 7 stacks, 5 Nos are process stacks. Continuous monitoring system to monitor gaseous emissions through 5 stacks has been commissioned and the online real time monitoring data is being transmitted to APPCB/CPCB server. In addition to this, stack emission monitoring is being done manually by the third party (MoEF&CC recognized laboratory) on quarterly basis. Report provided during the visit indicates that the particulate emission levels from the stacks are not exceeding 30 mg/Nm³.</p> <p>Inter locking system provided between pollution control equipments and process operation. Whenever pollution control equipment fails, the process system gets tripped and stops the operation as informed.</p>	Kiln & raw mill	: RABH	Cooler	: ESP	Coal mill	: Bag House	Cement mill	: Bag House	Slag grinding mill	: Bag House
Kiln & raw mill	: RABH											
Cooler	: ESP											
Coal mill	: Bag House											
Cement mill	: Bag House											
Slag grinding mill	: Bag House											
ii.	<p>ESP to clinker cooler, bag filters to kiln, coal mill and cement mill and bag house to raw mill/kiln shall be provided to control air emissions from various sources within 50 mg/Nm³.</p> <p>Continuous on-line monitoring system to monitor gaseous emissions shall be</p>	<p>Complied.</p> <p>For controlling particulate emissions following air pollution control systems have been installed:-</p> <table><tr><td>Kiln & raw mill</td><td>: RABH</td></tr><tr><td>Cooler</td><td>: ESP</td></tr><tr><td>Coal mill</td><td>: Bag House</td></tr><tr><td>Cement mill</td><td>: Bag House</td></tr><tr><td>Slag grinding mill</td><td>: Bag House</td></tr></table> <p>Continuous monitoring system to monitor gaseous emissions through 5 stacks has</p>	Kiln & raw mill	: RABH	Cooler	: ESP	Coal mill	: Bag House	Cement mill	: Bag House	Slag grinding mill	: Bag House
Kiln & raw mill	: RABH											
Cooler	: ESP											
Coal mill	: Bag House											
Cement mill	: Bag House											
Slag grinding mill	: Bag House											

S.No.	Specific conditions	Compliance status
	<p>provided and on-line monitoring data shall be submitted to the APPCB and CPCB regularly.</p> <p>Bag filters and ventilation system shall be provided to control fugitive dust in material handling areas. The dust collected from the pollution control equipment shall be recycled back into the process.</p>	<p>been commissioned and the online real time monitoring data is being transmitted to APPCB/CPCB server. In addition to this, stack emission monitoring is being done manually by the third party (MoEF&CC recognized laboratory) on quarterly basis. Report provided during the visit indicates that the particulate emission levels from the stacks are not exceeding 30 mg/Nm³.</p> <p>Total 43 dust collectors have been installed at all material transfer points in the cement plant for effective control of fugitive emissions as informed. All the raw materials except limestone are stored in covered sheds to control fugitive emissions. Clinker, fly ash and cement are stored in silos. Regular water sprinkling in the dust prone areas are being carried out. Dust collected from pollution control equipment is being reused in the process. One automatic road sweeping machine has been deployed for the concrete road cleaning.</p>
iii.	<p>One ambient air quality monitoring station shall be installed in down wind direction. Ambient air quality including ambient noise levels shall not exceed the standards stipulated under EPA or by the State authorities. Monitoring of ambient air quality and stack emissions shall be carried out regularly in consultation with APPCB and report submitted to the APPCB quarterly and to the Ministry's Regional Office at Bangalore half yearly.</p>	<p>Complied.</p> <p>Two online real time Continuous Ambient Air Quality Monitoring (CAAQM) stations have been installed in upwind & downwind directions after consultation with APPCB as informed. Online real time monitoring data is transmitted to APPCB & CPCB server for the parameters PM₁₀, PM_{2.5}, SO₂ and NO_x. In addition to this, Ambient Air Quality is monitored manually also at four locations by a third party (MoEF&CC recognized laboratory) on quarterly basis for the parameters PM₁₀, PM_{2.5}, SO₂ and NO_x. As per the report provided during the visit, it is observed that the AAQ parameters are within the limits. Monitored AAQ data are being submitted to the APPCB and Regional Office of the MoEF&CC along with the six monthly compliance report.</p>
iv.	<p>The company shall install adequate dust collection and extraction systems to control fugitive dust emissions at various transfer points, raw mill handling (unloading, conveying, transporting, stacking), vehicular movement, bagging and packing areas etc. Asphaltting/concreting of roads and water spray all around the stockyard and loading / unloading areas shall be carried out to control fugitive emissions.</p>	<p>Complied.</p> <ul style="list-style-type: none"> • Total 43 dust collectors have been installed at all material transfer points in the cement plant area for effective control of fugitive emissions. • All the raw materials except limestone are stored in covered sheds to control fugitive emissions. Clinker, fly ash and cement are stored in silos. • Regular water sprinkling in the dust

S.No.	Specific conditions	Compliance status
	Storage of raw material shall be in closed roof sheds. A closed clinker stockpile system shall be provided. Limestone shall be transported from Captive mine to the plant site by the belt conveyors to control spillage of dust and fugitive emission.	<p>prone areas are also being carried out.</p> <ul style="list-style-type: none"> Limestone from the crusher to the plant is being transported through closed conveyor belt. Transport vehicles are periodically checked for Pollution Under Control Certificate from approved agencies as informed. Internal and external roads of factory were concreted to reduce the dust emission during vehicle movement. One automatic road sweeping machine has been deployed for the concrete road cleaning and good housekeeping is maintained. Separate railway siding is commissioned from Jutur railway station to the cement plant site for transport of raw materials and cement.
v.	Total water requirement from the ground water source shall not exceed 700 m ³ /day. All the treated wastewater shall be recycled and reused in the process and/or for dust suppression, green belt development and other plant related activities etc. No process water waste shall be discharged outside the factory premises and 'Zero' discharge shall be adopted. Domestic effluent treated in Sewage Treatment Plant (STP) shall be used for green belt development within the plant and colony area.	<p>Complied.</p> <p>Actual ground water requirement is 700 KLD (Cement Plant: 580 KLD; Domestic: 120KLD) which is being met from 5 bore wells located within the project site. Flow meters are provided in the bore wells. Domestic wastewater generation from the plant & colony is 96 KLD and it's treated in the 250 KLD Sewage Treatment Plant. The treated wastewater is being utilized for the green belt development through drip irrigation method and also for dust suppression activity. There is no effluent generation as the dry process is used for manufacturing cement. No wastewater is discharged outside the plant premises. Zero liquid discharge is being maintained.</p>
vi.	Prior permission for the drawl of ground water from the Water Works Department / State Ground Water Board / Central Ground Water Authority shall be obtained and compliance to all the recommendations mentioned in the Ground Water Survey Report of Water Works Department shall be ensured.	<p>Complied.</p> <p>PP vide letter no.820/IDC/T1/2006 dated 7/12/2006 obtained permission from Ground Water Department, Govt. of Andhra Pradesh for the drawl of 700 KLD from 5 bore wells located within the project site. Flow meters are provided in the bore wells.</p>
vii.	The company must harvest the rainwater from the rooftops and storm water drains to recharge the ground water and use the same water for the various activities of the project to conserve fresh water.	<p>Complied</p> <p>Rain water from roof tops and storm water drains are being recharged into ground through 14 nos of rain water percolation pits constructed by the PP within the project site. Further, PP has constructed a check dam near Chintalayapalli village which helps to recharge the ground water.</p>
viii.	Green belt shall be developed in at least	Complied.

S.No.	Specific conditions	Compliance status
	20 ha. (33%) out of total 60 ha. Land in consultation with the local DFO as per the CPCB guidelines.	Total area (plant and colony) is 60 Ha. Out of 60 Ha, 27.17 Ha have been covered under the green belt development with mixed species as per the CPCB guidelines. It was informed that species for the green belt development have been chosen in consultation with DFO and as per the local climatic conditions. The total number of saplings/plants (Peltophorum, Kanuga, Neem, Ganneru, Dasani and Tapasvi etc.) exists in the 27.17 Ha is 36,050 Nos as informed. Plantation work is satisfactory and survival rate is observed to be about 90%.
ix.	High calorific hazardous waste shall be used as fuel in the cement kiln. Accordingly, provision shall be made in the kiln. As proposed, slag shall be used in the cement plant. All the cement dust collected from pollution control devices shall be recycled and reused in the process. Bio-degradable and non-degradable waste generated from the colony and STP shall be incinerated in the incinerator and incinerator ash shall be disposed off in identified areas. Hazardous waste viz. Spent oil from gear boxes and automotive batteries etc. shall be properly stored in a designated area and sold to authorize recyclers / re processors.	Complied. It was informed that necessary provisions in kiln have been made to use high calorific liquid fuel. Presently, lube oil generated from the cement plant is being burnt in the Kiln. Slag procured from JSW Vijayanagar steel plant is being used in the cement plant. Dust generated from the process is being recycled back into the cement manufacturing process. The solid waste from sewage treatment plant is being used as manure for Green Belt development. Waste lube oil generation is 7.5 MT/annum and it's disposed to the authorized recyclers (or) co-processed in the cement kiln. Used battery generation is 100 Nos and it's returned to the manufacturers on buy back basis. Authorization in this regard has been obtained from APPCB and it is valid up to 28/02/2018.
x.	The company shall undertake eco-development measures including community welfare measures in the project area.	Complied. Total area (plant and colony) is 60 Ha. Out of 60 Ha, 27.17 Ha have been covered under the green belt development by planting about 36,050 saplings. Further, it was informed that an amount of Rs. 2,57,64,613/- has been incurred towards the community welfare measures such as village infrastructure, free health camps and skill development etc.
xi.	All the recommendations of the Corporate Responsibility for Environment Protection (CREP) shall be strictly followed.	Complied. Recommendations mentioned in the CREP guidelines for cement plant such as installation of continuous monitoring equipment (stack & ambient), control of particulate matter emission level, fugitive emission control measures and recycling of dust into the process etc. are being complied.

B. GENERAL CONDITIONS:-

S.No.	General conditions	Compliance status
i.	The project authority must adhere to the stipulations made by A.P. State Pollution Control Board (APPCB) and State Government.	Complied. Consent for Operation (CFO) renewal has been obtained from the Andhra Pradesh Pollution Control Board (APPCB) vide order no. APPCB/KNL/ATP/97/HO/CFO/2015-475 dated 22/04/2015 and is valid up to 28/02/2018. Stipulations made by the APPCB are being adhered with.
ii.	No further expansion or modification of the plant shall be carried out without prior approval of this Ministry.	Agreed upon. It was submitted that this condition is noted and assured to abide by this condition.
iii.	At least four ambient air quality monitoring stations shall be established and one in the downward direction as well as where maximum ground level concentration of SPM, SO ₂ and NO _x are anticipated in consultation with the APPCB. Data on ambient air quality and stack emissions shall be regularly submitted to this Ministry including its Regional Office at Bangalore and APPCB once in six months.	Complied. Two online real time Continuous Ambient Air Quality Monitoring (CAAQM) stations have been installed in upwind & downwind directions after consultation with APPCB as informed. Online real time monitoring data is transmitted to APPCB & CPCB server for the parameters PM ₁₀ , PM _{2.5} , SO ₂ and NO _x . In addition to this, Ambient Air Quality is monitored manually also at four locations by a third party (MoEF&CC recognized laboratory) on quarterly basis for the parameters PM ₁₀ , PM _{2.5} , SO ₂ and NO _x . As per the report provided during the visit, it is observed that the AAQ parameters are within the limits. Monitored AAQ data are being submitted to the APPCB and Regional Office of the MoEF&CC along with the six monthly compliance report.
iv.	Industrial wastewater shall be properly collected, treated so as to conform to the standards prescribed under GSR 422 (E) dated 19th May, 1993 and 31st December, 1993 or as amended from time to time. The treated wastewater shall be utilized for plantation purpose.	Refer below. There is no effluent generation as the dry process is used for manufacturing cement. Domestic wastewater generation from the plant & colony is 96 KLD and it's treated in the 250 KLD Sewage Treatment Plant. The treated wastewater is being utilized for the green belt development through drip irrigation method and also for dust suppression activity. The quality of the STP treated wastewater is being analyzed by third party on quarterly basis. Report provided during the visit does not show any anomaly.
v.	The overall noise levels in and around the plant area shall be kept well within the standards (85 dBA) by providing noise control measures including acoustic hoods, silencers, enclosures etc. on all sources of noise generation. The ambient noise levels shall conform	Complied. Silencers and acoustic enclosures were provided in the noise generating sources. Earplugs are provided to the workmen and they are using the same. Ambient noise level (day time and night time) is being monitored by a third party (MoEF&CC

S.No.	General conditions	Compliance status
	to the standards prescribed under Environmental (Protection) Act, 1986 Rules, 1989 viz. 75 db A (day time) and 70 db A (night time).	recognized laboratory) at 5 locations on quarterly basis. Report provided during the visit indicates that the ambient noise levels are within the permissible limits.
vi.	Proper housekeeping and adequate occupational health programmers must be taken up. Occupational Health Surveillance programme shall be done on a regular basis and records maintained. The programme must include lung function and sputum analysis tests once in six months.	Complied. Proper housekeeping is maintained. PP has established separate Occupational Health Centre (OHC) with MBBS qualified doctor and round the clock para-medical staff. PP is carrying out occupational health surveillance programme including lung function and sputum tests and audiometric tests for their employees on six monthly basis through third party namely M/s J.R. Labs, Hyderabad. Records are maintained as per the Factories Act.
vii.	The project proponent shall also comply with all the environmental protection measures and safeguards recommended in the EIA/EMP	Complied. Environmental protection measures recommended in the EIA/EMP report are being adhered with.
viii.	A separate environmental management cell with full-fledged laboratory facilities to carry out various management and monitoring functions shall be set under the control of Senior Executive.	Complied. Separate Environmental Management Cell (EMC) with the following composition has been established: i. Unit head; ii. General Manager; and iii. Dy. General Manager - Environment Full-fledged laboratory facilities have been established for the monitoring of particulate matter in the ambient air and water quality parameters. Further, environmental monitoring is also being carried out by a third party (MoEF&CC recognized laboratory) on quarterly basis.
ix.	As mentioned in the EIA/EMP, Rs. 40.0 Crores earmarked towards the total cost and recurring cost/annum for implementing environmental pollution control measures shall be judiciously used to implement the conditions stipulated by the Ministry of Environment and Forests as well as the State government. The funds so provided shall not be diverted for any other purposes.	Complied. Fund provision as shown in s.no.9 of Part - I has been made. An amount of Rs.57.35 Crores and Rs.0.48 Crores has been incurred towards the capital cost and recurring cost per annum for environment protection measures. It was informed that fund earmarked towards EMP has not been diverted for any other purpose.
x.	The Regional Office of this Ministry at Bangalore / Central Pollution Control Board / A.P. Pollution Control Board shall monitor the stipulated conditions. A six monthly compliance report and the monitored data along with statistical interpretation should be	Partly complied. Six monthly compliance reports (both hard and soft copy) along with the environmental monitored data are being submitted to the Regional Office of the MoEF&CC, CPCB and APPCB. However, statistical interpretation of the monitored data have

S.No.	General conditions	Compliance status
	submitted to them regularly.	not been submitted to the Regional Office of the MoEF&CC.
xi.	The Project Authorities should inform the Regional Office as well as the Ministry, the date of financial closure and final approval of the project by concerned authorities and the date of commencing the land development work.	Not complied. Date of financial closure and final approval of the project by the concerned authorities and the date of start of the project has not been informed to the Regional Office.
xii.	The Project Proponent shall inform the public that the project has been accorded environmental clearance by the Ministry and copies of the clearance letter are available with the A. P. Pollution Control Board / Committee and may also be seen at Website of the Ministry of Environment and Forests at http://envfor.nic.in . This shall be advertised within seven days from the date of issue of the clearance letter at least in two local newspaper that are widely circulated in the region of which one shall be in the vernacular language of the locality concerned and a copy of the same should be forwarded to the Regional Office.	Partly complied. Advertisements regarding the accord of environmental clearance were given in the local newspaper namely Hindu and Eenadu on 22/06/2007. The clause of seven days has not been followed. Copy of the paper advertisement has been submitted to the Regional Office of the MoEF&CC on 7/07/2007.
6.	The Ministry or any other Competent Authority may stipulate any further condition(s) on receiving reports from the project authorities. The above conditions will be monitored by the Regional Office of this Ministry located at Bangalore.	Agreed upon. It was submitted that this condition is noted and assured to abide by this condition.
7.	The Ministry may revoke or suspend the clearance, if implementation of any of the above conditions is not satisfactory.	Agreed upon. It was submitted that this condition is noted and assured to abide by this condition.
8.	Any other conditions (or) alteration in the above conditions shall have to be implemented by the project authorities in a time bound manner.	Agreed upon. It was submitted that this condition is noted and assured to abide by this condition.
9.	The above conditions shall be enforced, inter-alia under the provisions of the Water (Prevention & Control of Pollution) Act, 1974, the Air (Prevention & Control of Pollution) Act, 1981, the Environment (Protection) Act, 1986 and the Public (Insurance) Liability Act, 1991 along with their amendments and rules.	Complied. Consent & Authorization under the Air Act, Water Act and Hazardous Waste (MH & TM) Rules, 2008 have been obtained which is valid up to 28/02/2018. Insurance under the provisions of the PLI Act, 1991 has been obtained.

Comments and End note:-

1. Status of implementation of stipulated conditions:- It is inferred from above that following are the non-compliances observed against the stipulated conditions of the Environmental Clearances:-

- I. Statistical interpretation of the monitored environmental data has not been submitted to the Regional Office of the MoEF&CC (**General condition no.x**).
 - II. Date of financial closure and final approval of the project by the concerned authorities and the date of start of the project has not been informed to the Regional Office (**General condition no.xi**).
- 2. Housekeeping:** Housekeeping in the premises is satisfactory.
- 3. With regard to issuance of show cause/closure notices/directions:-** It was informed by the PP that there was no issuance of Show Cause/directions/closure notices in the last two years by the APPCB.

This is approved by the Addl.PCCF (Central), RO-Chennai vide diary no.837 dated 27/06/2017.


(Sundar Ramanathan)
Scientist 'D'



ANDHRA PRADESH POLLUTION CONTROL BOARD
PARYAVARAN BHAVAN, A-3, INDUSTRIAL ESTATE,
SANATHNAGAR, HYDERABAD

Phone: 040-23887500
Fax: 040- 23815631
Grams : Kalusya Nivarana
Website : appcb.ap.nic.in

**BY REG. POST WITH ACK. DUE
CONSENT & AUTHORISATION ORDER**

Consent Order No : APPCB/KNL/ATP/97/HO/CFQ/2015- 475 Date: 22.04.2015

(Consent Order for Existing/New or altered discharge of sewage and/or trade effluents/outlet under Section 25/26 of the Water (Prevention & Control of Pollution) Act, 1974 and amendments thereof, Operation of the plant under section 21 of Air (Prevention & Control of Pollution) Act 1981 and amendments thereof and Authorisation / Renewal of Authorisation under Rule 5 of the Hazardous Wastes (Management, Handling & Transboundary, Movement) Rules 2008 & Amendments thereof.

CONSENT is hereby granted under section 25/26 of the Water (Prevention & Control of Pollution) Act, 1974, under section 21 of Air (Prevention & Control of Pollution) Act 1981 and Authorisation under the provisions of HW (MH & TM) Rules (hereinafter referred to as 'the Acts', 'the Rules') and the rules and orders made thereunder to

M/s. Penna Cement Industries Ltd., (Cement Plant),
Nittur (V), & Kamalapadu (V), Yadiki (M),
Anantapur District - 515 408.
e-mail: subbareddy.cv@pennacement.com

(hereinafter referred to as 'the Applicant') authorizing to operate the industrial plant to discharge the effluents from the outlets and the quantity of Emissions per hour from the chimneys as detailed below.

i) Out lets for discharge of effluents:

Outlet No.	Outlet Description	Max Daily Discharge	Point of Disposal
1.	Domestic (plant and canteen - 16 KLD and colony- 80 KLD)	96 KLD	After treatment in STP, the treated effluents should be used for onland for gardening/ plantation.

ii) Emissions from chimneys:

Chimney No.	Description of Chimney
1.	Attached to Rotary Mill / Kiln
2.	Attached to Kiln feeding system
3.	Attached to Clinker Cooler
4.	Attached to Coal Mill
5.	Attached to Cement Mill
6.	Attached to Slag grinding mill
7.	Attached to D.G set of capacity 1250 KVA

iii) HAZARDOUS WASTE AUTHORISATION (FORM - II) [See Rule 5 (4)]

M/s. Penna Cement Industries Ltd., (Cement Plant), Nittur (V), & Kamalapadu (V), Yadiki (M), Anantapur District is hereby granted an authorization to operate a facility for collection, reception, storage, treatment, transport and disposal of Hazardous Wastes namely:

Sl.No.	Name of the Hazardous waste	Stream	Quantity of Hazardous waste	Disposal Option.
1.	Hi-Chrome balls from the ball mill	B 1 of Schedule-II	10 TPA	Shall be disposed to the authorized parties / returned to the manufacturers / recyclers.
2.	Waste Grease & Lube Oil	5.2 Schedule-I	7.5MT/Annum	Shall be sent to the authorized recyclers / re-processors (or) shall be used in the cement kiln along with fuel.
3.	Lead Acid Batteries	17 of Schedule - IV	100 nos./annum	Shall be disposed to the authorized parties / returned to the manufacturers / recyclers.

This consent order is valid to manufacture the following products along with quantities indicated below only.

S.No	Products	Capacity
1.	Cement	2.0 Million TPA

* The cement production is inclusive of 1.5 MTPA of clinker production.

This order is subject to the provisions of 'the Acts' and the Rules' and orders made thereunder and further subject to the terms and conditions incorporated in the schedule A, B & C enclosed to this order.

This combined order of consent & Hazardous Waste Authorisation should be valid for a period ending with the 28th day of February 2018.

Sd/-
MEMBER SECRETARY

To
M/s. Penna Cement Industries Ltd., (Cement Plant),
Nittur(V), & Kamalapadu(V), Yadiki (M),
Anantapur District - 515408.

Copy to:

1. The JCEE, Zonal Office, Kurnool for information and necessary action.
 2. The JCEE (Cess), APPCB, Hyderabad for information.
- The Environmental Engineer, Regional Office, Kurnool for information and necessary action

//T.C.F.B.O//

Kale
JOINT CHIEF ENVIRONMENTAL ENGINEER
UNIT HEAD - IV

SCHEDULE - A

1. The applicant shall make applications through online for renewal of Consent (under Water and Air Acts) and Authorization under HWM Rules at least 120 days before the date of expiry of this order, along with prescribed fee under Water and Air Acts for obtaining Consent & HW Authorization of the Board.
2. The conditions stipulated in the Schedule - A of the earlier combined CFO & HWA order No. APPCB/KNL/TPT/394/HO/CFO/2518, dt.05.03.2007 remain same. The applicant should ensure consistent compliance of each condition of Schedule-A.
3. Any person aggrieved by an order made by the State Board under Section 25, Section 26, Section 27 of Water Act, 1974 or Section 21 of Air Act, 1981 may within thirty days from the date on which the order is communicated to him, prefer an appeal as per Andhra Pradesh Water Rules, 1976 and Air Rules 1982, to such authority (hereinafter referred to as the Appellate Authority) constituted under Section 28 of the Water (Prevention and Control of Pollution) Act, 1974 and Section 31 of the Air (Prevention and Control of Pollution) Act, 1981.
4. The applicant shall comply with the all the directions issued by the Board from time to time.
5. The Board reserves its right to modify above conditions or stipulate any further conditions and to take action including revoke of this order in the interest of protection of public health and environment.

SCHEDULE - B

1. The effluent discharged should not contain constituents in excess of the tolerance limits mentioned below :

Outlet No.	Parameter No.	Limiting Standards
1.	pH	5.5 - 9.0
	Suspended Solids	200 mg/l
	Oil and Grease	10 mg/l
	BOD	100 mg/l

2. The industry should take steps to reduce water consumption to the extent possible and consumption should NOT exceed the quantities mentioned below :

S.No.	Purpose	Quantity
1.	Process	550
2.	Industrial cooling (Makeup) / Humidification / Water spraying)	30
3.	Domestic	120
	Total	700

3. The industry should file the water Cess returns in Form-1 as required under Section (5) of Water (Prevention and Control of Pollution) Cess Act, 1977 on or before 5th of every calendar month, showing the quantity of the water consumed in the previous month along with water meter readings. The industry should remit water cess as per the assessment orders as and when issued by the Board.
4. The emissions should not contain constituents in excess of the prescribed limits mentioned below.

Chimney No.	Parameter	Standards
1 to 6	Particulate Matter	50 mg/Nm ³

5. The industry should comply with emission limits for DG Sets of capacity up to 800 KW as per the Notification G.S.R. 520(E), dated 01.07.2003 under Environment(Protection) Amendment Rules, 2003 and G.S.R. 448(E), dated 12.07.2004 under the Environment (Protection) Second Amendment Rules, 2004. In case of DG sets of capacity more than 800 KW should comply with emission limits as per the notification GSR 489(E), dated 09.07.2002 at Serial No.96, under the Environment(Protection) Act, 1986.
6. The industry should comply with ambient air quality standards of PM 10(Particulate Matter Size less than 10 μ m) - 100 μ g/m³; PM 2.5 (Particulate Matter size less than 2.5 μ m) - 60 μ g/m³; SO₂ - 80 μ g/m³; NO_x-80 μ g/m³, outside the factory premises at the periphery of the industry.
Standards for the other parameters as mentioned in the National Ambient Air Quality Standards CPCB Notification No.B-29016/20/90/PCI-I, dated 18.11.2009.
Noise Levels: Day time: (6 AM to 10 PM) - 75 dB(A)
Night time : (10 PM to 6 AM) - 70 Db(A)
7. The industry shall not produce the cement beyond the permitted capacity as mentioned in this order, without obtaining prior CFE & CFO of the Board.
8. The industry shall ensure regular maintenance and operation of the on-line stack monitoring systems and CAAQM stations with tamper proof mechanism having facilities for online calibration.
9. The industry shall maintain interlocking system for air pollution control equipments provided with raw materials feeding system so that the feeding of raw materials would be stopped in case the air pollution control equipment fails.
10. Coal shall be stored under closed sheds only.
11. The industry shall maintain 25% additional capacity of Bag filters and ESPs.
12. The industry shall ensure implementation of the requisite measures to prevent air pollution in the surrounding area.
13. The industry shall provide adequate dust collection and extraction system to control fugitive emissions at various transfer points and the dust collected from pollution control equipments should be recycled back into the process. The compliance status should be reported to R.O. Kurnool.
14. The industry shall maintain and submit the records of daily operating hours of kiln, ESP and reasons for ESP tripping to R.O., Kurnool on monthly basis.
15. The cement concrete roads in the plant area shall be properly maintained to prevent dust emissions.
16. The industry shall maintain the records on the clinker production, utilized for cement production and stocks maintained at on site and should submit consolidated reports to the Regional Office of the Board.
17. The industry shall maintain thick green belt with tall growing trees in the vacant spaces of the unit. The industry shall take proper measures for survival of the saplings planted.
18. The industry shall maintain RWH structure on the available up-stream portion of the plant site.
19. The industry shall maintain separate water meters with necessary pipeline for assessing the quantity of water used for each of the purposes mentioned below:
 - a. Industrial cooling, boiler feed
 - b. Domestic purposes
 - c. Processing, whereby water gets polluted and pollutants are easily biodegradable.
 - d. Processing, whereby water gets polluted and pollutants are not easily biodegradable.
20. The applicant should submit Environmental Statement in Form V before 30th September every year as per Rule No.14 of E(P) Rules, 1966 & amendments thereof.
21. The industry should maintain the compliance of the conditions stipulate din the E.C order dt.18.05.2007 and CFE order dt. 18.05.2007.
22. The industry shall provide rain water harvesting structures on the available up-stream portion of the plant to recharge ground water.

SCHEDULE - C

[see rule 5(4)]

[CONDITIONS OF AUTHORISATION FOR OCCUPIER OR OPERATOR HANDLING HAZARDOUS WASTES]

1. The industry shall give top priority for waste minimization and cleaner production practices.
2. The industry shall not store hazardous waste for more than 90 days as per the Hazardous Wastes (Management, Handling and Transboundary Movement) Rules, 2008 and amendments thereof.
3. The industry shall store Used / Waste Oil and Used Lead Acid Batteries in a secured way in their premises till its disposal.
4. The industry shall not dispose Waste oils to the traders and the same shall be disposed to the authorized Reprocessors/ Recyclers.
5. The industry shall dispose Used Lead Acid Batteries to the manufacturers / dealers on buyback basis.
6. The industry shall take necessary practical steps for prevention of oil spillages and carry over of oil from the premises.
7. The industry shall maintain 6 copy manifest system for transportation of waste generated and a copy shall be submitted to Board Office and concerned Regional Office.
8. The industry shall maintain good house keeping & maintain proper records for Hazardous Wastes stated in Authorisation.
9. The industry shall maintain proper records for Hazardous Wastes stated in Authorisation in FORM-3 i.e., quantity of Incinerable waste, land disposal waste, recyclable waste etc., and file annual returns in Form- 4 as per Rule 22(2) of the Hazardous Wastes (Management, Handling & Transboundary Movement) Rules, 2008 and amendments thereof.
10. The industry shall dispose of e-waste to the authorized recyclers only.
11. The industry shall submit the condition wise compliance report of the conditions stipulated in Schedule A, B & C of this Order on half yearly basis to Board Office, Hyderabad and concerned Regional Office.

Sd/-
MEMBER SECRETARY

To
M/s. Penna Cement Industries Ltd., (Cement Plant),
Nittur(V), & Kamalapadu(V), Yadiki (M),
Anantapur District - 515408.

//T.C.F.B.O//

24/4/15
JOINT CHIEF ENVIRONMENTAL ENGINEER
24/4 **UNIT HEAD - IV**

COMPLIANCE REPORT FOR PLANT		
Consent Order No: APPCB/KNL/ATP/97/HO/CFO/2015-475 dated:22.04.2015		
SCHEDULE - A		
1.The applicant shall make applications through online for renewal of Consent (under water and Air Acts) and Authorization under HWM Rules at least 120 days before of expiry of this order, along with prescribed fee under Water and Air Acts for obtaining Constant & HW Authorization of the Board.		
<i>Ans: We Shall follow and applied within time period.</i>		
2 The conditions stipulated in the Schedule - A of the earliar combined CFO & HWM Order No. APPCB/KLN/TPT/394/CFO/2518, dt.05.03.2007 remain same. The applicant should ensure consistent compliance of the each condition of Schedule-A		
<i>Ans: We should complied and follow above the order stipulated conditions in schedule- A</i>		
3 Any person aggrieved by an order made by the State Board under Section 25, section 26, section 27 of water Act,1974 pr sectopm 21 of Air Act, 1981 may within thirty days from the date on which the order is communicated to him, prefer an appeal as per Andhra Pradesh State Rules, 1976 and Air Rules 1982, to such authority (hereinafter referred to as the Appellate Authority) constituted under Section 28 of the Water (Prevention and Contorl of Pollution) Act, 1974 and section 31 of the Air (Prevention and Control of Pollution) Act,1981.		
<i>Ans: We should follow the baord oders</i>		
4 The applicant shall comply with the all the direction issued by the Board form time to time.		
<i>Ans: We should comply by the baord given directions within time.</i>		
5 The Board reserves its right to modify above condition or stipulate any further conditions and to take action including revoke of this order in the interest of protection of public health and environment.		
<i>Ans: We should obey the baord oders</i>		
SCHEDULE - B		
1. The effluent discharged should not contain consitituents in excess of the tolerance limits mentioned below:		
outlet No.	Parameter No.	Limiting Standards
1	pH	5.5 - 9.0
	Suspended Solids	200 mg/l
	Oil and Grease	10 mg/l
	BOD	100 mg/l
2.The industry should take steps to reduce water consumption to the exten possible and consumption should NOT exceed the quantities mentioned below:		
S.No	Purpose	Quantity
1	Process	550
2	Industrial cooling (Make up) / Humidification /Water spraying)	30
3	Domestic	120
	Total	700
<i>Ans: We are not exeeding the quantity of 700 KLD, We have installed Waste Heat Recovery plant boiles to reduce water quanity in cooler, internal mill water spray quantity and produced power.</i>		
3 The industry should file the water Cess returns in Form-1 as required under Section (5) of Water (Prevention and Control of Pollution) Cess Act, 1977, on or before 5th of every calander month, showing the quantity of the water consumed in the privious month along with water meter readings. The industry should remit water cess as per the assessment order as and when issued by the Board.		
<i>Ans: We have submitting water cess returns in Form-1 every month before 5th. Whenever assessment order received within time we are remiting the amount immediately.</i>		
4 The emissions should not contain constityents in excess of the prescribed limits mention below:		
Chimny No.	Parameter	Standards
1 to 6	Particulate Matter	50mg/Nm3
<i>Ans: Chimneys From 1 to 6 all maintained within stipulated new norms 30mg/Nm3 with effective from 01.04.2017 and 5 chimneys are installed by online monitors values are uploaded to APPCB and CPCB sevrver.</i>		

5	The industry should comply with emission limits for DG Sets of capacity up to 800 KW as per the Notification G.S.R. 520 (E), dated 01.07.2003 under Environment (Protection) Second Rules, 2003 and G.S.R 448(E), dated 12.07.2004 under the Environment (protection) Second Amendment Rules, 2004. in case of DG Set of capacity more than 800 KW should comply with emission limits as per the notification GSR 489(E), dated 09.07.2002 at Serial No.96, under the Environment (Protection) Act, 1986.
	Ans: The industry installed 1000 KW DG set and followed complied with emission limits as per the notification GSR 489(E), dated 09.07.2002 at Serial No.96
6	The Industry should comply with ambient air quality standards of PM 10 (Particulate Matter size less than 10 µm) - 100 ug/m³; PM 2.5 (Particulate Matter size less than 2.5 µm) - 60 ug/m³; SO₂ - 80 ug/m³, outside the factory premises at the periphery of the industry. Standards for the other parameters as mentioned in the National Ambient Air Quality Standards CPCB Notification No.B-29016/20/90/PCI-I, dated 18.11.2009.
	Noise level: Day time: (6 AM to 10 PM) -75 dB (A)
	Night time: (10 PM to 6 AM)-75 dB (A)
	Ans: Provided 2 nos of online AAQMS stations in one number downwind direction and another one in the direction of Up wind direction with measuring PM ₁₀ , PM _{2.5} , Sox, and Nox. regular housekeepings, Regularly roads sweeping, regularly spraying water on roads and maintaining within stipulated values. Noise levels are within stipulated value in day and night times.
7	The Industry shall not produce the cement beyond the permitted capacity as mentioned in this order, without obtaining prior CFE & CFO of the Board.
	Ans: We are not exceeding the quantities of cement as mentioned in the order.
8	The Industry shall ensure regular maintenance and operation of the on-line stack monitoring systems and CAQM stations with tamper proof mechanism having facilities for online calibration.
	Ans: Ensuring that regular maintenance is carried out by us and the online stack monitors and CAQM stations are working well. Also we have providing on line calibration facility.
9	The Industry shall maintain interlocking system for air pollution control equipments provided with raw water materials feeding system so that the feeding of raw materials would be stopped in case the air pollution control equipment fails.
	Ans: Provided inter locking systems to all process bag filters and all feeding system bags filters.
10	Coal shall be stored under closed sheds only.
	Ans: Coal was stored in closed sheds
11	The Industry shall maintain 25% additional capacity of Bag filters and ESPs.
	Ans: All process bag filters and ESP having additional capacities available.
12	The industry shall ensure implementation of the requisite measures to prevent air pollution in the surrounding area.
	Ans: We have implemented prevention of air pollution measures in surrounding area.
13	The Industry shall provide adequate dust collection and extraction system to control fugitive emission at various transfer points and the dust collected from pollution control equipments should be recycled back into the process. The compliance status should be reported to R.O Kurnool.
	Ans: We have provided 43 nos of bagfilters to control fugitive emissions at various transfer points and recycled back into process. The compliance status reporting to R.O. Kurnool.
14	The industry shall maintain and submit the records of daily operating hours of kiln, ESP and reasons for ESP tripping to R.O, Kurnool on monthly basis.
	Ans: we have submitting records of operating hours of kiln, ESP and stoppages reasons for ESP trippings to R.O, Kurnool on regular monthly basis.
15	The cement concrete roads in the plant area shall be properly maintained to prevent dust emissions
	Ans: We have maintaining good house keeping in plant as well as on concrete roads by mechanised sweeping machine and water sprinkling on roads as a regular practice.
16	The industry shall maintain the records on the clinker production, utilized for cement production and stocks maintained at on site and should submit consolidated reports to the Regional Offices of the Board.
	Ans: we have maintaining all the records and submitting as a consolidated reports to R.O. Kurnool.
17	The industry shall maintain thick green belt with tall growing trees in the vacant spaces of the unit. The industry shall take proper measures for survival of the saplings planted.

	Ans: Our industry was maintaining thick green belt in vacant of the plant and we have appointed one Horticulturist to take care of proper measures of Green belt.
18	The industry shall maintain RWH structure on the available up-stream portion of the plant site
	Ans: We have constructed 14 RWH structures in up-stream and desilted old formpond with check dam at NE side, Provided Water reservoir for rain water collection, We have constructed check dam near Chintalapalli village.
19	The industry shall maintain separate water meters with necessary pipeline for assessing the quantity of water used for each of the purposes mentioned below:
	a. Industrial cooling boiler feed
	b. Domestic purposes
	c. Processing whereby water gets polluted and pollutants are easily biodegradable.
	d. Processing whereby water gets polluted and pollutants are bit easily biodegradable.
	Ans: Provided separate water meters for each to assess the water consumption
20	The applicant should submit Environmental Statement in Form V before 30th September every year as per Rule No.14 of E(P) Rules, 1966 & amendments thereof.
	Ans: Submitting Form-V within time on regularly
21	The applicant should maintain the compliance of the conditions stipulated in the E.C order dt.18.05.2007 and CFE order dt, 18.05.2007.
	Ans: We are complied all the conditions stipulated in the E.C. Order.
22	The industry shall provide rain water harvesting structures on the available up-stream portion of the plant to recharge ground water.
	Ans: We have constructed 14 RWH structures in up-stream and desilted old formpond with check dam at NE side, Provided Water reservoir for rain water collection, We have constructed check dam near Chintalapalli village.
SCHEDULE -C	
(CONDITIONS OF AUTHORISATION FOR OCCUPIER OR OPERATOR HANDLING HAZARDOUS WASTES)	
1	The industry shall give top priority for waste minimization and cleaner production practices.
	Ans: Our industry was giving high priority for waste minimisation and adopting cleaner practice.
2	The industry shall not store hazardous waste for more than 90 days as per the Hazardous Wastes (Management, Handling and Transboundary Movement) Rules, 2008 and amendments thereof.
	Ans: We are following
3	The industry shall store Used/Waste Oil and Used Acid Batteries in a secured way in their premises till its disposal.
	Ans: We are storing separate secured place in the stores.
4	The industry shall not dispose Waste oils to the traders and the same shall be disposed to the authorized Reprocessors/Recyclers.
	Ans: We are consuming waste oils and grease feeding to kiln system along with coal.
5	The industry shall dispose Used Lead Acid Batteries to the manufacturers/dealers on buyback basis.
	Ans: We are disposing to dealers on buyback basis.
6	The industry shall take necessary practical steps for prevention of oil spillages and carry over of oil from the premises.
	Ans: All areas are covered with concrete flooring, prepared SOP for oils transportation and maintaining good practice.
7	The industry shall maintain 6 days manifest system for transportation of waste generated and a copy shall be submitted to Board Office and concerned Regional Office.
	Ans: Adopted above the system and submitting to Concerned R.O.
8	The industry shall maintain good house keeping & maintain proper records for Hazardous Wastes stated in Authorisation.

	Ans: We have maintaining good house keeping by the adopting 5S sytem and maintaining records hazardous waste stated in authrisation.
9	The industry shall maintain proper records for Hazaardous Wastes stated in Authorisation in FORM-3 i.e., quantity of incinerable waste, land disposal waste, recyclable waste etc., and file annual returns in FORM-4 as per Rule22(2) of the Hazardous Wastes (Management, Handling & Transboundary Movaement) Rules, 2008 and amendments thereof.
	Ans: We are maintaining records for Hazardous waste stated in authorisation in Form-3 and submitting annual returns in From-4 on regular basis.
10	The industry shall dispose of e-waste to the authorized recyclers only.
	Ans: Our industry is disposing E-waste to the authorised recycler.
11	The industry shall submit the condition wise compliance report of the conditions stipulated in Schedule A, B & C of this order on half yearly basis to Board Office, Hyderabad and concerned Regional Office.
	Ans: We have submitting the condition wise compliance report of the conditions stipulated in schedule A,B and C on regular basis to the Board office,and R.O.

**ANDHRA PRADESH POLLUTION CONTROL BOARD**

Paryavarana Bhavan, A-III, Industrial Estate,

Sanathnagar, Hyderabad-500 018

Phone : 040-23887500, Website : www.appcb.ap.nic.in

**RED CATEGORY
CONSENT ORDER****Consent Order No. APPCB/KNI/ATP/97/HO/CFO/2016****Date: 07.10.2016**

CONSENT is hereby granted for Operation under section 25/26 of the Water (Prevention & Control of Pollution) Act, 1974 and under section 21 of Air (Prevention & Control of Pollution) Act 1981 and amendments thereof and the rules and orders made there under (hereinafter referred to as 'the Acts', 'the Rules') to:

M/s. Penna Cement Industries Limited,**Nittur (V) & Kamalapadu (V),****Yadiki (M),****Anantapur District.****E-mail: srinivas.c@pennacement.com**

(Hereinafter referred to as 'the Applicant') authorizing to operate the industrial plant to discharge the effluents from the outlets and the quantity of emissions per hour from the chimneys as detailed below:

i) Out lets for discharge of effluents:

Outlet No.	Outlet Description	Max Daily Discharge	Point of Disposal
1.	DM Plant regeneration	20.0 KLD	After neutralization shall be used for dust suppression within the premises.
2.	Domestic	30.0 KLD	After treatment in STP shall be used for on land for gardening / plantation

ii) Emissions from chimneys:

Chimney No.	Description of Chimney
1.	Attached to Pre Heater Boiler of capacity 23 TPH (Existing Kiln / Raw Mill Stack)
2	Attached to Cooler Boiler of capacity 25 TPH (Existing Cooler Stack)

This consent order is valid for power generation of following capacity only:

Sl.No	Products	Capacity
1.	Waste Heat Recovery based Power Plant	10 MW

This order is subject to the provisions of the Acts and orders made thereunder and further subject to the terms and conditions incorporated in the Schedule A and B enclosed to this order.

This combined order of consent shall be valid for a period ending with the 31st day of August, 2021.

Sd/-
MEMBER SECRETARY

To
M/s. Penna Cement Industries Limited,
Nittur (V) & Kamalapadu (V),
Yadiki (M),
Anantapur District-515408.

Copy to:

1. The JCEE, Zonal Office, Kurnool for information and necessary action.
2. The JCEE (Cess), APPCB, Hyderabad for information.
3. The Environmental Engineer, Regional Office, Kurnool for information and necessary action.

//T.C.F.B.O//

Uka 01/10/16.
JOINT CHIEF ENVIRONMENTAL ENGINEER
(UH-IV)

SCHEDULE - A

1. Any up-set condition in any industrial plant / activity of the industry, which result in, increased effluent / emission discharge and/ or violation of standards stipulated in this order shall be informed to this Board, under intimation to the Collector and District Magistrate and take immediate action to bring down the discharge / emission below the limits.
2. The industry should carryout analysis of waste water discharges or emissions through chimneys for the parameters mentioned in this order on quarterly basis and submit to the Board.
3. All the rules & regulations notified by Ministry of Law and Justice, Government of India regarding Public Liability Insurance Act, 1991 should be followed as applicable.
4. The industry should put up two sign boards (6x4 ft. each) at publicly visible places at the main gate indicating the products, effluent discharge standards, air emission standards, hazardous waste quantities and validity of CFO and exhibit the CFO order at a prominent place in the factory premises.
5. Notwithstanding anything contained in this consent order, the Board hereby reserves the right and powers to review / revoke any and/or all the conditions imposed herein above and to make such variations as deemed fit for the purpose of the Acts by the Board.
6. The industry shall file the water cess returns in Form-I as required under section (5) of Water (Prevention and Control of Pollution) Cess Act, 1977 on or before the 5th of every calendar month, showing the quantity of water consumed in the previous month along with water meter readings. The industry shall remit water cess as per the assessment orders as and when issued by Board.
7. The applicant shall submit Environment statement in Form V before 30th September every year as per Rule No.14 of E(P) Rules, 1986 & amendments thereof.
8. The applicant should make applications through Online for renewal of Consent (under Water and Air Acts) and Authorization under HWM Rules at least 120 days before the date of expiry of this order, along with prescribed fee under Water and Air Acts and detailed compliance of CFO conditions for obtaining Consent & HW Authorization of the Board. The industry should immediately submit the revised application for consent to this Board in the event of any change in the raw material used, processes employed, quantity of trade effluents & quantity of emissions. Any change in the management shall be informed to the Board. The person authorized should not let out the premises / lend / sell / transfer their industrial premises without obtaining prior permission of the State Pollution Control Board.
9. Any person aggrieved by an order made by the State Board under Section 25, Section 26, Section 27 of Water Act, 1974 or Section 21 of Air Act, 1981 may within thirty days from the date on which the order is communicated to him, prefer an appeal as per Andhra Pradesh Water Rules, 1976 and Air Rules 1982, to Appellate authority constituted under Section 28 of the Water(Prevention and Control of Pollution) Act, 1974 and Section 31 of the Air(Prevention and Control of Pollution) Act, 1981.

SCHEDULE - B

WATER POLLUTION:

1. The source of water is Bore well. The following is the permitted water consumption:

Sl.No	Purpose	Quantity
1.	Industrial Cooling (Makeup) / Humidification / Water Spraying)	150.0 KLD (makeup)
2.	Softener / DM Plant / RO Plant	50.0 KLD
3.	Domestic	30.0 KLD
Total		230.0 KLD

Separate meters with necessary pipe-line shall be maintained for assessing the quantity of water used for each of the purposes mentioned above for Cess assessment purpose.

2. The effluent discharged should not contain constituents in excess of the tolerance limits mentioned below :

Onland standards:

Outlet No.	Parameter No.	Limiting Standards
2.	pH	5.5 - 9.0
	Suspended Solids	200 mg/l
	Oil and Grease	10 mg/l
	BOD	100 mg/l

AIR POLLUTION:

3. No new stacks are provided for waste heat recovery of power plant. As per MoEF & CC Notification G.S.R. 612 (E) dt.25.08.2014 and its Amendment G.S.R. 496 (E) dt.09.05.2016, the industry shall comply with the following emission standards for cement plant.

Cement plant without co-processing	Parameter	Emission Standards
	Particulate Matter (PM)	50 mg/Nm ³ (upto 31.03.2017) 30 mg/Nm ³ (w.e.f.01.04.2017)
	Sulphur Dioxide (SO ₂) in mg/Nm ³	100, 700 and 1000 when pyritic Sulphur in the limestone is less than 0.25%, 0.25 to 0.5% and more than 0.5% respectively.
	Oxides of Nitrogen (NO _x) in mg/Nm ³	(1) 800 for rotary kiln with in Line Calciner (ILC) technology. (2) 1000 for rotary kiln using mixed stream of ILC, Separate Line Calciner (SLC) and suspension preheater technology or SLC technology alone or without calciner.

* Particulate matter, from raw mill, kiln and pre-calciner system put together shall not exceed 0.125 Kg/tonne of clinker (with effect from 01.01.2017)

4. The industry shall comply with ambient air quality standards of PM10 (Particulate Matter size less than 10µm) - 100 µg/ m³; PM2.5 (Particulate Matter size less than 2.5 µm) - 60 µg/ m³; SO₂ - 80 µg/ m³; NO_x - 80 µg/m³, outside the factory premises at the periphery of the industry. Standards for other parameters as mentioned in the National Ambient Air Quality Standards CPCB Notification No.B-29016/20/90/PCI-I, dated 18.11.2009.
- Noise Levels: Day time (6 AM to 10 PM) - 75 dB (A)
Night time (10 PM to 6 AM) - 70 dB (A)

GENERAL:

5. The industry shall not manufacture any product, other than those mentioned in this order, without CFE & CFO of the Board. The industry shall not increase the capacity beyond the permitted capacity mentioned in this order, without obtaining CFE & CFO of the Board.
6. The industry shall submit compliance report on the conditions mentioned in the consent order every 6 months to the Regional Office/Zonal Office.
7. The industry shall maintain the following records and the same shall be made available to the Board Officials during the inspection.
- Daily production details, RG-1 records and Central Excise Returns.
 - Quantity of Effluents generated and disposed.
 - Log Books for pollution control systems.
 - Daily solid waste generated and disposed.
8. The industry shall develop and maintain greenbelt in an area of 33% of the total area of the plant. The industry shall take proper measures for survival of the saplings planted.

Sd/-
MEMBER SECRETARY

To
M/s. Penna Cement Industries Limited,
Nittur (V) & Kamalapadu (V),
Yadiki (M),
Anantapur District -515408.

//T.C.F.R.O//

K. Nagaraj 10/16
JOINT CHIEF ENVIRONMENTAL ENGINEER
(UH-IV)

COMPLIANCE REPORT FOR WASTE HEAT RECOVERY CONSENT FOR OPERATIONS		
Consent Order No:APPCB/KNL/ATP/97/HO/CFO/2016, DATED:07.10.2016		
SCHEDULE - A		
1. Any up-set condition in any industrial plant / activity of the industry, which result in,increased affluent / emission discharge and / or violation of standards stipulated in this order Shall be informed to this Board, under intimation to the Collector and Dist Magistrate and take immediate action to the bring down the discharge / emission below the limits.		
<i>Ans: If any upset conditions we shall be inform to the Board Officials, Collector and District Magistrate and initiate immediate action and bring down the discharge emssions below limits.</i>		
2. The industry should carryout analysis of waste water discharges or emissions through chimneys for the parameters mentioned in this order on quarterly basis and submit to the Board.		
<i>Ans: We have provided online stack monitors to all process chimneys and same up loaded to APPCB website as well as CPCB server for day to day monitoring of discharges of emissions.</i>		
3. All the rules & regulations notified by Ministry of Law and Justice, Government of the India regarding Public Liability Insurance Act, 1991 should be followed as applicable.		
<i>Ans: We should follow the rules and regulations notified by Ministry of Law and Justice.</i>		
4. The industry should put up two sign boards (6x4ft. each) at publicly visible places at the main gate indicating the products, effluent discharge standards, air emission standards, hazardous waste quantities and validity of CFO and exhibit the CFO order at a prominent place in the factory premises.		
<i>Ans: We have displayed sign baords(6X4 ft) at our main gate in English and Telugu with indications of Product,effluents discharges standards, air emission standards, hazardous waste quantities and validity of CFO</i>		
5. Not withstanding anything contained in this consent order, the Board hereby reserves the right and powers to review / revoke any and / or all at the conditions imposed herein above and to make such variations as deemed fit for the purpose of at the Acts by the Board.		
<i>Ans: We will obey the Baord orders .</i>		
6. The industry shall file the water cess returns in Form-1 as required under section (5) of Water (Prevention and Control of Pollution) Cess Act, 1977 on or before 5th of every calendar month, showing the quantity of water consumed in the previous month along with water meter readings. The industry shall remit water cess as per the assessment orders as and when issued by Board.		
<i>Ans: We have submitting water returns in Form-I before every month and after receiving the water assesment order we have remit amount immediately.</i>		
7. The applicant shall submit Environment statement in Form V before 30th September every year as per Rule No.14 of E(P) Rules, 1968 & amendments thereof.		
<i>Ans: We have submitting Environment statement in Form V before 30th September in every year as per Rule No.14 of E(P) Rules, 1968 & amendments thereof.</i>		
8. The applicant should make application through Online for renewal of Consent (under Water and Air Acts) and Authorization under HWM Rules at least 120 days before the date of expiry of this order, along with prescribed fee under Water and Air Acts and detailed compliance of CFO conditions for obtaining Consent & HW Authorization of the Board. The industry should immediately submit the revised application for consent to this Board in the event of any change in raw material used, processes ,employed, quantity of trade effluents & quantity of emissions. Any change in the management shall be informed to the Board. The person authorized should not let out the premises / land / transfer their industrial premises without obtaining prior permission of the State Pollution Control Board.		
<i>Ans: We should follow the above within time.</i>		
9. Any person aggrieved by an order made by the State Board under Section 25, Section 26, Section 27 of Water Act, 1974 or Section 21 of Air Act, 1981 may within thirty days form the date on which the order is communicated to him, prefer an appeal as per Andhra Pradesh Water Rules, 1976 and Air Rules 1982, to Appellate authority constituted under Section 28 of the Water (Prevention and Control of Pollution) Act,1974 and Section 31 of the Air (Prevention and control of Pollution) Act, 1981.		

Ans: We should follow the board orders.

SCHEDULE - B

WATER POLLUTION:

1. The source of water is Bore well. The following is the permitted water consumption:

Sl.No	Purpose	Quantity
1	Industrial Cooling (Makingup) / Humidification / Water Spraying)	150.0 KLD (makeup)
2	Softener / DM Plant / RO Plant	50.0 KLD
3	Domestic	30.0 KLD
	Total	230.0 KLD

Separate meters with necessary pipe-line shall be maintained for assessing the quantity of water used for each of the purposes mentioned above for Cess assessment purpose.

Ans: We are drawing water from Bore well / Mine pit and we are not consuming more than 230 KLD. Provided separate water meters for assessing water quantity.

2. The effluent discharged should not contain constituents in excess of the tolerance limits mentioned below:

On land standards :

Outlet No.	Parameter No.	limiting standards
2	pH	5.5 - 9.0
	Suspended solids	200 mg/l
	Oil and Grease	10 mg/l
	BOD	100mg/l

Ans: Provided neutralised pit in DM plant and the quality of discharge water well within stipulated limits and the water using for dust suppression on concrete roads

AIR POLLUTION:

3. No new stacks are provided for waste heat recovery of power plant. As per MoFE & CC Notification G.S.R 612 (E) dt. 25.05.2014 and its Amendment G.S.R (E) dt. 9.05.2016, the industry shall comply with the following emission standards for cement plant.

	Parameter	Emission Standards
Cement plant Without co-processing	Particulate Matter (PM)	50 mg/Nm ³ (upto 31.03.2017) 30mg/Nm ³ (w.e.f 1.04.2017)
	Sulphur Dioxide (SO ₂) in mg/Nm ³	100,700 and 1000 when pyritic Sulphur in the limestone is less than 0.25% , 0.25 to 0.5% and more than 0.5% respectively
	Oxides of Nitrogen (NO _x)	(1) 800 for rotary kiln with in line Calciner (ILC) technology. (2) 1000 for rotary kiln using mixed stream Of ILC, Separate Line Calciner (SLC) and Suspension preheater technology or SLC Technology alone or with calciner.

***Particulate matter from raw mill, kiln and pre-calciner system put together shall not Exceed 0.125 Kg/tonne of clinker (with effect from 01.01.2017)**

Ans: No new stacks are provided and utilising existing stacks of RABH and Cooler ESP stacks. Provided online stack monitors and maintaining well within stipulated values.

4. The industry shall comply with ambient air quality standards of PM 10 (Particulate Matter size less than 10µm) - 100 µg/m³; PM 2.5 (Particulate Matter Size less than 2.5µm) - 60 µg/m³; SO₂ - 80 µg/m³; NO_x - 80 µg/m³, Outside the factory premises at the periphery of the Industry. Standards for other parameters as mention in the National Ambient Air Quality Standards CPCB Notification No.B-29016/20/90/PCI-I, dated 18.11.2009.

Noise Levels: Day time (6 AM to 10 PM) - 75 dB (A)

Night time (10 PM to 6 AM) - 70dB (A)

Ans: Provided 2 nos of online AAQMS stations in one numnber downwind direction and another one in the direction of Up wind direction with measuring PM10,PM2.5,Sox, and Nox. regular housekeepings, Regularly roads sweeping, regularly spraying water on roads and maitaining within stipulated values. Noise levels are within stipulated value in day and night times.

GENERAL CONDITIONS:		
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5. The industrial shall not manufacture any product, other than those mentioned in this order, without CFE & CFO of the Board. The industry shall not increase the capacity beyond the Permitted capacity mention in this order, without obtaining CFE & CFO of the Board.

Ans: We should follow the above point.

6.The industry shall submit compliance report on the condition mentioned in the consent Order every 6 months of the Regional Office/Zonal Office.

Ans: We should follow the above and submitting at regular intervals.

7. The Industry shall maintain the following records and the same shall be made available to the Board Officials during the inspection.

A. Daily production details,RG-1 records and Central Excise Returns.

B. Quantity of Effluents generated and disposed.

C. Log Books for pollution control systems.

D. Daily solid waste generated and disposed.

Ans: We are maintaining the above records and show the records to Board officials in their visits.

8. The industry shall develop and maintain greenbelt in an area of 33% of the total area of the Plant. The industry shall take proper measures for survival of the samplings planted.

Ans: We have developed green belt about 34.5% in our area and appointed one harticulturist to care of the green belt on regular developments.

**COMPLIANCE TO THE GENERIC TERMS OF REFERENCE (TOR) IN
RESPECT OF INDUSTRY SECTOR FOR CONDUCTING ENVIRONMENT
IMPACT ASSESSMENT STUDY FOR CEMENT PLANTS PROJECTS AND
INFORMATION TO BE INCLUDED IN EIA / EMP REPORT**

STANDARD TERMS OF REFERENCE (TOR)

S. No	TOR Point	Compliance
1	Executive Summary	Enclosed
2	Introduction	
i.	Details of the EIA Consultant including NABET accreditation	Chapter – 12 Page No. 208
ii.	Information about the project proponent	Chapter – 1 Para – 1.2 Page No.2
iii.	Importance and benefits of the project	Chapter – 1 Para – 1.5 & 1.5.1 Page No.6,7
3	Project Description	
i.	Cost of project and time of completion.	Chapter – 1 Para – 1.3.2 Page No.4
ii.	Products with capacities for the proposed project.	Chapter – 1 Para – 1.3.1 & 1.3.3 Page No.3, 4
iii.	If expansion project, details of existing products with capacities and whether adequate land is available for expansion, reference of earlier EC if any.	Chapter – 1 Para – 1.3.1 & 1.3.3 Annexure – 1B Page No.3, 4
iv.	List of raw materials required and their source along with mode of transportation.	Chapter – 2 Para – 2.6.1 & 2.6.7 Page No.18, 23
v.	Other chemicals and materials required with quantities and storage capacities	Chapter – 2 Para – 2.6.1 & 2.6.7 Page No.18, 23
vi.	Details of Emission, effluents, hazardous waste generation and their management.	Chapter – 4 Para 4.1 and subsequent paragraphs Table – 4.2 Page No. 107. Para – 4.3.1 & 4.4.2 Page No.124 & 131
vii.	Requirement of water, power, with source of supply, status of approval, water balance diagram, man-power requirement (regular and contract)	Chapter – 2 Para – 2.6 Page No.18
viii.	Process description along with major equipments and machineries, process	Chapter – 2 Para – 2.7

S. No	TOR Point	Compliance
	flow sheet (quantitative) from raw material to products to be provided.	Fig – 2.8, Page No.24 & 26
ix.	Hazard identification and details of proposed safety systems.	Chapter – 7 Para – 7.2.1 Page No.148
x.	Expansion/modernization proposals: a. Copy of all the Environmental Clearance(s) including Amendments there to obtain for the project from MoEF/SEIAA shall be attached as an Annexure. A certified copy of the latest Monitoring Report of the Regional Office of the Ministry of Environment and Forests as per circular dated 30th May, 2012 on the status of compliance of conditions stipulated in all the existing environmental clearances including Amendments shall be provided. In addition, status of compliance of Consent to Operate for the ongoing and existing operation of the project from SPCB shall be attached with the EIA-EMP report.	Annexure – 1C Annexure – 1D
	b. In case the existing project has not obtained environmental clearance, reasons for not taking EC under the provisions of the EIA Notification 1994 and/or EIA Notification 2006 shall be provided. Copies of Consent to Establish/No Objection Certificate and Consent to Operate (in case of units operating prior to EIA Notification 2006, CTE and CTO of FY 2005-2006) obtained from the SPCB shall be submitted. Further, compliance report to the conditions of consents from the SPCB shall be submitted.	Not Applicable
4	Site Details	
i.	Location of the project site covering village, Taluka/Tehsil, District and State, Justification for selecting the site, whether other sites were considered.	Chapter – 2 Fig – 2.1 Page No.11 Chapter – 5 Para – 5.2 Page No.141
ii.	A toposheet of the study area of radius of 10km and site location on 1:50,000/1:25,000 scale on an A3/A2 sheet. (including all eco-sensitive areas	Chapter – 2 Fig – 2.4 Page No.15

S. No	TOR Point	Compliance
	and environmentally sensitive places)	
iii.	Co-ordinates (lat-long) of all four corners of the site.	Chapter – 2 Fig – 2.3 Page No.14
iv.	Google map-Earth downloaded of the project site.	Chapter – 2 Fig – 2.6 Page No.17
v.	Layout maps indicating existing unit as well as proposed unit indicating storage area, plant area, greenbelt area, utilities etc. If located within an Industrial area/Estate/Complex, layout of Industrial Area indicating location of unit within the Industrial area/Estate.	Chapter – 2 Fig – 2.7 Page No.21
vi.	Photographs of the proposed and existing (if applicable) plant site. If existing, show photographs of plantation/greenbelt, in particular.	Chapter – 2 Fig – 2.5 Page No.16
vii.	Landuse break-up of total land of the project site (identified and acquired), government/ private - agricultural, forest, wasteland, water bodies, settlements, etc shall be included. (not required for industrial area)	Chapter – 2 Para – 2.6.2 Page No.20
viii.	A list of major industries with name and type within study area (10km radius) shall be incorporated. Land use details of the study area	Chapter – 2 Para – 2.3 and Table – 1.1 Page No.10 & 5
ix.	Geological features and Geo-hydrological status of the study area shall be included.	Chapter – 3 Para – 3.4 Page No.55
X.	Details of Drainage of the project up to 5km radius of study area. If the site is within 1 km radius of any major river, peak and lean season river discharge as well as flood occurrence frequency based on peak rainfall data of the past 30 years. Details of Flood Level of the project site and maximum Flood Level of the river shall also be provided. (mega green field projects)	Not applicable No major river is passing within 1km radius of plant site.
xi.	Status of acquisition of land. If acquisition is not complete, stage of the acquisition process and expected time of complete possession of the land.	Chapter – 2 Para – 2.6.2 Page No.20
xii.	R&R details in respect of land in line with state Government policy	No additional land will be acquired. R & R is not

S. No	TOR Point	Compliance
		applicable
5	Forest and wildlife related issues (if applicable):	
i.	Permission and approval for the use of forest land (forestry clearance), if any, and recommendations of the State Forest Department. (if applicable)	No Forest area is involved.
ii.	Landuse map based on High resolution satellite imagery (GPS) of the proposed site delineating the forestland (in case of projects involving forest land more than 40 ha)	Not Applicable No Forest area is involved.
iii.	Status of Application submitted for obtaining the stage I forestry clearance along with latest status shall be submitted.	Not Applicable No Forest area is involved.
iv.	The projects to be located within 10 km of the National Parks, Sanctuaries, Biosphere Reserves, Migratory Corridors of Wild Animals, the project proponent shall submit the map duly authenticated by Chief Wildlife Warden showing these features vis-à-vis the project location and the recommendations or comments of the Chief Wildlife Warden-thereon.	There are no wild life sanctuaries, national parks, elephant/tiger reserves within 10km radius of the study area.
v.	Wildlife Conservation Plan duly authenticated by the Chief Wildlife Warden of the State Government for conservation of Schedule I fauna, if any exists in the study area.	No Schedule - I fauna is existing within the study area
vi.	Copy of application submitted for clearance under the Wildlife (Protection) Act, 1972, to the Standing Committee of the National Board for Wildlife.	Not Applicable
6	Environmental Status	
i.	Determination of atmospheric inversion level at the project site and site-specific micro - meteorological data using temperature, relative humidity, hourly wind speed and direction and rainfall.	Chapter - 4 Para - 4.1.1, 4.1.2, 4.1.3 Page No.107, 108 & 110 Annexure - 4 A
ii.	AAQ data (except monsoon) at 8 locations for PM ₁₀ , PM _{2.5} , SO ₂ , NO _x , CO and other parameters relevant to the project shall be collected. The monitoring stations shall be based CPCB guidelines and take into account the pre-dominant wind direction, population zone and sensitive receptors including reserved	Chapter - 3 Para - 3.3.2.2 Page No.47

S. No	TOR Point	Compliance
	forests.	
iii.	Raw data of all AAQ measurement for 12 weeks of all stations as per frequency given in the NAQQM Notification of Nov. 2009 along with - min., max., average and 98% values for each of the AAQ parameters from data of all AAQ stations should be provided as an annexure to the EIA Report.	Chapter – 3 Annexure – 3A
iv.	Surface water quality of nearby River (100m upstream and downstream of discharge point) and other surface drains at eight locations as per CPCB/MoEF & CC guidelines.	Chapter – 3 Annexure – 3B
v.	Whether the site falls near to polluted stretch of river identified by the CPCB / MoEF & CC, if yes give details.	Chapter – 2 Para – 2.3 Page No. 10
vi.	Ground water monitoring at minimum at 8 locations shall be included.	Chapter – 3 Para - 3.3.4 Annexure – 3B Page No. 51
vii.	Noise levels monitoring at 8 locations within the study area.	Chapter – 3 Para - 3.3.3 Page No. 49
viii.	Soil Characteristic as per CPCB guidelines.	Chapter – 3 Annexure – 3 C, 3C1
ix.	Traffic study of the area, type of vehicles, frequency of vehicles for transportation of materials, additional traffic due to proposed project, parking arrangement etc.	Chapter – 7 Para – 7.19.3 Page No.173
x.	Detailed description of flora and fauna (terrestrial and aquatic) existing in the study area shall be given with special reference to rare, endemic and endangered species. If Schedule- I fauna are found within the study area, a Wildlife Conservation Plan shall be prepared and furnished.	Chapter – 3 Para - 3.5 and sub paragraphs Page No. 62
xi.	Socio-economic status of the study area.	Chapter – 3 Para - 3.6 and sub paragraphs Page No. 72
7	Impact Assessment and Environment Management Plan	
i.	Assessment of ground level concentration of pollutants from the stack emission based on site- specific meteorological	Chapter – 4 Para – 4.1.1, 4.1.2, 4.1.3 Page No. 107, 108 & 110

S. No	TOR Point	Compliance
	features. In case the project is located on a hilly terrain, the AQIP Modelling shall be done using inputs of the specific terrain characteristics for determining the potential impacts of the project on the AAQ. Cumulative impact of all sources of emissions (including transportation) on the AAQ of the area shall be assessed. Details of the model used and the input data used for modelling shall also be provided. The air quality contours shall be plotted on a location map showing the location of project site, habitation nearby, sensitive receptors, if any.	Fig – 4.1 to Fig – 4.5 Page No.113 - 116
ii.	Water Quality modelling - in case, if the effluent is proposed to be discharged in to the local drain water taking in to consideration the upstream and downstream quality of water of the drain.	No wastewater discharge from cement plant to surface water bodies/drains
iii.	Impact of the transport of the raw materials and end products on the surrounding environment shall be assessed and provided. In this regard, options for transport of raw materials and finished products and wastes (large quantities) by rail or rail-cum road transport or conveyor- cum-rail transport shall be examined.	Chapter – 7 Para – 7.19.3 Page No.173
iv.	A note on treatment of wastewater from different plant operations, extent recycled and reused for different purposes shall be included. Complete scheme of effluent treatment. Characteristics of untreated and treated effluent to meet the prescribed standards of discharge under E(P) Rules.	Chapter – 4 Para – 4.3.1.1 Page No.125
v.	Details of stack emission and action plan for control of emissions to meet standards.	In the existing plant to comply with the new norm PCIL have replaced some bags in major stacks and maintaining particulate matter well within stipulated limits. The proposed new unit – II is designed to comply with the new standards
vi.	Measures for fugitive emission control	Chapter – 4

S. No	TOR Point	Compliance
		Para – 4.1.7 Page No.120
vii.	Details of hazardous waste generation and their storage, utilization and management. Copies of MOU regarding utilization of solid and hazardous waste in cement plant shall also be included. EMP shall include the concept of waste-minimization, recycle/reuse/recover techniques, Energy conservation, and natural resource conservation.	Chapter – 4 Para – 4.4.2 Page No.131
viii.	Proper utilization of fly ash shall be ensured as per Fly Ash Notification, 2009. A detailed plan of action shall be provided.	No flyash generation from the plant
ix.	Action plan for the green belt development plan in 33 % area i.e. land with not less than 1,500 trees per ha. Giving details of species, width of plantation, planning schedule etc. shall be included. The green belt shall be around the project boundary and a scheme for greening of the roads used for the project shall also be incorporated.	Chapter – 4 Para – 4.4.3 Page No.132
x.	Action plan for rainwater harvesting measures at plant site shall be submitted to harvest rainwater from the roof tops and storm water drains to recharge the ground water and also to use for the various activities at the project site to conserve fresh water and reduce the water requirement from other sources.	Chapter – 4 Para – 4.3.2 Page No.128
xi.	Total capital cost and recurring cost/annum for environmental pollution control measures shall be included.	Chapter – 6 Para – 6.2 Page No.142
xii.	Action plan for post-project environmental monitoring shall be submitted.	Chapter – 6 Para – 6.2 Page No.146
xiii.	Onsite and Offsite Disaster (natural and Man-made) Preparedness and Emergency Management Plan including Risk Assessment and damage control. Disaster management plan should be linked with District Disaster Management Plan.	Chapter – 7 Para – 7.2 Page No.148
8	Occupational health	
i.	Details of existing Occupational & Safety Hazards. What are the exposure levels of	Chapter – 4 Para – 4.6.1

S. No	TOR Point	Compliance
	above mentioned hazards and whether they are within Permissible Exposure Level (PEL). If these are not within PEL, what measures the company has adopted to keep them within PEL so that health of the workers can be preserved.	Page No.139
ii.	Details of exposure specific health status evaluation of worker. If the workers' health is being evaluated by pre designed format, chest x rays, Audiometry, Spirometry, Vision testing (Far & Near vision, colour vision and any other ocular defect) ECG, during pre-placement and periodical examinations give the details of the same. Details regarding last month analyzed data of above mentioned parameters as per age, sex, duration of exposure and department wise.	Chapter – 4 Para – 4.6 Page No.138
iii.	Annual report of health status of workers with special reference to Occupational Health and Safety.	Annexure – 4D
iv.	Plan and fund allocation to ensure the occupational health & safety of all contract and casual workers	Chapter – 4 Para – 4.6 Page No.138
9	Corporate Environment Policy	
i.	Does the company have a well laid down Environment Policy approved by its Board of Directors? If so, it may be detailed in the EIA report.	Chapter – 10 Para 10.2 Page No.196
ii.	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.	Chapter – 10 Para 10.2 & 10.3 Page No.196, 197
iii.	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.	Chapter – 10 Para – 10.4 Page No.198
iv.	Does the company have system of reporting of non-compliances / violations of environmental norms to the Board of Directors of the company and / or	Chapter – 10 Para 10.2 & 10.3 Page No.196, 197

S. No	TOR Point	Compliance
	shareholders or stakeholders at large? This reporting mechanism shall be detailed in the EIA report.	
10	Details regarding infrastructure facilities such as sanitation, fuel, restroom etc. to be provided to the labour force during construction as well as to the casual workers including truck drivers during operation phase.	Rest shelter, canteen and sanitation facilities are made available for the truck drivers.
11	Enterprise Social Commitment (ESC)	
i.	Adequate funds (at least 2.5 % of the project cost) shall be earmarked towards the Enterprise Social Commitment based on Public Hearing issues and item-wise details along with time bound action plan shall be included. Socio-economic development activities need to be elaborated upon.	Chapter – 8 Para – 8.3 Page No. 185
12	Any litigation pending against the project and/or any direction/order passed by any Court of Law against the project, if so, details thereof shall also be included. Has the unit received any notice under the Section 5 of Environment (Protection) Act, 1986 or relevant Sections of Air and Water Acts? If so, details thereof and compliance/ATR to the notice(s) and present status of the case.	No Litigation case is pending against the proponent.
13	A tabular chart with index for point wise compliance of above TOR.	Annexure – 1E
14	The TORs prescribed shall be valid for a period of three years for submission of the EIA – EMP reports along with Public Hearing Proceedings (wherever stipulated)	Noted

ADDITIONAL TOR FOR CEMENT INDUSTRY

S. No	TOR Point	Compliance
1	Limestone and coal linkage documents along with the status of environmental clearance of limestone and coal mines	PCIL has obtained EC (vide Letter. F. No. : J-11015/211/2007-IA.II (M) Dated 17-07-2007 for 2.30 MTPA of Limestone production. PCIL proposes to enhance the limestone production from 2.30 MTPA to 5.30 MTPA from its mining lease area known as Gudipadu Limestone Mine spread over an area of 392.62 Ha. located

S. No	TOR Point	Compliance
		<p>at Gudipadu & Kundanakota villages, Yadiki Mandal, Anantapur District, Andhra Pradesh..</p> <p>TOR obtained from MOEF for expansion of mine vide letter No J-11015/207/2016.-IA.II (M) dated 19-1-2017</p> <p>PCIL will obtain Environmental clearance for enhancement of limestone production.</p> <p>Coal is obtained from E-Auction</p>
2	Quantum of production of coal and limestone from coal & limestone mines and the projects they cater to	<p>The present Limestone production from this mine is 2.3 MTPA i.e Gudipadu Limestone Mine which is a captive mine of PCIL.</p> <p>PCIL proposes to enhance the limestone production from 2.30 MTPA to 5.30 MTPA for which process is initiated along with the subject cement plant expansion proposal.</p> <p>Coal is obtained from E-Auction</p>
3	Present land use shall be prepared based on satellite imagery. High-resolution satellite image data having 1m-5m spatial resolution like quickbird, Ikonos, IRS P-6 pan sharpened etc. for the 10 Km radius area from proposed site. The same shall be used for land used/land-cover mapping of the area.	<p>Chapter - 3</p> <p>Para - 3.4.2, Fig - 3.8 & 3.9</p> <p>Page No. 57, 59 & 60</p>
4	If the raw materials used have trace elements, an environment management plan shall also be included.	<p>No trace metals are found in the raw materials used.</p>
5	Plan for the implementation of the recommendations made for the cement plants in the CREP guidelines must be prepared.	<p>Chapter - 4</p> <p>Table - 4.1</p> <p>Page No.105</p>
6	Energy consumption per ton of clinker and cement grinding	<p>Chapter - 4</p> <p>Para - 4.0</p>

S. No	TOR Point	Compliance
		Page No.103
7	Provision of waste heat recovery boiler	PCIL has already installed 10 MW Waste Heat Recovery based captive Power Plant Power generation from Waste Heat Recovery Power Plant under expansion will be increased from 10 to 20 MW.
8	Arrangement for Co-processing of hazardous waste in Cement Plant	The new Unit – II will be designed to firing hazardous waste in the Kiln
9	Trace metals in waste material especially slag	No waste generation from the cement plant. PCIL is using Slag for production of Portland Slag Cement. Trace metals in slag are given below <ul style="list-style-type: none"> • Aluminium - 3.1 ppm • Barium-314 ppm • Nickel-362 ppm • Vanadium-17.25 ppm • Chromium -213 ppm • Lead-3.1 ppm

The following general points shall be noted		
i	All documents shall be properly indexed, page numbered.	Complied
ii	Period/date of data collection should be clearly indicated.	Complied
iii	Authenticated English translation of all material in Regional languages shall be provided.	Complied
iv	The letter/application for environmental clearance should quote the MoEF file No. and also attach a copy of the letter.	Annexure -1 A
v	The copy of the letter received from the Ministry should be also attached as an annexure to the final EIA-EMP Report.	Annexure -1 A
vi	The index of the final EIA-EMP report must indicate the specific chapter and page no. of the EIA-EMP Report	Complied
vii	While preparing the EIA report, the instructions for the proponents and instructions for the consultants issued by MoEF vide O.M. No. J-11013/41/2006-IA.II (I) dated 4 th	Noted

	August, 2009, which are available on the website of this Ministry should also be followed.	
viii	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. name of the consultant and the accreditation details shall be posted on the EIA – EMP Report as well as on the cover of the Hard copy of the presentation material for EC presentation.	Enclosed
ix	TORs' prescribed by the Expert Appraisal Committee (industry) shall be considered for preparation of EIA-EMP report for the project in addition to all the relevant information as per the 'Generic Structure of EIA' given in Appendix III and IIIA in the EIA Notification, 2006. Where the documents provided are in a language other than English, an English translation shall be provided. The draft EIA-EMP report shall be submitted to the State Pollution Control Board of the concerned State for conduct of Public Hearing. The SPCB shall conduct the Public Hearing/public consultation, district-wise, as per the provisions of EIA notification, 2006. The public hearing shall be chaired by an officer not below the rank of Additional District Magistrate. The issues raised in Public Hearing and during the consultation process and the commitments made by the project proponent on the same shall be included separately.	The issues raised in Public Hearing and during the consultation process and the commitments made by the project proponent are enclosed as Annexure – 7 A .

ANNEXURE - 3A

SUMMARY OF AMBIENT AIR QUALITY IN THE STUDY AREA

CODE	(µg/m ³)			PERCENTILE VALUES (µg/m ³)									
	MIN	MAX	AVG	10	20	30	40	50	60	70	80	90	98
Particulate Matter (PM₁₀)													
A1	45.6	56.9	51.3	45.8	46.4	47.9	48.6	49.8	52.7	54.3	55.0	56.1	56.5
A2	44.1	51.9	48.0	44.3	45.5	46.2	47.3	48.0	48.7	49.8	50.5	51.3	51.4
A3	46.1	56.1	51.1	46.4	48.2	49.3	51.0	52.1	53.2	54.5	54.9	55.5	55.7
A4	46.8	53.3	50.1	47.2	48.1	48.7	49.5	51.0	51.4	51.9	52.3	52.6	52.8
A5	44.8	51.2	48.0	45.0	45.8	46.3	47.0	47.5	48.0	48.8	49.5	50.5	50.9
A6	47.8	54.5	51.2	47.9	48.5	48.9	50.2	50.5	51.2	52.0	52.7	53.8	54.3
A7	47.1	55.4	51.3	47.2	48.8	49.7	50.6	50.9	51.0	51.7	53.9	54.9	55.2
A8	45.9	53.9	49.9	46.2	47.9	48.9	50.4	51.4	51.9	52.4	52.7	53.3	53.5
Particulate Matter (PM_{2.5})													
A1	18.1	24.8	21.5	18.4	19.3	19.9	20.5	21.3	21.9	22.5	22.7	23.4	24.3
A2	18.8	21.3	20.1	18.9	19.2	19.4	19.7	19.9	20.1	20.4	20.6	20.9	21.2
A3	23.8	26.1	25.0	23.9	24.2	24.4	24.7	24.9	25.1	25.4	25.6	25.9	26.0
A4	18.2	23.5	20.9	18.4	19.4	19.8	20.3	20.7	21.0	21.5	22.0	22.6	22.9
A5	19.2	23.9	21.6	19.4	20.0	20.4	21.0	21.4	21.8	22.4	22.8	23.4	23.6
A6	20.8	25.8	23.3	21.0	21.6	22.0	22.4	22.8	23.1	23.7	24.0	24.5	24.7
A7	22.5	26.5	24.5	22.6	23.0	23.3	23.7	23.9	24.2	24.6	24.9	25.5	25.8
A8	20.2	25.7	23.0	20.4	21.2	21.6	22.4	22.8	23.3	24.0	24.5	25.2	25.5
Sulfur Dioxide (SO₂)													
A1	8.1	13.3	10.7	8.2	8.8	9.5	9.8	10.2	10.9	11.6	11.8	12.5	12.7
A2	8.4	11.8	10.1	8.5	9.0	9.3	9.7	10.0	10.3	10.8	11.0	11.5	11.7
A3	8.5	12.6	10.6	8.6	9.3	9.7	10.1	10.5	10.8	11.4	11.7	12.3	12.5
A4	8.2	12.4	10.3	8.3	8.9	9.4	9.8	10.2	10.5	10.9	11.1	11.5	11.9
A5	8.7	12.3	10.5	8.9	9.3	9.6	10.2	10.5	10.8	11.3	11.6	12.0	12.1
A6	9.6	13.4	11.5	9.7	10.2	10.6	11.0	11.3	11.6	12.1	12.4	12.9	13.0
A7	8.4	13.2	10.8	8.5	9.1	9.9	10.4	10.7	11.3	11.6	12.0	12.4	12.8
A8	7.9	12.5	10.2	8.1	8.7	9.1	9.7	10.1	10.5	11.1	11.5	12.1	12.3
Oxides of Nitrogen (NO_x)													
A1	9.6	14.2	11.9	9.9	10.8	11.2	11.9	12.2	12.4	12.9	13.1	13.7	13.9
A2	9.9	13.4	11.6	10.1	10.5	10.8	11.3	11.6	11.9	12.3	12.6	13.1	13.2
A3	9.1	13.9	11.5	9.3	9.9	10.3	11.0	11.4	11.8	12.4	12.8	13.5	13.7
A4	9.5	13.2	11.4	9.6	10.4	10.7	11.2	11.5	11.7	12.1	12.4	12.7	12.8
A5	10.3	13.5	11.9	10.4	10.7	10.9	11.4	11.7	11.9	12.3	12.5	13.1	13.3
A6	10.9	14.3	12.6	11.1	11.5	11.8	12.3	12.8	13.0	13.4	13.6	13.9	14.1
A7	9.1	14.5	11.8	9.2	10.1	10.6	11.2	11.8	12.0	12.7	12.9	13.4	13.6
A8	10.2	14.6	12.4	10.4	11.0	11.3	12.0	12.3	12.7	13.2	13.5	14.2	14.4

A1	Plant Site	A5	Nitturu
A2	Gudipadu	A6	Kamalapadu
A3	Guruvanipalle	A7	Boyareddypalli
A4	Sivaramapuram	A8	Chintalayapalli

ANNEXURE - 3A CONTD...**AMBIENT AIR QUALITY DATA ($\mu\text{g}/\text{m}^3$)**

Client : Penna Cement Industries Limited
Project : Expansion of Cement Plant
Season : Winter Season' 2016 - 17
Period : December -2016 - February-2017
Station : Plant Site

Code : A-1

Date of sampling	PM ₁₀	PM _{2.5}	SO ₂	NO _x	CO (ppm)
December - 2016					
05/12/2016	47.9	19.9	12.7	13.9	<1
06/12/2016	45.8	18.4	9.5	11.2	<1
12/12/2016	45.6	18.1	8.1	9.6	<1
13/12/2016	47.6	19.4	8.6	10.5	<1
19/12/2016	52.9	22.2	13.3	14.1	<1
20/12/2016	55.2	22.9	8.8	10.8	<1
26/12/2016	48.3	20.4	8.2	9.9	<1
27/12/2016	45.8	18.6	9.6	11.5	<1
January - 2017					
04/01/2017	52.7	21.9	9.7	11.7	<1
05/01/2017	55.7	23.1	11.9	13.3	<1
11/01/2017	48.6	20.5	9.8	11.9	<1
12/01/2017	55.0	22.7	10.2	12.2	<1
18/01/2017	54.3	22.5	12.5	13.7	<1
19/01/2017	49.8	21.3	10.5	12.3	<1
25/01/2017	56.9	24.8	12.2	13.5	<1
26/01/2017	56.5	24.3	10.0	12.0	<1
February - 2017					
01/02/2017	54.8	22.6	11.5	12.6	<1
02/02/2017	46.4	19.3	11.6	12.9	<1
08/02/2017	53.4	22.3	8.4	10.2	<1
09/02/2017	56.1	23.4	10.9	12.4	<1
15/02/2017	48.9	20.8	9.3	11.0	<1
16/02/2017	46.2	19.0	11.7	13.0	<1
22/02/2017	51.5	21.5	11.4	12.5	<1
23/02/2017	48.1	20.2	11.8	13.1	<1

AMBIENT AIR QUALITY DATA ($\mu\text{g}/\text{m}^3$)

Client : Penna Cement Industries Limited
Project : Expansion of Cement Plant
Season : Winter Season' 2016 - 17
Period : December -2016 - February-2017
Station : Gudipadu

Code: A-2

Date of sampling	PM ₁₀	PM _{2.5}	SO ₂	NO _x	CO (ppm)
December - 2016					
05/12/2016	49.1	20.2	9.0	10.5	<1
06/12/2016	46.2	19.4	9.9	11.4	<1
12/12/2016	45.2	19.1	11.5	13.1	<1
13/12/2016	44.1	18.8	9.7	11.3	<1
19/12/2016	50.9	20.7	9.3	10.8	<1
20/12/2016	48.3	20.0	10.9	12.5	<1
26/12/2016	47.6	19.8	11.7	13.2	<1
27/12/2016	51.3	20.9	9.4	11.0	<1
January - 2017					
04/01/2017	44.6	19.0	10.0	11.6	<1
05/01/2017	49.4	20.3	8.4	9.9	<1
11/01/2017	45.5	19.2	8.8	10.4	<1
12/01/2017	50.5	20.6	10.5	12.0	<1
18/01/2017	46.5	19.5	8.5	10.1	<1
19/01/2017	44.3	18.9	10.2	11.7	<1
25/01/2017	45.8	19.3	11.2	12.8	<1
26/01/2017	46.9	19.6	10.3	11.9	<1
February - 2017					
01/02/2017	51.9	21.3	9.6	11.1	<1
02/02/2017	47.3	19.7	11.8	13.4	<1
08/02/2017	50.1	20.5	10.6	12.2	<1
09/02/2017	51.1	20.8	8.7	10.2	<1
15/02/2017	48.7	20.1	11.1	12.6	<1
16/02/2017	49.8	20.4	11.4	12.9	<1
22/02/2017	48.0	19.9	9.1	10.7	<1
23/02/2017	51.4	21.2	10.8	12.3	<1

AMBIENT AIR QUALITY DATA ($\mu\text{g}/\text{m}^3$)

Client : Penna Cement Industries Limited
Project : Expansion of Cement Plant
Season : Winter Season' 2016 - 17
Period : December -2016 - February-2017
Station : Guruvanipalle

Code: A-3

Date of sampling	PM ₁₀	PM _{2.5}	SO ₂	NO _x	CO (ppm)
December - 2016					
05/12/2016	50.4	24.6	10.0	10.7	<1
06/12/2016	52.1	24.9	8.5	9.1	<1
12/12/2016	55.1	25.7	8.9	9.5	<1
13/12/2016	52.6	25.0	9.3	9.9	<1
19/12/2016	46.4	23.9	12.3	13.5	<1
20/12/2016	49.3	24.4	9.8	10.5	<1
26/12/2016	48.8	24.3	9.4	10.1	<1
27/12/2016	53.7	25.2	9.5	10.3	<1
January - 2017					
04/01/2017	49.9	24.5	10.7	11.6	<1
05/01/2017	54.7	25.5	10.1	11.0	<1
11/01/2017	47.2	24.0	11.6	12.6	<1
12/01/2017	54.5	25.4	11.7	12.8	<1
18/01/2017	56.1	26.1	10.3	11.2	<1
19/01/2017	46.1	23.8	10.5	11.4	<1
25/01/2017	54.3	25.3	11.4	12.4	<1
26/01/2017	55.3	25.8	12.1	13.3	<1
February - 2017					
01/02/2017	51.5	24.8	12.6	13.9	<1
02/02/2017	47.7	24.1	10.8	11.8	<1
08/02/2017	48.2	24.2	12.5	13.7	<1
09/02/2017	53.2	25.1	8.6	9.2	<1
15/02/2017	55.5	25.9	11.0	12.0	<1
16/02/2017	51.0	24.7	11.2	12.2	<1
22/02/2017	55.7	26.0	11.9	13.1	<1
23/02/2017	54.9	25.6	9.2	9.7	<1

AMBIENT AIR QUALITY DATA ($\mu\text{g}/\text{m}^3$)

Client : Penna Cement Industries Limited
Project : Expansion of Cement Plant
Season : Winter Season' 2016 - 17
Period : December -2016 - February-2017
Station : Sivaramapuram

Code: A-4

Date of sampling	PM₁₀	PM_{2.5}	SO₂	NO_x	CO (ppm)
December - 2016					
05/12/2016	48.7	19.8	9.7	11.0	<1
06/12/2016	47.6	19.0	8.4	9.8	<1
12/12/2016	49.5	20.3	8.9	10.4	<1
13/12/2016	48.1	19.4	8.5	10.3	<1
19/12/2016	51.2	20.9	9.3	10.6	<1
20/12/2016	48.4	19.5	9.6	10.8	<1
26/12/2016	52.1	21.8	8.2	9.5	<1
27/12/2016	46.8	18.2	9.4	10.7	<1
January - 2017					
04/01/2017	49.8	20.5	10.2	11.5	<1
05/01/2017	49.1	20.0	10.7	11.9	<1
11/01/2017	51.4	21.0	10.5	11.7	<1
12/01/2017	51.6	21.3	10.3	11.6	<1
18/01/2017	51.0	20.7	11.2	12.5	<1
19/01/2017	47.4	18.6	11.1	12.4	<1
25/01/2017	52.8	22.9	11.0	12.3	<1
26/01/2017	52.3	22.0	9.8	11.2	<1
February - 2017					
01/02/2017	52.5	22.4	10.9	12.1	<1
02/02/2017	51.5	21.1	11.9	12.8	<1
08/02/2017	52.6	22.6	11.5	12.7	<1
09/02/2017	53.3	23.5	12.4	13.2	<1
15/02/2017	52.4	22.2	10.8	12.0	<1
16/02/2017	51.9	21.5	10.0	11.4	<1
22/02/2017	47.2	18.4	8.3	9.6	<1
23/02/2017	49.3	20.1	11.4	12.6	<1

AMBIENT AIR QUALITY DATA ($\mu\text{g}/\text{m}^3$)

Client : Penna Cement Industries Limited
Project : Expansion of Cement Plant
Season : Winter Season' 2016 - 17
Period : December -2016 - February-2017
Station : Nitturu

Code: A-5

Date of sampling	PM ₁₀	PM _{2.5}	SO ₂	NO _x	CO (ppm)
December - 2016					
07/12/2016	45.5	19.8	9.0	10.5	<1
08/12/2016	46.8	20.8	9.6	10.9	<1
14/12/2016	46.3	20.4	9.3	10.7	<1
15/12/2016	45.3	19.6	9.5	10.8	<1
21/12/2016	45.8	20.0	9.1	10.6	<1
22/12/2016	47.8	21.6	10.3	11.5	<1
28/12/2016	47.0	21.0	11.2	12.2	<1
29/12/2016	46.5	20.6	10.2	11.4	<1
January - 2017					
06/01/2017	45.0	19.4	12.3	13.5	<1
07/01/2017	47.5	21.4	10.7	11.8	<1
13/01/2017	49.5	22.8	8.7	10.3	<1
14/01/2017	48.3	22.0	11.0	12.0	<1
20/01/2017	44.8	19.2	12.1	13.3	<1
21/01/2017	51.2	23.9	8.9	10.4	<1
27/01/2017	48.0	21.8	10.8	11.9	<1
28/01/2017	49.8	23.0	10.0	11.3	<1
February - 2017					
03/02/2017	46.0	20.2	11.6	12.5	<1
04/02/2017	49.1	22.6	11.8	12.9	<1
10/02/2017	48.8	22.4	12.0	13.1	<1
11/02/2017	47.3	21.2	10.5	11.7	<1
17/02/2017	48.5	22.2	11.3	12.3	<1
18/02/2017	50.1	23.2	9.8	11.1	<1
24/03/2017	50.9	23.6	11.7	12.7	<1
25/03/2017	50.5	23.4	11.5	12.4	<1

AMBIENT AIR QUALITY DATA ($\mu\text{g}/\text{m}^3$)

Client : Penna Cement Industries Limited
Project : Expansion of Cement Plant
Season : Winter Season' 2016 - 17
Period : December -2016 - February-2017
Station : Kamalapadu

Code: A-6

Date of sampling	PM ₁₀	PM _{2.5}	SO ₂	NO _x	CO (ppm)
December - 2016					
07/12/2016	48.1	21.2	9.8	11.3	<1
08/12/2016	47.8	20.8	9.7	11.1	<1
14/12/2016	48.9	22.0	10.4	11.7	<1
15/12/2016	48.3	21.4	13.4	14.3	<1
21/12/2016	52.7	24.0	10.6	11.8	<1
22/12/2016	49.3	22.1	10.7	11.9	<1
28/12/2016	50.3	22.5	10.0	11.4	<1
29/12/2016	52.0	23.7	9.6	10.9	<1
January - 2017					
06/01/2017	47.9	21.0	10.2	11.5	<1
07/01/2017	50.5	22.8	11.0	12.3	<1
13/01/2017	51.8	23.6	12.4	13.6	<1
14/01/2017	54.3	24.7	12.1	13.4	<1
20/01/2017	51.2	23.1	11.5	12.9	<1
21/01/2017	48.7	21.8	12.9	13.9	<1
27/01/2017	50.9	23.0	11.7	13.1	<1
28/01/2017	49.8	22.3	11.6	13.0	<1
February - 2017					
03/02/2017	50.2	22.4	12.3	13.5	<1
04/02/2017	52.3	23.9	11.3	12.8	<1
10/02/2017	54.5	25.8	11.1	12.4	<1
11/02/2017	48.5	21.6	10.9	12.1	<1
17/02/2017	51.6	23.4	13.0	14.1	<1
18/02/2017	53.8	24.5	11.9	13.3	<1
24/03/2017	53.4	24.3	12.8	13.8	<1
25/03/2017	52.9	24.1	12.6	13.7	<1

AMBIENT AIR QUALITY DATA ($\mu\text{g}/\text{m}^3$)**Client : Penna Cement Industries Limited****Project : Expansion of Cement Plant****Season : Winter Season' 2016 - 17****Period : December -2016 - February-2017****Code: A-7****Station : Boyareddypalli**

Date of sampling	PM ₁₀	PM _{2.5}	SO ₂	NO _x	CO (ppm)
December - 2016					
07/12/2016	49.7	23.3	8.7	9.3	<1
08/12/2016	47.1	22.5	8.4	9.1	<1
14/12/2016	51.3	24.3	12.3	13.1	<1
15/12/2016	50.2	23.5	13.2	14.1	<1
21/12/2016	48.0	22.7	8.9	9.4	<1
22/12/2016	54.3	25.1	9.9	10.6	<1
28/12/2016	50.6	23.7	11.2	11.7	<1
29/12/2016	49.9	23.4	8.5	9.2	<1
January - 2017					
06/01/2017	50.9	24.0	11.6	12.7	<1
07/01/2017	51.4	24.4	12.4	13.4	<1
13/01/2017	48.2	22.9	10.5	11.5	<1
14/01/2017	51.7	24.6	10.4	11.2	<1
20/01/2017	55.2	25.8	11.3	12	<1
21/01/2017	53.8	24.7	11.7	12.8	<1
27/01/2017	55.4	26.5	12	12.9	<1
28/01/2017	53.9	24.9	9.1	10.1	<1
February - 2017					
03/02/2017	47.2	22.6	12.2	13.1	<1
04/02/2017	50.8	23.8	9.4	10.4	<1
10/02/2017	54.9	25.5	10.7	11.8	<1
11/02/2017	54.5	25.3	10.3	10.8	<1
17/02/2017	48.8	23.0	12.8	13.6	<1
18/02/2017	51.0	24.2	11.5	12.4	<1
24/03/2017	50.9	23.9	11.4	12.3	<1
25/03/2017	49.4	23.1	10.3	11	<1

AMBIENT AIR QUALITY DATA ($\mu\text{g}/\text{m}^3$)

Client : Penna Cement Industries Limited
Project : Expansion of Cement Plant
Season : Winter Season' 2016 - 17
Period : December -2016 - February-2017
Station : Chintalayapalli

Code: A-8

Date of sampling	PM ₁₀	PM _{2.5}	SO ₂	NO _x	CO (ppm)
December - 2016					
07/12/2016	49.9	22.1	10.7	12.9	<1
08/12/2016	46.2	20.4	8.3	10.5	<1
14/12/2016	47.4	20.9	9.5	11.7	<1
15/12/2016	46.8	20.7	8.5	10.8	<1
21/12/2016	49.4	21.9	11.1	13.2	<1
22/12/2016	48.4	21.4	8.7	11.0	<1
28/12/2016	47.9	21.2	10.3	12.5	<1
29/12/2016	51.4	22.8	12.1	14.2	<1
January - 2017					
06/01/2017	50.4	22.4	9.7	11.9	<1
07/01/2017	52.0	23.6	11.9	14.0	<1
13/01/2017	53.3	25.2	10.9	13.0	<1
14/01/2017	53.9	25.7	11.5	13.6	<1
20/01/2017	53.1	25.0	11.7	13.8	<1
21/01/2017	53.5	25.5	9.3	11.5	<1
27/01/2017	45.9	20.2	9.9	12.1	<1
28/01/2017	52.6	24.3	10.5	12.7	<1
February - 2017					
03/02/2017	52.4	24.0	8.9	11.1	<1
04/02/2017	48.9	21.6	7.9	10.2	<1
10/02/2017	52.9	24.8	11.3	13.4	<1
11/02/2017	52.2	23.8	8.1	10.4	<1
17/02/2017	50.9	22.6	9.1	11.3	<1
18/02/2017	51.7	23.1	10.1	12.3	<1
24/03/2017	51.9	23.3	12.5	14.6	<1
25/03/2017	52.7	24.5	12.3	14.4	<1

ANNEXURE-3B
WATER QUALITY DATA

S.No	TESTS	RESULTS			IS 10500 [DRINKING WATER STANDARD]	
		Plant Site Drinking Water	Gudipadu	Guruvanipalli	DESIRABLE LIMITS	PERMISSIBLE LIMITS
1	Odour	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
2	Taste	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
3	Colour (Hazen units)	<5	<5	<5	5	15
4	pH	7.12	7.34	7.46	6.5 to 8.5	No Relaxation
5	Turbidity, NTU	<1	<1	<1	1	5
6	Total Hardness as CaCO ₃ , mg/l	30	240	250	200	600
7	Iron as Fe, mg/l	0.04	0.04	0.06	1.0	No Relaxation
8	Chlorides as Cl, mg/l@105°C	23	110	78	250	1000
9	Dissolved solids, mg/l	72	568	605	500	2000
10	Calcium as Ca, mg/l	6.4	72	72	75	200
11	Magnesium as Mg, mg/l	3.4	15	17	30	100
12	Copper as Cu, mg/l	<0.02	<0.02	<0.02	0.05	1.5
13	Manganese as Mn, mg/l	<0.03	<0.03	<0.03	0.1	0.3
14	Sulphate as SO ₄ , mg/l	<4	58	62	200	400
15	Nitrate as NO ₃ , mg/l	<1	30	18	45	100
16	Fluoride as F, mg/l	0.16	1.04	1.02	1.0	1.5
17	Mercury as Hg, mg/l	<0.001	<0.001	<0.001	0.001	No Relaxation
18	Cadmium as Cd, mg/l	<0.003	<0.003	<0.003	0.003	No Relaxation
19	Selenium as Se , mg/l	<0.01	<0.01	<0.01	0.01	No Relaxation
20	Arsenic as As, mg/l	<0.01	<0.01	<0.01	0.01	No Relaxation
21	Cyanide as CN mg/l	<0.02	<0.02	<0.02	0.05	No Relaxation
22	Lead as Pb, mg/l	<0.01	<0.01	<0.01	0.01	No Relaxation
23	Zinc as Zn, mg/l	<0.02	<0.02	<0.02	5	15
24	Total Chromium as Cr, mg/l	<0.02	<0.02	<0.02	0.05	No Relaxation
25	Alkalinity as CaCO ₃ , mg/l	20	195	275	200	600
26	Boron as B, mg/l	<0.1	<0.1	<0.1	0.5	1

WATER QUALITY DATA

S.No	TESTS	RESULTS			IS 10500 [DRINKING WATER STANDARD]	
		Virareddypalli Bore well	Nitturu Bore well	Boyareddy palli Bore Well	DESIRABLE LIMITS	PERMISSIBLE LIMITS
1	Odour	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
2	Taste	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
3	Colour (Hazen units)	<5	<5	<5	5	15
4	pH	7.51	7.49	7.56	6.5 to 8.5	No Relaxation
5	Turbidity, NTU	<1	<1	1	1	5
6	Total Hardness as CaCO ₃ , mg/l	215	260	215	200	600
7	Iron as Fe, mg/l	0.09	0.07	0.06	1.0	No Relaxation
8	Chlorides as Cl, mg/l@105°C	80	75	85	250	1000
9	Dissolved solids, mg/l	428	492	457	500	2000
10	Calcium as Ca, mg/l	54	68	58	75	200
11	Magnesium as Mg, mg/l	19.5	22	17	30	100
12	Copper as Cu, mg/l	<0.02	<0.02	<0.02	0.05	1.5
13	Manganese as Mn, mg/l	<0.03	<0.03	<0.03	0.1	0.3
14	Sulphate as SO ₄ , mg/l	74	65	74	200	400
15	Nitrate as NO ₃ , mg/l	18	21	18	45	100
16	Fluoride as F, mg/l	1.06	1.12	0.96	1.0	1.5
17	Mercury as Hg, mg/l	<0.001	<0.001	<0.001	0.001	No Relaxation
18	Cadmium as Cd, mg/l	<0.003	<0.003	<0.003	0.003	No Relaxation
19	Selenium as Se , mg/l	<0.01	<0.01	<0.01	0.01	No Relaxation
20	Arsenic as As, mg/l	<0.01	<0.01	<0.01	0.01	No Relaxation
21	Cyanide as CN mg/l	<0.02	<0.02	<0.02	0.05	No Relaxation
22	Lead as Pb, mg/l	<0.01	<0.01	<0.01	0.01	No Relaxation
23	Zinc as Zn, mg/l	<0.02	<0.02	<0.02	5	15
24	Total Chromium as Cr, mg/l	<0.02	<0.02	<0.02	0.05	No Relaxation
25	Alkalinity as CaCO ₃ , mg/l	120	185	140	200	600
26	Boron as B, mg/l	<0.1	<0.1	<0.1	0.5	1

WATER QUALITY DATA

S.No	TESTS	RESULTS			IS 10500 [DRINKING WATER STANDARD]	
		Chintalaya palli	Kundana kota	Mine Site	DESIRABLE LIMITS	PERMISSIBLE LIMITS
1	Odour	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
2	Taste	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
3	Colour (Hazen units)	<5	<5	<5	5	15
4	pH	7.19	7.38	7.26	6.5 to 8.5	No Relaxation
5	Turbidity, NTU	<1	<1	<1	1	5
6	Total Hardness as CaCO ₃ , mg/l	180	230	200	200	600
7	Iron as Fe, mg/l	0.09	0.07	0.05	1.0	No Relaxation
8	Chlorides as Cl, mg/l@105°C	73	98	53	250	1000
9	Dissolved solids, mg/l	443	542	412	500	2000
10	Calcium as Ca, mg/l	52	70	54	75	200
11	Magnesium as Mg, mg/l	12	13	16	30	100
12	Copper as Cu, mg/l	<0.02	<0.02	<0.02	0.05	1.5
13	Manganese as Mn, mg/l	<0.03	<0.03	<0.03	0.1	0.3
14	Sulphate as SO ₄ , mg/l	51	56	43	200	400
15	Nitrate as NO ₃ , mg/l	12	32	20	45	100
16	Fluoride as F, mg/l	0.85	1.06	0.76	1.0	1.5
17	Mercury as Hg, mg/l	<0.001	<0.001	<0.001	0.001	No Relaxation
18	Cadmium as Cd, mg/l	<0.003	<0.003	<0.003	0.003	No Relaxation
19	Selenium as Se , mg/l	<0.01	<0.01	<0.01	0.01	No Relaxation
20	Arsenic as As, mg/l	<0.01	<0.01	<0.01	0.01	No Relaxation
21	Cyanide as CN mg/l	<0.02	<0.02	<0.02	0.05	No Relaxation
22	Lead as Pb, mg/l	<0.01	<0.01	<0.01<0.02	0.01	No Relaxation
23	Zinc as Zn, mg/l	<0.02	<0.02	<0.02	5	15
24	Total Chromium as Cr. mg/l	<0.02	<0.02	<0.02	0.05	No Relaxation
25	Alkalinity as CaCO ₃ , mg/l	172	190	180	200	600
26	Boron as B, mg/l	<0.1	<0.1	<0.1	0.5	1

HYDROGEOLOGY REPORT

M/s. **PENNA CEMENT INDUSTRIES LTD., (PCIL)**, is operating a cement plant located in Boyareddypalli in South-Western Andhra Pradesh, the unit was commissioned in Sep 2008 with a capacity of 2.0 MTPA. PCIL now proposes to increase production capacity of Boyareddypalli cement plant located at Boyareddypalli Village, Yadiki Mandal, Anantapur District, Andhra Pradesh.

In Cement Plant, water is required for cooling, dust suppression, sanitary facilities and gardening. The present water requirement of the plant is 930 m³/day and is sourced from bore wells within the plant site. Additional Water requirement for the expansion proposal is 500 m³/day. The source of water is bore well/mine pit.

Hydrological and hydrogeological study has been carried out as per GEC norms in the core zone (Cement Plant area) and buffer zone (10 km radius study area) for estimating availability of water and impact of Water drawl from bore wells on the water regime.

TOPOGRAPHY AND DRAINAGE

The Cement Plant area is a plateau type linear land. The general ground level has a very gentle southeasterly slope. Rest of the area is gently undulating with a relief of not more than 10 m. The higher elevations are in the northern part with altitude about 277 m above MSL and the lower ones with an average altitude of 273 m above MSL along the southern boundary. The maximum relief is 4 m.

The regional drainage is controlled by the River Pennar and its tributaries. The drainage pattern is of dendrite type. The drainage is towards NE and E, matching with the gentle gradient of the land. The area is a drought prone one, which is manifested in scanty vegetation cover. The study area is devoid of any significant vegetation.

Groundwater occurs under water table and semi-confined conditions.

The groundwater level ranges from 30 to 35 m bgl in summer season. The average fluctuation of ground water table is 2-4 m during monsoon/ winter and summer seasons.

The temperatures may reach up to 45.6° C with minimum around 6.7° C. The annual average rainfall varies between 364 and 867 mm.

REGIONAL GEOLOGY

The study area forms a part of Cuddapah Super group which has two distinct sub basins (Kurnool and Palnad Sub basins). These sub basins are made up of sandstone, shale, and limestone which is included in the Kurnool Sub group of middle to upper Proterozoic age co-relatable with Vindhyan Super group of Northern India. In the Kurnool group the Narji Limestone formation has two distinct components viz the lower massive, limestone and the upper calcareous flaggy stone. The limestone is of cement grade and constitutes the main source of raw material to several cement plants in the region.

Local Geology

The surface is mostly covered by black-cotton soil of variable thickness ranging from 0.3 to about 0.5 m with an average of 0.4 m.

The area is underlain by Tadipatri shales of lower Cuddaph. The shales are brown, and grey in colour and show fine to medium grained texture. They occur as shales and calcareous shales

Groundwater occurs under water table and semi confined conditions in the weathered and fractured shales. The thickness of weathered zone varies from 13.00 to 18.00 m.

The Bore wells / open wells were inventoried village wise and in total 345 irrigation bore wells and 28 open wells are fitted with pump sets for raising crops.

Ground water irrigates 78% of the total irrigation in the study area and it plays a vital role in irrigation.

The irrigation by ground water accounts for 78% of the total area irrigated, out of which 76% account for bore well and filter point wells and remaining 2 % for dug well irrigation. The total area irrigated by ground water is 1228 ha. In all, there are 373 ground water abstraction structures in the study area.

The inventory data shows that the bore wells drilled for drinking within the premises of villages are deep seated. The inventory data reveals that the open wells are having a range of depth from 6 m to 15 m bgl, with an average yield of 3000 liters per hour whereas the bore wells have been drilled up to a maximum depth of 100 m and the average depth is 75 m. The water first met in the area is about 25 m and the average water level in these bore wells is 35 m. Further the joints and fracture system extends up to a depth of 150 m. The average yield of the bore wells is \approx 1300 liters per hour.

There are totally 24 drinking water bore wells within the village limits and most of them are at a depth of 30 to 40 meters. Majority of them are fitted with Hand pumps and few of them are fitted with motors under piped water schemes.

CLIMATE & RAIN FALL DATA

The average annual rainfall is 535 mm, which ranges from Nil rainfall in February and March to 129 mm in September. September and October are the wettest months of the year. The mean seasonal rainfall distribution is 316 mm during southwest monsoon (June - September) 146 mm during northeast monsoon (Oct-Dec), 1 mm rainfall during winter (Jan-Feb) and 72 mm during summer (March-May). The percentage distribution of rainfall season wise is 58.7% in southwest monsoon, 27.6% in northeast monsoon, 0.21 percentages in winter and 13.5% in summer.

GROUND WATER DRAFT

The study area consists of 19 villages. Under the geohydrological survey the inventory of existing irrigation open / bore wells, drinking water bore

wells fitted with hand pumps and piped water supply villages and the surface water structures like tanks, ponds etc., has been considered.

There are about 8 tanks in the study area with the mine pits of various industries which receive about 1.43 MCM of rainwater. Taking 10 % of Surface water as return recharge, it is 0.143 MCM.

The total irrigation bore wells in the study area are 345 and the total open wells are 28. Thus the ground water draft is worked out by taking 10 hrs of pumping with an average yield of 3000 liters / hour for bore well and 2000 liters / hour for open well. **The total ground water draft per annum works out to 3.98 MCM.**

The human consumption also contributes for the Ground water draft and it is worked out by taking the population as per the 2011 census in the study area and the total population is 81,808. **Thus the draft from human consumption works out annually to 4.03 MCM.**

REQUIREMENT OF WATER

Water is required for cooling, dust suppression, Domestic use and gardening. The present water requirement of the plant is 930 m³/day. 700 m³/day for cement plant and colony is sourced from borewells within the plant site. Ground water withdrawal will not exceed 700 m³/day. 230 m³/day of water for existing waste heat recovery based power plant is met from mine pit.

Additional water requirement for expansion of cement plant and WHRB power plant is 500 m³/day and the same will be met from Mine pit.

There are 12 bore wells existing in the plant area. The total depth of the bore well ranges from 27.27 to 75.75 m and depth to water levels ranges from 6.91 to 9.85. The average yield of the bore wells is 1300 lph/borewell

Ground water withdrawal for Penna cement plant will not exceed 700 m³/day even after expansion.

Total ground water withdrawal per annum will be 0.231 MCM

GROUND WATER POTENTIAL

The main source of ground water is rain water. Based on the *National Resource Estimation Committee report*, the rainfall infiltration method is adopted. Since, this area falls in the Hard rock area category the rainfall infiltration factor is taken as 10 % of average rainfall. The ground water potential works out to 18.94 MCM.

The other sources of ground water recharges are the return irrigation from the surface water and ground water. (a) The return recharge from ground water structures irrigation is 10 % of the draft. This works out to 0.398 MCM and (b) from return irrigation from tanks, here also 10 % is taken out of the water used for irrigation, this works out to 0.143 MCM.

Hence, the total recharge from all these sources works out to 19.48 MCM.

GROUND WATER BALANCE

Ground Water Balance is worked out as follows:

	In MCM
a) Total water available from rainfall	189.4
b) Ground Water recharge from rain water	18.94
c) Return recharge from Tanks	0.143
d) Return irrigation recharge from Draft	0.398
e) Present annual draft i) Human	4.030
ii) Bore wells	3.98
f) Water Requirement for Plant and for greenbelt and residential etc	0.231
g) Total Ground Water Available (e+f)	19.48
h) Ground water balance (present)	11.24

The present utilization is 42.30 % and after the plant operations (after expansion) the utilization will not change as the additional water requirement of plant will be sourced from Mine pit.

Thus the ground water development computation at present is 42.30 % only and since it is well below the 70 % hence, categorized as safe.

However, since the area is likely to turn into exploited state, further ground water tapping is not recommended. On the other side, more water (rain) conservation shall be adopted.

GROUND WATER RECHARGING AND RAINWATER HARVESTING

PCIL is implementing rainwater harvesting measures in all the possible ways in the plant site and study area.

Rain water collected from Plant & Colony are routed to a common storm water drain which has an outlet into rain water harvesting pit located at the lower level in the colony area.

PCIL has constructed 18 no's of rain harvesting pits along the road from main gate to the colony for the storm water recharge in to the ground and also roof tops.

PCIL has taken up De-silting and renovation of old water reservoir which is in NE of plant with capacity of 0.2 TMC for rainwater harvesting.

- The water conserved will be used to meet the plant water requirement.
- Rain water harvesting and groundwater recharge structures have been be constructed outside the plant premises at following villages
- Check dam near chintalayapalli for storing of rain water has been constructed and PCIL has initiated Checkdam construction at Kundanakota

CHINTALAYAPALLI - PERCOLATION TANK











WATER CONSERVATION AND RECHARGING OF THE GROUND WATER

The following water conservation measures are implemented in the plant.

- a. Treated waste water is used for greenbelt development.
- b. Greenbelt by drip irrigation covering an area of 85 acres within and outside the cement plant was developed by PCIL.
- c. Water meters have been installed at various location of the cement plant to optimize the usage and leakages.

WATER METERS INSTALLED IN CEMENT PLANT

			
PLANT WATER TANK INLET	COOLING TOWER MAKEUP WATER	COLONY WATER	RAW MILL
			
COOLER WATER SPRAY	CEMENT MILL WATER SPRAY	CEMENT MILL WATER SPRAY	VRM SLAG WATER SPRAY

- a. Roof top rain water is harvested, led into a tank and is recycled.
- b. Paved roads result in proper channeling of rain water in to storage ponds.

IMPACT OF MINING ON GROUND WATER

Ground water table occurs at a depth of 45m below ground level i.e. 405 m RL as observed and as per the gathered information in the nearby villages in summer and 35 m i.e. 415 m RL during the rainy season.

The workings are expected to reach 420 m RL as ultimate depth of mining, which is above the water table in the area. Hence there will not be any impact on ground water regime of the lease area and its surroundings.

No dewatering is proposed from the mine pit, only rainwater collected in the existing mine pits will be utilized for plant and mine water requirement to minimize ground water drawl.

However, the mined out pit is being converted into rain water storage source and ground water recharge also. As the pit area increases, the Rain water storage and recharging also goes up.

CONCLUSION

1. At present the usage is 42.30 % of available ground water and it is categorized as safe zone.
2. The average rain fall computed is 535 mm whereas the normal rain fall is 550 mm.
3. The ground water study reveals that the operations will not have much effect on the ground water utilization in the long run. With added 10 % ground water recharge by constructing recharge structures and rain water harvesting structures there will not be any additional burden on the aquifer.
4. Water quality is good at present, and remains to be the same even after expansion operations by taking precautionary measures.
5. The impact on water quality due to plant operation will be negligible on the water used at plant as it is in closed circuit and no water effluent will be discharged from the plant.

SOIL QUALITY DATA

S. No	Parameters	RESULTS				
		S1	S2	S3	S4	S5
1	pH (1:2 Soil water Extract)	7.98	7.73	7.62	7.59	7.52
2	Electrical conductivity ($\mu\text{S}/\text{cm}$) (1:2 Soil water Extract)	234	247	211	275	213
3	Total soluble salts, mg/kg	290	320	270	350	280
4	Available Nitrogen as N, kg/Ha	290	210	260	290	240
5	Available Phosphorous as (P_2O_5) kg/Ha	34	20	29	36	28
6	Available Sodium as Na_2O (mg/kg)	328	347	381	316	224
7	Available Potassium as (K_2O)kg/Ha	220	304	356	263	272
8	Available Calcium as Ca (mg/kg)	3960	2940	3060	2720	2360
9	Available Magnesium as Mg (mg/kg)	474	377	413	353	377
10	Available Chlorides as Cl (mg/kg)	70	70	60	75	65
11	Total Organic carbon (%)	0.52	0.40	0.48	0.52	0.49
12	Sodium Absorption Ratio(SAR)	0.31	0.38	0.40	0.48	0.26
13	Texture of Soil	Sandy Clay	Sandy Clay	Sandy Clay	Sandy Clay	Sandy Loam
	Sand (%)	41	36	32	40	64
	Silt (%)	27	29	30	27	16
	Clay (%)	32	35	38	33	18

S-1	Gudipadu	S-4	Boyareddypalli Village
S-2	Guruvanipalle	S-5	Chintalayapalli Village
S-3	Nitturu Village		

ANNEXURE - 3C1

CLIENT : Penna Cement Industries Limited
PROJECT : Expansion of Cement Plant
LOCATION : Boyareddypalli (V), Yadiki (M), Anantapur (D), A.P
SOIL SAMPLE CODE : S - 1
LANDUSE : Barren Land

SOIL TEST REPORT WITH INTERPRETATION

S. No	Parameters	RESULTS	INTERPRETATION
		S1	
1	pH Value of 1:2 aqueous extract Solution	7.85	Moderately Alkaline, Alkaline
2	E.C, $\mu\text{S}/\text{cm}$ of 1:2 aqueous extract Solution	388	Low
3	Total Soluble Salts mg/kg	486	Suitable, Low
4	Mineralized Nitrogen (Available Nitrogen) , kg/ha	335	Sufficient
5	Available Phosphorous as P_2O_5 , kg/Ha	36	Medium
6	Available Potassium as K_2O , Kg/Ha	241	Average
7	Available Magnesium as Mg, mg/kg	108	Medium
8	Available Chlorides as Cl, mg/Kg (Water soluble)	109	Excessive
9	Total Organic Carbon, %	0.62	Average
10	Sodium Absorption Ratio (SAR)	0.08	Low
11	Texture:	Loamy Sand	-
	a) Sand %	83	-
	b) Silt %	8	-
	c) Clay %	9	-

CLIENT : Penna Cement Industries Limited
PROJECT : Expansion of Cement Plant
LOCATION : Boyareddypalli (V), Yadiki (M), Anantapur (D), A.P
SOIL SAMPLE CODE : S - 2
LANDUSE : Agriculture crop land

SOIL TEST REPORT WITH INTERPRETATION

S. No	Parameters	RESULTS	INTERPRETATION
		S2	
1	pH Value of 1:2 aqueous extract Solution	7.72	Moderately Alkaline, Alkaline
2	E.C, $\mu\text{S}/\text{cm}$ of 1:2 aqueous extract Solution	318	Low
3	Total Soluble Salts mg/kg	405	Low, Suitable
4	Mineralized Nitrogen (Available Nitrogen) , kg/ha	392	Sufficient
5	Available Phosphorous as P_2O_5 , kg/Ha	144	More than sufficient
6	Available Potassium as K_2O , Kg/Ha	812	More than sufficient
7	Available Magnesium as Mg, mg/kg	371	High
8	Available Chlorides as Cl, mg/Kg (Water soluble)	94	Excessive
9	Total Organic Carbon, %	0.82	Better
10	Sodium Absorption Ratio (SAR)	0.16	Low
11	Texture:	Sandy Clay	-
	a) Sand %	43	-
	b) Silt %	24	-
	c) Clay %	33	-

CLIENT : Penna Cement Industries Limited
PROJECT : Expansion of Cement Plant
LOCATION : Boyareddypalli (V), Yadiki (M), Anantapur (D), A.P
SOIL SAMPLE CODE : S - 3
LANDUSE : Agriculture Fallow Land

SOIL TEST REPORT WITH INTERPRETATION

S. No	Parameters	RESULTS	INTERPRETATION
		S3	
1	pH Value of 1:2 aqueous extract Solution	7.02	Neutral, Optimal
2	E.C, $\mu\text{S}/\text{cm}$ of 1:2 aqueous extract Solution	106	Low
3	Total Soluble Salts mg/kg	155	Suitable, Low
4	Mineralized Nitrogen (Available Nitrogen) , kg/ha	168	On average sufficient
5	Available Phosphorous as P_2O_5 , kg/Ha	180	More than sufficient
6	Available Potassium as K_2O , Kg/Ha	192	Medium
7	Available Magnesium as Mg, mg/kg	96	Medium
8	Available Chlorides as Cl, mg/Kg (Water soluble)	38	High
9	Total Organic Carbon, %	0.30	Less
10	Sodium Absorption Ratio (SAR)	0.10	Low
11	Texture:	Loamy Sand	-
	a) Sand %	82	-
	b) Silt %	8	-
	c) Clay %	10	-

CLIENT : Penna Cement Industries Limited
PROJECT : Expansion of Cement Plant
LOCATION : Boyareddypalli (V), Yadiki (M), Anantapur (D), A.P
SOIL SAMPLE CODE : S - 4
LANDUSE : Forest Land

SOIL TEST REPORT WITH INTERPRETATION

S. No	Parameters	RESULTS	INTERPRETATION
		S4	
1	pH Value of 1:2 aqueous extract Solution	7.68	Moderately Alkaline Alkaline
2	E.C, $\mu\text{S}/\text{cm}$ of 1:2 aqueous extract Solution	158	Low
3	Total Soluble Salts mg/kg	215	Suitable, Low
4	Mineralized Nitrogen (Available Nitrogen) , kg/ha	316	Sufficient
5	Available Phosphorous as P_2O_5 , kg/Ha	28	Less
6	Available Potassium as K_2O , Kg/Ha	180	Less
7	Available Magnesium as Mg, mg/kg	147	Medium
8	Available Chlorides as Cl, mg/Kg (Water soluble)	52	Excessive
9	Total Organic Carbon, %	0.68	Average
10	Sodium Absorption Ratio (SAR)	0.14	Low
11	Texture:	Loamy Sand	-
	a) Sand %	80	-
	b) Silt %	11	-
	c) Clay %	9	-

INTERPRETATION OF SOIL RESULTS

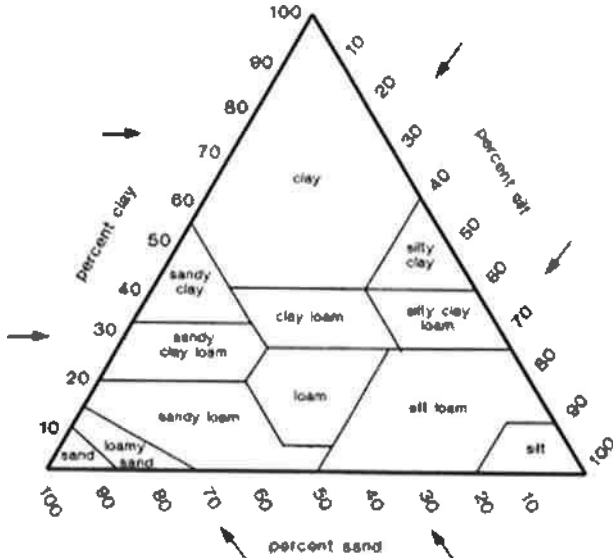
INTERPRETATION OF SOIL RESULTS							
1	pH Value	<5.1	5.2-6.0	6.1-6.5	6.6-7.3	7.4-8.4	>8.5
		Strongly Acidic	Moderately Acidic	Slightly Acidic	Neutral	Moderately Alkaline	Strongly Alkaline
		Acid		Optimal		Alkaline	
2	Electrical Conductivity	<1.0		1.0-2.5		>2.5	
		Low		Medium		High	
3	Total Soluble Salts	<640		640-1600		>1600	
		Suitable		Marginal		Poor, unsuitable for many crops	
		Low		Medium		High	
4	Nitrogen	<50	51-100	101-150	151-300	>300	
		Very less	Less	Medium	On average sufficient	Sufficient	
5	Phosphorous	<15	16-30	31-50	51-65	66-80	>80
		Very less	Less	Medium	On average sufficient	Sufficient	More than sufficient
7	Potassium	0-120	120-180	181-240	241-300	301-360	>360
		Very less	Less	Medium	Average	Better	More than sufficient
9	Magnesium	<60		60-300		>300	
		Low		Medium		High	
10	Chlorides	0-5	5-10	10-20	20-50	>50	
		Very low	Low	Medium	High	Excessive	
11	Total Organic Carbon	<0.2	0.21-0.4	0.41-0.5	0.51-0.8	0.81-1.0	>1
		Very less	Less	Medium	Average	Better	More than sufficient
12	Sodium Absorption Ratio	1-10		10-18	18-26	>26	
		Low		Medium	High	Very High	
13	Texture	<div><p style="text-align: center;">Soil Textural Triangle</p></div>					

TABLE-3.7
LIST OF PLANT SPECIES RECORDED IN ANANTHAPUR FOREST DIVISION

S.No	Botanical Name	Local name(Telugu/Kannda)
1.	<i>Abrus precatorius</i>	Golagongi
2.	<i>Acacia ;eucophloe</i>	Bilijali, tumma
3.	<i>Acacia arabica</i>	Babul, karijali
4.	<i>Acacia catechu</i>	Tadwad
5.	<i>Acacia ferruginea</i>	Bannimara
6.	<i>Acacia intsia</i>	Billisege
7.	<i>Acacia latrorum</i>	Hottlejali
8.	<i>Acacia sundra</i>	Mugatimara
9.	<i>Aegle marmelos</i>	Bilvapaatre, bilvam
10.	<i>Albizia amara</i>	Thuggali
11.	<i>Albizia lebbeck</i>	Bage
12.	<i>Albizia odorattissima</i>	Bilwara
13.	<i>Annona squamosa</i>	Seethaphal
14.	<i>Anogeissus latifolia</i>	Dindiga, dindalu
15.	<i>Asparagus racemosa</i>	Majjigaaygadai
16.	<i>Atalantia monophylla</i>	Kadunimbe
17.	<i>Azadirachta indica</i>	Bevu, vepa
18.	<i>Bambusa bamboo</i>	Hebbideru
19.	<i>Bauhinia prupuria</i>	Basavannapada
20.	<i>Bombax ceiba</i>	Boogga, buorga
21.	<i>Boswellia serrata</i>	Doopa, palaki tadak
22.	<i>Bridelia retusa</i>	Gojayamara
23.	<i>Buchanania angustifolia</i>	Maradi
24.	<i>Butea monosperma</i>	Muthuga
25.	<i>Canthium didynum</i>	Nallabalusu
26.	<i>Canthium parviflora</i>	Kare
27.	<i>Carissa carandus</i>	Kavali
28.	<i>Carya arborea</i>	Kavalu
29.	<i>Cassia auriculata</i>	Thangedu, thangai
30.	<i>Cassia fistula</i>	Kakke
31.	<i>Chloroxylon swietenia</i>	Masavalu bitlu
32.	<i>Cochlospermum gossypium</i>	Bettadavare, Harismabooruga
33.	<i>Cordia myxa</i>	Sollehannu
34.	<i>Dalbergia latifolia</i>	Karimara, beete
35.	<i>Dalbergia paniculata</i>	Pacholi
36.	<i>Decalepis hamiltoni</i>	Makliberu
37.	<i>Delonix regia</i>	Samkeshwari
38.	<i>Dendrocalamus strictus</i>	Sannabiduru
39.	<i>Dichrystachys cineria</i>	Neladeachalu, earadutharaddu
40.	<i>Diospyros Montana</i>	Jagalaganti
41.	<i>Disopyros melanoxylon</i>	Tupra, tumbri
42.	<i>Dodonia viscosa</i>	Bandre, Hangru
43.	<i>Eerythroxyton monogynum</i>	Devadari

44.	<i>Elaedendrum glaucum</i>	Mukurthi
45.	<i>Emblica officinalis</i>	Nelli
46.	<i>Eugenia jambolina</i>	Neralze,neredu
47.	<i>Euphorbia tirucauli</i>	Kalli
48.	<i>Ferosia limonia</i>	Byala, bela,
49.	<i>Ficus benghalensis</i>	Aladawara,
50.	<i>Ficus mysoorensis</i>	Goni
51.	<i>Ficus religiosa</i>	Arailmara, Ravi
52.	<i>Ficus tseila</i>	Basarimara
53.	<i>Gardenia gummifera</i>	Bike, bong
54.	<i>Garuga pinnata</i>	Goddadaamara
55.	<i>Givotia rottleriformis</i>	Bilidale
56.	<i>Grewia tiliifolia</i>	Jane
57.	<i>Gymnosperia Montana</i>	Thandrasi
58.	<i>Hardwickia binata</i>	Hasu
59.	<i>Holoptelia integrefolia</i>	Thapasi
60.	<i>Ixora parviflora</i>	Goravi
61.	<i>Jatropha curcas</i>	Thukahale
62.	<i>Kydia calcina</i>	Bende, wild bende
63.	<i>Langaerstromea parviflora</i>	Channangi
64.	<i>Lantana camara</i>	Lantana
65.	<i>Madhuca latifolia</i>	Ippe, mahua
66.	<i>Mallotus philippinensis</i>	Kumkumadamara
67.	<i>Mangifera indica</i>	Mavu, mamidi
68.	<i>Melia dubua</i>	Hebbevu
69.	<i>Mitrgyna parviflora</i>	Kadagadamara
70.	<i>Moridna tinctoria</i>	Kadukamabala
71.	<i>Opuntia dillinei</i>	Papaskalli
72.	<i>Phoenix farnifera</i>	Kirichilu
73.	<i>Phoenix sylvestris</i>	Eachalu
74.	<i>Plumaria actutifolia</i>	Devakanagalu
75.	<i>Pongamia pinnata</i>	Honge
76.	<i>Premna tomentosa</i>	Narve,eaji
77.	<i>Proteium candatum</i>	Kallutji
78.	<i>Pterocarpus marsupium</i>	Honne
79.	<i>Saccopetalum tomentosum</i>	Hesare
80.	<i>Santalum album</i>	Album
81.	<i>Sapindus emerginatus</i>	Antavala, kunkudu
82.	<i>Schleicheria oleosa</i>	Kodlimuruka
83.	<i>Seeurinega virosa</i>	Bilisule, Hooli
84.	<i>Semecarpus anacardium</i>	Kadugeru
85.	<i>Shorea talura</i>	Jalari
86.	<i>Soymida fabrifuga</i>	Somed
87.	<i>Stachytarptieta jamaicensis</i>	Uthrani
88.	<i>Sterculia urens</i>	Bhutale
89.	<i>Sterculia villosa</i>	Bilidalemara
90.	<i>Stereospermum chelonoides</i>	Padrimara

91.	<i>Strebulus asper</i>	Mitle
92.	<i>Strychnos muxvomica</i>	Chilladamara
93.	<i>Tamarindus indica</i>	Hunase
94.	<i>Tectona grandis</i>	Saguvvani
95.	<i>Terminalia arjuna</i>	Thoremathi
96.	<i>Terminalia belerica</i>	Thera
97.	<i>Terminalia chebula</i>	Alale, karaka
98.	<i>Terminalia tomentosa</i>	Mathi, budri
99.	<i>Terminalia paniculata</i>	Hulabe
100.	<i>Thespesia lampas</i>	Kadubende
101.	<i>Toddalia aculata</i>	Kakke
102.	<i>Wrightia tinctoria</i>	Hale, Neeli
103.	<i>Zizyphus jujuba</i>	Bore, elachi
104.	<i>Zizyphus oenoplia</i>	Godchi

TABLE-3.8
LIST OF STAPLE FOOD AND COMMERIAL CROP PLANT SPECIES RECORDED
IN STUDY AREA

S. No.	Technical Name	Local Name
1	<i>Sorghum vulgare</i>	Jonna, jola
2	<i>Triticum vulgare</i>	Godhuma
3	<i>Zea mays</i>	Mokkajonna
4	<i>Oryza sativa</i>	Vari, batta
5	<i>Elusine coracona</i>	Ragi
6	<i>Pennisetum glaucum</i>	Sajjalu, saja
7	<i>Paspalum scrobicum</i>	Korralu, korra
8	<i>Echinochloe colore</i>	Waaragalu
9	<i>Seteria verticillata</i>	Bandra
10	Commercial crops	
11	<i>Abelomoschus indicus</i>	Benda
12	<i>Allium cepa</i>	Ulli
13	<i>Allium sativum</i>	Velluli
14	<i>Annona squamosa</i>	Sitahpahalam
15	<i>Arachis hypogia</i>	Verusenega
16	<i>Brassica oleracea var botrydis</i>	Cabbage
17	<i>Brassica oleracea var capitata</i>	Cauliflower
18	<i>Cajanus cajan</i>	Kandulu
19	<i>Carica papaya</i>	Boppayi
20	<i>Catharanthes pusillus</i>	Kanuppolakku
21	<i>Cicer arietinum</i>	Senegalu
22	<i>Citrus lemon</i>	Nimma
23	<i>Colacasia esculenta</i>	Chema
24	<i>Coreandrum sativum</i>	Dhaniyalu
25	<i>Daucus carota</i>	Karattu
26	<i>Gossypium sp</i>	Pratthi
27	<i>Lycopersicum esculentus</i>	Tomato
28	<i>Mangifera indica</i>	Mamidi
29	<i>Memordia charantia</i>	Kakara
30	<i>Pisum sativum</i>	Batani
31	<i>Psidium guava</i>	Jama, guava
32	<i>Raphanus sativa</i>	Mullangi, muli
33	<i>Solanum tuberosum</i>	Potato

S. No.	Technical Name	Local Name
34	<i>Trichosanthes anguina</i>	Potla,snake guard
35	<i>Capsicum annulatum</i>	Mirapa

TABLE-3.9

LIST OF NATURAL VEGETATION RECORDED IN STUDY AREA

S.No.	Technical Name	Local name
1.	<i>Abrus precatorius</i>	Guruvinda
2.	<i>Abutilon indicum</i>	Erribenda, Tuttigida
3.	<i>Acacia nilotica</i>	Nalla tumma
4.	<i>Acacia arabica</i>	tellatumma
5.	<i>Acacia auriculiformis</i>	-
6.	<i>Acacia catechu</i>	Nalla sundra,kachhu
7.	<i>Acacia horrida</i>	-
8.	<i>Acacia leucophloe</i>	Circaru Tumma
9.	<i>Acacia Senegal</i>	Senegal
10.	<i>Acalypha ciliata</i>	-
11.	<i>Acanthospermum hispidum</i>	Guntakalagarku
12.	<i>Achras sapota</i>	Sapota
13.	<i>Achyranthes aspera</i>	Uttarena, uttarani
14.	<i>Adina cordifolia</i>	Pasupuganapu, anavu
15.	<i>Aegle marmelos</i>	Bel
16.	<i>Aerva lanata</i>	Pindikarra
17.	<i>Agave wightii</i>	Agave
18.	<i>Ageratum conyzoides</i>	-
19.	<i>Ailanthus excelsa</i>	Peddham manu,peethari
20.	<i>Alangium salivus</i>	-
21.	<i>Aloe barbedensis</i>	Erra kalabanda
22.	<i>Alternanthera sessilis</i>	Ponnaganti kura
23.	<i>Alysicarpus rugosus</i>	-
24.	<i>Alysicarpus monilifer</i>	Maera
25.	<i>Ammania baccafera</i>	Agnivendrapaku
26.	<i>Argemone mexicana</i>	Balu rakkisa,dhanduri
27.	<i>Asparagus racemosus</i>	Asparagus
28.	<i>Atalantia monophylla</i>	adavinimma
29.	<i>Balanites aegyptica</i>	Gara, ingalukke
30.	<i>Barleria prionites</i>	Mullagorinda, gobbi gorinta
31.	<i>Bidens biternata</i>	-
32.	<i>Blepharis asperima</i>	-
33.	<i>Blepharis madaraspatis</i>	-
34.	<i>Blumea lacera</i>	-
35.	<i>Boerhaavia diffusa</i>	Atikamamidi
36.	<i>Bombax ceiba</i>	Booruga
37.	<i>Borreria stricta</i>	Madanaku
38.	<i>Boswellia serrata</i>	Guggilam
39.	<i>Brassica campestris</i>	-
40.	<i>Bridelia retusa</i>	Korra maddi
41.	<i>Bridelia superba</i>	-
42.	<i>Calotropis procera</i>	Jilledu
43.	<i>Canna indica</i>	canna
44.	<i>Capparis aphylla</i>	Karira
45.	<i>Capparis deciduas</i>	-

46.	<i>Careya arborea</i>	-
47.	<i>Carissa carandus</i>	Vaka
48.	<i>Carissa spinarium</i>	vaka
49.	<i>Cassia auriculata</i>	Tangedu
50.	<i>Cassia obtuse</i>	Tangedu
51.	<i>Cassia occidentalis</i>	Pedda kasinda
52.	<i>Cassia tora</i>	Kasinda
53.	<i>Ceiba pentandra</i>	Booruga
54.	<i>Cestrum diurnum</i>	Din-ka-raja
55.	<i>Cestrum nocturnum</i>	Rath-ka-rani
56.	<i>Chrysanthemum sp</i>	Chamanthi
57.	<i>Cissus quadrangularis</i>	nalleru
58.	<i>Citrus limon</i>	Nimma
59.	<i>Citrus media</i>	Gaja nimma
60.	<i>Cleome gynandra</i>	Vominta
61.	<i>Cleome viscosa</i>	Vominta
62.	<i>Cocos nucifera</i>	Kobbari,nariyelu
63.	<i>Combretum ovalifolium</i>	Bonta teega
64.	<i>Commelina benghalensis</i>	Kanchara-kanateri
65.	<i>Cordia dichotoma</i>	Banka-nakkeru
66.	<i>Cordia rothri</i>	Banka
67.	<i>Crataeva adsoni</i>	Ulmidi
68.	<i>Crotalaria burhia</i>	-
69.	<i>Crotalaria medicagenia</i>	-
70.	<i>Croton bonplandinum</i>	Kukka mirapa
71.	<i>Cuscuta reflexa</i>	Seetamma pogunulu
72.	<i>Datura alba</i>	Ummetha
73.	<i>Desmodium triflorum</i>	Muntamandu
74.	<i>Diospyros melanoxylon</i>	Beedi aku
75.	<i>Echinops echinatus</i>	-
76.	<i>Eclipta alba</i>	-
77.	<i>Eclipta prostrate</i>	
78.	<i>Emblica officinale</i>	Usiri
79.	<i>Emilia lajerium</i>	-
80.	<i>Erythrina indica</i>	Tellavarjam, Halivana
81.	<i>Eugenia jambolina</i>	Neredu
82.	<i>Euphorbia acaulis</i>	-
83.	<i>Euphorbia antiquorum</i>	Boomajemudu
84.	<i>Euphorbia geniculata</i>	-
85.	<i>Euphorbia heyneae</i>	-
86.	<i>Euphorbia hirta</i>	Nanubalu
87.	<i>Euphorbia nerifolia</i>	Jemudu
88.	<i>Euphorbia neruri</i>	Nelausiri
89.	<i>Euphorbia nivula</i>	Jemudu
90.	<i>Euphorbia parviflora</i>	-
91.	<i>Euphorbia tricauli</i>	Manchijemudu
92.	<i>Evolvulus alsinoides</i>	Vishnukrantha
93.	<i>Fagonia cretica</i>	-
94.	<i>Feronia elephantum</i>	Velaga
95.	<i>Ficus benghalensis</i>	Marri, alanda
96.	<i>Ficus carica</i>	Manch-maddi

97.	<i>Ficus glomerata</i>	Atti-gular
98.	<i>Ficus hispida</i>	Kaki-maddi
99.	<i>Ficus religiosa</i>	maddi
100.	<i>Ficus gibbosa</i>	Karasa
101.	<i>Flacourtia indica</i>	Kanru
102.	<i>Flacourtia latifolia</i>	-
103.	<i>Flacourtia Montana</i>	-
104.	<i>Fumaria indica</i>	-
105.	<i>Gardenia latifolia</i>	-
106.	<i>Garuga pinnata</i>	Garuga
107.	<i>Grewia abutifolia</i>	-
108.	<i>Grewia salivifolia</i>	-
109.	<i>Grewia subinaqualis</i>	-
110.	<i>Gynandropis gynandra</i>	
111.	<i>Helictis isora</i>	-
112.	<i>Heliotropium indicum</i>	Suryakantha
113.	<i>Heliotropium ovalifolium</i>	-
114.	<i>Hemidesmus indicus</i>	Tella
115.	<i>Hibiscus gibbosa</i>	Nityamalli
116.	<i>Hibiscus micronthus</i>	Nityamalli
117.	<i>Hibiscus ovalifolia</i>	-
118.	<i>Hibiscus rosa-cianensis</i>	Mandara
119.	<i>Hibiscus caesus</i>	-
120.	<i>Hyptis suaveolens</i>	Sirna tulasi
121.	<i>Ipomea carnea</i>	-
122.	<i>Ipomea coccinea</i>	-
123.	<i>Ipomea tuba</i>	-
124.	<i>Ixora parviflora</i>	Ixora
125.	<i>Ixora singapuriensis</i>	Jacarandra
126.	<i>Jacarandra jacquimontii</i>	Jacarandra
127.	<i>Jasminum arborens</i>	Malli
128.	<i>Jatropha gossypifolia</i>	Jatropha
129.	<i>Justicia simplex</i>	-
130.	<i>Justia diffusa</i>	-
131.	<i>Justicia diffusa</i>	-
132.	<i>Lantana camara</i>	Akshintalapoolu
133.	<i>Lathyrus sativus</i>	-
134.	<i>Lawsonia inermis</i>	Kunkudu
135.	<i>Lepidogathis cristata</i>	-
136.	<i>Leucas aspera</i>	-
137.	<i>Leucas longifolia</i>	-
138.	<i>Leucas stelligera</i>	-
139.	<i>Loranthus sp</i>	Loranthes
140.	<i>Malvastrum coramandalicum</i>	-
141.	<i>Merremia emerginata</i>	-
142.	<i>Mimosa pudica</i>	-
143.	<i>Mimosa hamata</i>	-
144.	<i>Mollugo hirta</i>	-
145.	<i>Moringa oleifera</i>	Munaga
146.	<i>Murraya exotica</i>	Tella malli
147.	<i>Murraya koenigii</i>	Karivepaku

148.	<i>Musa paradisiaca</i>	Arati
149.	<i>Nerium indicum</i>	Nerium
150.	<i>Ocimum americanum</i>	Kukka-tulasi
151.	<i>Ocimum basillum</i>	Tulasi
152.	<i>Ocimum canum</i>	Krishha tulasi
153.	<i>Ocimum sanctum</i>	Krishha tulasi
154.	<i>Oldenlandia corymbosa</i>	-
155.	<i>Opuntia dillinii</i>	Naga-mullu
156.	<i>Opuntia elator</i>	Pedda-naphani
157.	<i>Oxalis corniculata</i>	-
158.	<i>Parkinsonia aculata</i>	Seema-tumma
159.	<i>Parthenium hysterophorus</i>	Congress grass
160.	<i>Passiflora foetida</i>	Passiflora
161.	<i>Pavonia zeylanica</i>	Karu-benda
162.	<i>Phoenix aculis</i>	Eetha
163.	<i>Phyllanthus emblica</i>	Peddausiri
164.	<i>Phyllanthus niruri</i>	Nelausiri
165.	<i>Physalis minima</i>	Budama
166.	<i>Pithocolobium dulce</i>	Seemachinta
167.	<i>Polyalthia longifolia</i>	Seetamma asoka
168.	<i>Portulaca oleracea</i>	Totakura
169.	<i>Prosopis spicegera</i>	babool
170.	<i>Punica granulatam</i>	Danimma
171.	<i>Sapindus emarginatus</i>	Peddakunkudu
172.	<i>Sida cordifolia</i>	-
173.	<i>Sida vernanifolia</i>	-
174.	<i>Solanum nigrum</i>	-
175.	<i>Solanum xanthocarpum</i>	-
176.	<i>Sterculia villosa</i>	-
177.	<i>Sygygium cumini</i>	China neredu
178.	<i>Tagetes sp</i>	-
179.	<i>Tamarindus indica</i>	Chinta
180.	<i>Tecomella undulate</i>	-
181.	<i>Tephrosia purpuria</i>	Vempali
182.	<i>Terminalia tomentosa</i>	Nallamaddi
183.	<i>Thespesia populanea</i>	Papidi
184.	<i>Thespesia lampas</i>	Papidi
185.	<i>Tinospora cordifolia</i>	Tippateega
186.	<i>Tragus biflorus</i>	-
187.	<i>Tribulus terrestris</i>	Palleru
188.	<i>Tridax procumbens</i>	Kukka chamanti
189.	<i>Triumferta pilosa</i>	-
190.	<i>Vernonia cinera</i>	-
191.	<i>Vicoa indica</i>	-
192.	<i>Vitex negundo</i>	-
193.	<i>Vitis vermifera</i>	-
194.	<i>Wrightia tomentosa</i>	-
195.	<i>Xanthium strumariumk</i>	-
196.	<i>Yucca gloriosa</i>	Yukka
197.	<i>Zizyphus jujube</i>	Regu
198.	<i>Zizyphus mauritiana</i>	-

199.	<i>Zizyphus nummularis</i>	-
200.	<i>Zizyphus oenoplica</i>	Pedda regu
201.	<i>Zizyphus rotundus</i>	-
202.	<i>Zornia gobbosa</i>	-

TABLE-3.10
LIST OF BRYOPHYTES AND PTERIDOPHYTES RECORDED IN STUDY AREA

S.No.	Name of the plant species	Study area
	Bryophytes	
1.	<i>Polytrichum sp</i>	*
	Pteridophytes	
2.	<i>Pteridium aqualium</i>	*
	Shade fern	
3.	<i>Lycopodium cerum</i>	*
4.	<i>Pteris aquallium</i>	*
5.	<i>Pteris biequerecta</i>	*
6.	<i>Pteris enseformis</i>	*
7.	<i>Selaginella monospora</i>	*
	Lithophytic fern	
8.	<i>Adiantum caudatum</i>	*
9.	<i>Chielanthes tenuefolia</i>	*
	Aquatic fern	
10.	<i>Marselia minuta</i>	*
	*= presence in slopes of hills,near water streams,shady areas	-absence

TABLE-3.11
LIST OF PLANT SPECIES RECORDED IN STUDY AREA

S. No.	Technical Name	Family	Life form
I. Agricultural Crops			
1.	<i>Sorghum vulgare</i>	Poaceae	Hemicryptophyte
2.	<i>Triticum vulgare</i>	Poaceae	Hemicryptophyte
3.	<i>Zea mays</i>	Poaceae	Hemicryptophyte
4.	<i>Oryza sativa</i>	Poaceae	Hemicryptophyte
5.	<i>Elusine coracona</i>	Poaceae	Hemicryptophyte
6.	<i>Pennisetum glaucum</i>	Poaceae	Hemicryptophyte
7.	<i>Paspalum scrobicum</i>	Poaceae	Hemicryptophyte
8.	<i>Echinochloe colore</i>	Poaceae	Hemicryptophyte
9.	<i>Seteria verticillata</i>	Cyperaceae	Hemicryptophyte
II. Commercial Crops (including Vegetables)			
10.	<i>Abelomoschus indicus</i>	Malvaceae	Therophyte
11.	<i>Allium cepa</i>	Liliaceae	Geophyte
12.	<i>Allium sativum</i>	Liliaceae	Geophyte
13.	<i>Annona squamosa</i>	Annonaceae	Phanerophyte
14.	<i>Arachis hypogia</i>	Fabaceae	Geophyte
15.	<i>Brassica oleracea var botrydis</i>	Cruciferae	Therophyte
16.	<i>Brassica oleracea var capitata</i>	Cruciferae	Therophyte
17.	<i>Cajanus cajan</i>	Fabaceae	Therophyte

S. No.	Technical Name	Family	Life form
18.	<i>Carica papaya</i>	Caricaceae	Therophyte
19.	<i>Catharanthes pusillus</i>	Compositae	Therophyte
20.	<i>Cicer arietinum</i>	Fabaceae	Hemicryptophyte
21.	<i>Citrus lemon</i>	Ruataceae	Therophyte
22.	<i>Colacasia esculenta</i>	Areaceae	Geophyte
23.	<i>Coreandrum sativum</i>	Umbelliferae	Hemicryptophyte
24.	<i>Daucus carota</i>	Umbelliferae	Geophyte
25.	<i>Gossypium sp</i>	Malvaceae	Therophyte
26.	<i>Lycopersicum esculentus</i>	Solanaceae	Therophyte
27.	<i>Mangifera indica</i>	Anacardiaceae	Phanerophyte
28.	<i>Memordia charantia</i>	Cucurbitaceae	Therophyte
29.	<i>Pisum sativum</i>	Fabaceae	Therophyte
30.	<i>Psidium guava</i>	Myrtaceae	Phanerophyte
31.	<i>Raphanus sativa</i>	Cruciferae	Geophyte
32.	<i>Solanum tuberosum</i>	Solanaceae	Geophyte
33.	<i>Trichosanthes anguina</i>	Cucurbitaceae	Therophyte
III. Plantations			
34.	<i>Acacia nilotica</i>	Mimosaceae	Phanerophyte
35.	<i>Albizia lebbeck</i>	Mimosaceae	Phanerophyte
36.	<i>Albizia odorattissima</i>	Mimosaceae	Phanerophyte
37.	<i>Albizia procera</i>	Mimosaceae	Phanerophyte
38.	<i>Azadirachta indica</i>	Meliaceae	Phanerophyte
39.	<i>Bauhinia variegata</i>	Caesalpinaceae	Phanerophyte
40.	<i>Bauhinia purpuria</i>	Caesalpinaceae	Phanerophyte
41.	<i>Bambusa arundanacea</i>	Poaceae	Phanerophyte
42.	<i>Butea superba</i>	Caesalpinaceae	Phanerophyte
43.	<i>Butea frondosa</i>	Caesalpinaceae	Phanerophyte
44.	<i>Eucalyptus sp</i>	Myrtaceae	Phanerophyte
45.	<i>Delonix regia</i>	Caesalpinaceae	Phanerophyte
46.	<i>Leucena leucophloe</i>	Caesalpinaceae	Phanerophyte
47.	<i>Peltoforrum ferrusinum</i>	Caesalpinaceae	Phanerophyte
48.	<i>Pongamia pinnata</i>	Papillionaceae	Phanerophyte
49.	<i>Tectona grandis</i>	Verbinaceae	Phanerophyte
50.	<i>Sesbania suevalens</i>	Ceasalpinacae	Phanerophyte
IV. Natural Vegetation/Forest Type			
51.	<i>Abrus precatorius</i>	Fabaceae	Therophyte
52.	<i>Abutilon indicum</i>	Malvaceae	Phanerophyte
53.	<i>Acacia nilotica</i>	Mimosaceae	Phanerophyte
54.	<i>Acacia arabica</i>	Mimosaceae	Phanerophyte
55.	<i>Acacia auriculiformis</i>	Mimosaceae	Phanerophyte
56.	<i>Acacia catechu</i>	Mimosaceae	Phanerophyte
57.	<i>Acacia horrida</i>	Mimosaceae	Phanerophyte
58.	<i>Acacia leucophloe</i>	Mimosaceae	Phanerophyte
59.	<i>Acacia Senegal</i>	Mimosaceae	Phanerophyte
60.	<i>Acalypha ciliate</i>	Mimosaceae	Phanorophyte
61.	<i>Acanthospermum hispidum</i>	Compositae	Therophyte

S. No.	Technical Name	Family	Life form
62.	<i>Achras sapota</i>	Sapotaceae	Phanerophyte
63.	<i>Achyranthes aspera</i>	Amaranthaceae	Therophyte
64.	<i>Adina cordifolia</i>	Rubiaceae	Phanerophyte
65.	<i>Aegle marmelos</i>	Rutaceae	Phanerophyte
66.	<i>Aerva lanata</i>	Compositae	Phanerophyte
67.	<i>Agave wightii</i>	Agavaceae	Phanerophyte
68.	<i>Ageratum conyzoides</i>	Compositae	Therophyte
69.	<i>Ailanthus excelsa</i>	Simaroubaceae	Phanerophyte
70.	<i>Alangium salivus</i>	Alangiceae	Phanerophyte
71.	<i>Aloe barbedensis</i>	Agavaceae	Geophyte
72.	<i>Alternanthera sessilis</i>	Amaranthaceae	Therophyte
73.	<i>Alysicarpus hamosus</i>	Fabaceae	Therophyte
74.	<i>Ammania baccafera</i>	Lytharaceae	Therophyte
75.	<i>Argemone mexicana</i>	Papevaraceae	Phanerophyte
76.	<i>Asparagus racemosus</i>	Liliaceae	Therophyte
77.	<i>Atalantia monophylla</i>	Rutaceae	Phanerophyte
78.	<i>Atalantia monophylla</i>	Rutaceae	Therophyte
79.	<i>Balanites aegyptica</i>	Simaroubaceae	Phanerophyte
80.	<i>Barleria prionoites</i>	Acanthaceae	Therophyte
81.	<i>Bidens biternata</i>	Compositae	Therophyte
82.	<i>Blepharis asperima</i>	Acanthaceae	Phanerophyte
83.	<i>Blepharis madaraspatis</i>	Acanthaceae	Therophyte
84.	<i>Blumea lacera</i>	Compositae	Therophyte
85.	<i>Boerheavia diffusa</i>	Nyctaginaceae	Therophyte
86.	<i>Bombax ceiba</i>	Bombacaceae	Phanerophyte
87.	<i>Borreria stricta</i>	Rubiaceae	Therophyte
88.	<i>Boswellia serrata</i>	Burseraceae	Phanerophyte
89.	<i>Brassica camprestis</i>	Cruciferae	Therophyte
90.	<i>Bridelia retusa</i>	Euphorbiaceae	Phanerophyte
91.	<i>Bridelia superba</i>	Euphorbiaceae	Phanerophyte
92.	<i>Calotropis procera</i>	Asclpiadaceae	Phanerophyte
93.	<i>Canna indicda</i>	Cannaceae	Therophyte
94.	<i>Capparis aphylla</i>	Capparidaceae	Therophyte
95.	<i>Capparis deciduas</i>	Capparidaceae	Phanerophyte
96.	<i>Capsicum annulatum</i>	Solanaceae	Therophyte
97.	<i>Careya arborea</i>	Palmae	Phanerophyte
98.	<i>Carissa carandus</i>	Apocyanaceae	Phanerophyte
99.	<i>Carissa spinarium</i>	Apocyanaceae	Phanerophyte
100.	<i>Cassia auriculata</i>	Caesalpinaceae	Therophyte
101.	<i>Cassia obtuse</i>	Caesalpinaceae	Therophyte
102.	<i>Cassia occidentalis</i>	Caesalpinaceae	Therophyte
103.	<i>Cassia tora</i>	Caesalpinaceae	Phanerophyte
104.	<i>Ceiba pentandra</i>	Bombacaceae	Phanerophyte
105.	<i>Cestrum diurnum</i>	Rubiaceae	Theophyte
106.	<i>Cestrum noctrunum</i>	Rubiaceae	Therophyte
107.	<i>Chrysanthemum sp</i>	Compositae	Therophyte
108.	<i>Cissus quadrangularis</i>	Vitaceae	Therophyte
109.	<i>Citrus limon</i>	Rutaceae	Phanerophyte

S. No.	Technical Name	Family	Life form
110.	<i>Citrus media</i>	Rutaceae	Phanerophyte
111.	<i>Cleome gynandra</i>	Capparidaceae	Therophyte
112.	<i>Cleome viscosa</i>	Capparidaceae	Therophyte
113.	<i>Cocos nucifera</i>	Palmae	Phanerophyte
114.	<i>Combretum ovalifolium</i>	Rubiaceae	Phanerophyte
115.	<i>Commelina benghalensis</i>	Commelinaceae	Therophyte
116.	<i>Cordia dichotoma</i>	Rubiaceae	Phanerophyte
117.	<i>Cordia rothri</i>	Rubiaceae	Phanerophyte
118.	<i>Crataeva adsoni</i>	Capparidaceae	Phanerophyte
119.	<i>Crotalaria burhia</i>	Fabaceae	Therophyte
120.	<i>Crotalaria medicagenia</i>	Fabaceae	Therophyte
121.	<i>Croton bonplandinum</i>	Amaryllidaceae	Therophyte
122.	<i>Cuscuta reflexa</i>	Cuscutaceae	Epiphyte
123.	<i>Datura alba</i>	Solanaceae	Therophyte
124.	<i>Desmodium triflorum</i>	Asclepiadaceae	Therophyte
125.	<i>Diospyros melanoxylon</i>	Ebanaceae	Phanerophyte
126.	<i>Echinops echinatus</i>	Compositae	Therophyte
127.	<i>Eclipta alba</i>	Compositae	Therophyte
128.	<i>Eclipta prostrata</i>	Compositae	Hemicryptophyte
129.	<i>Emblica officinale</i>	Euphorbiaceae	Phanerophyte
130.	<i>Emilia lajerium</i>	Compositae	Hemicryptophyte
131.	<i>Erythrina indica</i>	Papilionaceae	Phanerophyte
132.	<i>Eugenia jumbolina</i>	Myrtaaceae	Phanerophyte
133.	<i>Euphorbia acaulis</i>	Euphorbiaceae	Therophyte
134.	<i>Euphorbia antiquorum</i>	Euphorbiaceae	Phanerophyte
135.	<i>Euphorbia heyneae</i>	Euphorbiaceae	Therophyte
136.	<i>Euphorbia hirta</i>	Euphorbiaceae	Therophyte
137.	<i>Euphorbia nerifolia</i>	Euphorbiaceae	Phanerophyte
138.	<i>Euphorbia neruri</i>	Euphorbiaceae	Therophyte
139.	<i>Euphorbia nivula</i>	Euphorbiaceae	Therophyte
140.	<i>Euphorbia parviflora</i>	Euphorbiaceae	Therophyte
141.	<i>Euphorbia tricauli</i>	Euphorbiaceae	Hemicryptophyte
142.	<i>Evolvulus alsinoides</i>	Convolvulaceae	Therophyte
143.	<i>Fagonia cretica</i>	Zygophyllaceae	Phanerophyte
144.	<i>Feronia elephantum</i>	Rutaceae	Phanerophyte
145.	<i>Ficus benghalensis</i>	Moraceae	Phanerophyte
146.	<i>Ficus carica</i>	Moraceae	Phanerophyte
147.	<i>Ficus glomerata</i>	Moraceae	Phanerophyte
148.	<i>Ficus hispida</i>	Moraceae	Phanerophyte
149.	<i>Ficus religiosa</i>	Moraceae	Phanerophyte
150.	<i>Ficus gibbosa</i>	Moraceae	Phanerophyte
151.	<i>Flacourtia indica</i>	Flacourtiaceae	Phanerophyte
152.	<i>Flacourtia latifolia</i>	Flacourtiaceae	Phanerophyte
153.	<i>Flacourtia Montana</i>	Flacourtiaceae	Phanerophyte
154.	<i>Fumaria indica</i>	Papilionaceae	Hemicryptophyte
155.	<i>Gardenia latifolia</i>	Rubiaceae	Phanerophyte

S. No.	Technical Name	Family	Life form
156.	<i>Garuga pinnata</i>	Burseraceae	Phanerophyte
157.	<i>Grewia abutifolia</i>	Tiliaceae	Phanerophyte
158.	<i>Grewia salivifolia</i>	Tiliaceae	Phanerophyte
159.	<i>Grewia subinaqualis</i>	Tiliaceae	Phanerophyte
160.	<i>Gynandropis gynandra</i>	Capparidaceae	Hemicryptophyte
161.	<i>Helictis isora</i>	Rubiaceae	Phanerophyte
162.	<i>Heliotropium indicum</i>	Rubiaceae	Hemicryptophyte
163.	<i>Hemidesmus indicus</i>	Asclepiadaceae	Phanerophyte
164.	<i>Hibiscus gibbosa</i>	Malvaceae	Therophyte
165.	<i>Hibiscus micronthus</i>	Malvaceae	Therophyte
166.	<i>Hibiscus ovalifolia</i>	Malvaceae	Therophyte
167.	<i>Hibiscus rosa-cianensis</i>	Malvaceae	Therophyte
168.	<i>Hibiscus caesus</i>	Malvaceae	Hemicryptophyte
169.	<i>Hyptis suaveolens</i>	Labiatae	Therophyte
170.	<i>Ipomea carnea</i>	Convolvulaceae	Phanerophyte
171.	<i>Ipomea coccinea</i>	Convolvulaceae	Therophyte
172.	<i>Ipomea tuba</i>	Convolvulaceae	Hemicryptophyte
173.	<i>Ixora parviflora</i>	Rubiaceae	Phanerophyte
174.	<i>Ixora singapuriensis</i>	Rubiaceae	Phanerophyte
175.	<i>Jacarandra jacquimontii</i>	Bignoniaceae	Therophyte
176.	<i>Jasminum arborens</i>	Oleaceae	Phanerophyte
177.	<i>Jatropha gossypifolia</i>	Euphorbiaceae	Therophyte
178.	<i>Justicia simplex</i>	Acanthaceae	Therophyte
179.	<i>Justia diffusa</i>	Acanthaceae	Therophyte
180.	<i>Justicia diffusa</i>	Acanthaceae	Therophyte
181.	<i>Lantana camara</i>	Verbinaceae	Phanerophyte
182.	<i>Lathyrus sativus</i>	Papillionaceae	Hemicryptophyte
183.	<i>Lawsonia inermis</i>	Lythraceae	Phanerophyte
184.	<i>Lepidogathis cristata</i>	Acanthaceae	Therophyte
185.	<i>Leucas aspera</i>	Labiatae	Therophyte
186.	<i>Leucas longifolia</i>	Labiatae	Therophyte
187.	<i>Leucas stelligera</i>	Labiatae	Therophyte
188.	<i>Loranthus sp</i>	Loranthaceae	Epiphyte
189.	<i>Malvastrum coramandalicum</i>	Malvaceae	Therophyte
190.	<i>Merremia emerginata</i>	Convolvulaceae	Therophyte
191.	<i>Mimosa pudica</i>	Mimosaceae	Therophyte
192.	<i>Mollugo hirta</i>	Aizoaceae	Therophyte
193.	<i>Moringa oleifera</i>	Moringaceae	Phanerophyte
194.	<i>Murraya exotica</i>	Rutaceae	Phanerophyte
195.	<i>Murraya koenigii</i>	Rutaceae	Phanerophyte
196.	<i>Musa paradisiaca</i>	Musaceae	Therophyte
197.	<i>Nerium indicum</i>	Apocyanaceae	Phanerophyte
198.	<i>Ocimum americanum</i>	Labiatae	Therophyte
199.	<i>Ocimum basilicum</i>	Labiatae	Therophyte
200.	<i>Ocimum canum</i>	Labiatae	Therophyte
201.	<i>Ocimum sanctum</i>	Labiatae	Therophyte
202.	<i>Oldenlandia</i>	Rubiaceae	Therophyte

S. No.	Technical Name	Family	Life form
	<i>corymbosa</i>		
203.	<i>Opuntia dillinii</i>	Opuntiaceae	Therophyte
204.	<i>Opuntia elator</i>	Cacataceae	Therophyteq
205.	<i>Oxalis corniculata</i>	Oxalidaceae	Therophyte
206.	<i>Parkinsonia aculata</i>	Mimosaceae	Phanerophyte
207.	<i>Parthenium hysterophorus</i>	Compositae	Therophyte
208.	<i>Passiflora foetida</i>	Passifloraceae	Phanerophyte
209.	<i>Pavonia zeylanica</i>	Malvaceae	Phanerophyte
210.	<i>Phoenix aculis</i>	Palmae	Phanerophyte
211.	<i>Phyllanthus emblica</i>	Euphorbiaceae	Phanerophyte
212.	<i>Phyllanthus niruri</i>	Euphorbiaceae	Therophyte
213.	<i>Physalis minima</i>	Solanaceae	Therophyte
214.	<i>Pithocolobium dulce</i>	Mimosaceae	Phanerophyte
215.	<i>Polyalthia longifolia</i>	Annonaceae	Phanerophyte
216.	<i>Portulaca oleracea</i>	Portulaccaceae	Therophyte
217.	<i>Prosopis spicegera</i>	Mimosaceae	Phanerophyte
218.	<i>Psidium guava</i>	Myrtaceae	Phanerophyte
219.	<i>Punica granulatam</i>	Puniaceae	Therophyte
220.	<i>Sapindus emarginatus</i>	Sapindaceae	Phanerophyte
221.	<i>Sida cordifolia</i>	Malvaceae	Phanerophyte
222.	<i>Sida vernanifolia</i>	Malvaceae	Hemicryptophyte
223.	<i>Solanum nigrum</i>	Solanaceae	Therophyte
224.	<i>Solanum xanthocarpum</i>	Solanaceae	Therophyte
225.	<i>Sterculia villosa</i>	Tiliaceae	Therophyte
226.	<i>Syzygium cumini</i>	Myrtaceae	Phanerophyte
227.	<i>Tagetes sp</i>	Compositae	Therophyte
228.	<i>Tamarindus indica</i>	Caesalpinaceae	Phanerophyte
229.	<i>Tecomella undulate</i>	Bignoniaceae	Therophyte
230.	<i>Tephrosia purpuria</i>	Fabaceae	Therophyte
231.	<i>Terminalia tomentosa</i>	Combretaceae	Phanerophyte
232.	<i>Thespesia populanea</i>	Malvaceae	Phanerophyte
233.	<i>Thespesia lampas</i>	Malvaceae	Phanerophyte
234.	<i>Tinospora cordifolia</i>	Rhamnaceae	Therophyte
235.	<i>Tragus biflorus</i>	Poaceae	Hemicryptophyte
236.	<i>Tribulus terrestris</i>	Zygophyllaceae	Therophyte
237.	<i>Tridax procumbens</i>	Compositae	Therophyte
238.	<i>Triumferta pilosa</i>	Tiliaceae	Therophyte
239.	<i>Vernonia cinera</i>	Compositae	Therophyte
240.	<i>Vicoa indica</i>	Compositae	Phanerophyte
241.	<i>Vitex negundo</i>	Verbinaceae	Therophyte
242.	<i>Vitis vermifera</i>	Vitaceae	Therophyte
243.	<i>Wrightia tomentosa</i>	Apocyanaceae	Phanerophyte
244.	<i>Xanthium strumariumk</i>	Compositae	Therophyte
245.	<i>Yucca gloriosa</i>	Agavaceae	Therophyte
246.	<i>Zizyphus jujube</i>	Rhamnaceae	Phanerophyte
247.	<i>Zizyphus mauritiana</i>	Rhamanaceae	Phanerophyte
248.	<i>Zizyphus nummularis</i>	Rhamnaceae	Phanerophyte

S. No.	Technical Name	Family	Life form
249.	<i>Zizyphus oenoplica</i>	Rhamnaceae	Therophyte
250.	<i>Zizyphus rotundus</i>	Rhamnaceae	Phanerophyte
251.	<i>Zornia gobbosa</i>	Compositae	Therophyte
V. Grasslands			
252.	<i>Apluda mutica</i>	Poaceae	Hemicryptophyte
253.	<i>Chloris dolichosta</i>	Poaceae	Hemicryptophyte
254.	<i>Cyanodactylon sp</i>	Poaceae	Geophyte
255.	<i>Dichanthium annulatum</i>	Poaceae	Hemicryptophyte
256.	<i>Cenchrus ciliaris</i>	Poaceae	Therophyte
257.	<i>Cenchrus setifera</i>	Poaceae	Therophyte
258.	<i>Cyperus aristatus</i>	Cyperaceae	Therophyte
259.	<i>Cyperus irea</i>	Cyperaceae	Therophyte
260.	<i>Cyperus rotundus</i>	Cyperaceae	Therophyte
261.	<i>Cyperus triceps</i>	Cyperaceae	Therophyte
262.	<i>Dactylectinium annualatum</i>	Poaceae	Therophyte
263.	<i>Digetaria bicornis</i>	Poaceae	Hemicryptophyte
264.	<i>Digetaria stricta</i>	Poaceae	Hemicryptophyte
265.	<i>Eragrostis japonica</i>	Poaceae	Therophyte
266.	<i>Eragrostis tenella</i>	Poaceae	Therophyte
267.	<i>Fibrystylis dichotoma</i>	Poaceae	Hemicryptophyte
268.	<i>Ichnocarpus frutescens</i>	Poaceae	Therophyte
269.	<i>Setaria glauca</i>	Cyperaceae	Hemicryptophyte
270.	<i>Themeda ciliate</i>	Cyperaceae	Hemicryptophyte

Table 3.16

LIST OF AVIFAUNA OBSERVED IN STUDY AREA

S. No	Technical Name	Common Name	Distribution
1.	<i>Acridotheres tristis</i>	Common myna	Recorded in study area
2	<i>Aegithina tiphia</i>	Iora	
3	<i>Alcedo atthis</i>	Common Kingfisher	
4	<i>Anas acuta</i>	Common Teal	
5	<i>Anas querquedula</i>	Gangney Teal	
6	<i>Ardeola grayii</i>	Pond Heron	
7	<i>Artamus fuscus</i>	Ashy Swallow Shrike	
8	<i>Astur badius</i>	Shikra	
9	<i>Aythya feroma</i>	White eyed Pochard	
1	<i>Brachypternus bengalensis</i>	Malabar Golden backed wood	
1	<i>Bubo bubo</i>	Indian great horned Owl	
1	<i>Bubulcus ibis</i>	Cattle Egret	
1	<i>Caprimulgus asiaticus</i>	Common Indian jar	
1	<i>Centropus sinensis</i>	Crow Pheasant	
1	<i>Chalcophaps indica</i>	Emerald Dove	
1	<i>Cinnyris asiatica</i>	Purple Sunbird	
1	<i>Cinnyris lotensis</i>	Loten's sunbird	
1	<i>Circus aeruginosus</i>	Marsh harrier	
1	<i>Columbus livibus</i>	Rock Pigeon	
2	<i>Copsychus saularis</i>	Magpie Robin	

S. No	Technical Name	Common Name	Distribution
2	<i>Coracias benghalensis</i>	Indian Roller	Recorded in study area
2	<i>Corvus corvus</i>	Jungle crow	
2	<i>Corvus splendens</i>	House crow	
2	<i>Coryllis vaeralis</i>	Lorikeet	
2	<i>Dicrurus longicaudatus</i>	Grey Drongo	
2	<i>Dicrurus macrocerus</i>	Black Drongo	
2	<i>Dissemurus paradiseus</i>	Rackete tailed Drongo	
2	<i>Egretta garzetta</i>	Little Egret	
2	<i>Eudynamis scolopaceus</i>	Koel	
3	<i>Gallinula chloropus</i>	Moore hen	
3	<i>Gallus gallus</i>	Red Jungle fowl	
3	<i>Haliastur indus</i>	Brahmny kite	
3	<i>Hierococys varius</i>	Common Hawk Cuckoo	
3	<i>Hirundo daurica</i>	Redrumped Swallow	
3	<i>Lalage sykesi</i>	Black headed cochoo Shrike	
3	<i>Lobpluvia malabaraica</i>	Yellow wattled Lapwing	
3	<i>Lobvanella indicus</i>	Redwattled Lapwing	
3	<i>Megalaima merulinus</i>	Indian Cuckoo	
3	<i>Merops leschenaulti</i>	Chestnut headed Bee Eater	
4	<i>Merops orinetalis</i>	Common Bee Eater	
4	<i>Milvus migrans</i>	Pariah kite	
4	<i>Milyus migrans</i>	Common Kite	
4	<i>Motacilla cinerea</i>	Grey wagtail	
4	<i>Motacilla maderaspatensis</i>	Large pied wagtail	
4	<i>Oriolus oriolus</i>	Indian Oriole	
4	<i>Oriolus xanthornus</i>	Black Headed Oriole	
4	<i>Pavo cristatus</i>	Peacock	
4	<i>Passer domesticus</i>	House Sparrow	
4	<i>Ploceus philippines</i>	Weaver bird	
5	<i>Psittacula Krammeri</i>	Rose ringed parakeet	
5	<i>Pycnonotus cafer</i>	Red vented bulbul	
5	<i>Pycnonotus jokokus</i>	White browed Bulbul	
5	<i>Quills contronix</i>	Grey quail	
5	<i>Saxicoloides fulicata</i>	Indian robin	
5	<i>Sterna albifrons</i>	Indian River Tern	
5	<i>Tchitrea paradisi</i>	Paradise Flycatcher	
5	<i>Temenuchus pagodarum</i>	Brahmny Myna	
5	<i>Tephrodornis ondiceraianus</i>	Common Wood shrike	
5	<i>Turdoides striatus</i>	White headed babler	
6	<i>Tylo alba</i>	Barn Owl	
6	<i>Uroloncha striata</i>	Spotted munia	

Data collected through interactions with local elderly personnel and forest officials of respective forest ranges

TABLE - 3.17

LIST OF ANIMALS AND THEIR CONSERVATION STATUS IN STUDY AREA

Technical Name	Local name	Conservation status as per wildlife protection act, 1972
Mammals		
<i>Herpestres edwardsingula</i>	Common Mongoose	Part-II of Sch-II
<i>Lapus nigricollis</i>	Indian Hare	Sch-IV
<i>Canis auris</i>	Jackal	Part-II of Sch-II
<i>Rousettus leschenaultia</i>	Fruit Bat	Sch-V
<i>Bandicota benghalensis</i>	Bandicoot	Sch-V
<i>Bandicota indica</i>	Rat	Sch-V
<i>Funumbuls palmarum</i>	Squirrel	Sch-IV
<i>Mus rattus</i>	Indian rat	Sch-V
<i>Hystrix indica</i>	Porcupine	Sch-IV
<i>Mus musculus</i>	Common Mouse	Sch-V
<i>Macaca mulata</i>	Monkey	Part-II of Sch-II
<i>Presbytis entellus</i>	Langur	Part-II of Sch-II
<i>Muntiacus muntjac</i>	Barking deer	Sch-III
Reptiles		
<i>Varanus sp*</i>	Tree monitored lizard	Part-II of sch-II
<i>Naja naja*</i>	Common cobra	Sch-IV
<i>Vipera sp*</i>	Russel viper	Part-II of sch-II
<i>Bungarus candidus</i>	Common krait	Sch-IV
<i>Hemidactylus sp</i>	House Lizard	Sch-IV
<i>Calotes versicolor</i>	Garden Lizard	Sch-IV
<i>Chameleon zeylanicus</i>	Lizard	Sch-IV
Amphibians		
<i>Rana tigrina</i>	Common frog	Sch-IV
<i>Bufo melanosticus</i>	Toad	Sch-IV
Birds		
<i>Acridotheres tristis</i>	Common myna	Sch-IV
<i>Aegithina tiphia</i>	Iora	Sch-IV
<i>Alcedo atthis</i>	Common Kingfisher	Sch-IV
<i>Anas acuta</i>	Common Teal	Sch-IV
<i>Anas querquedula</i>	Gangney Teal	Sch-IV
<i>Ardeola grayii</i>	Pond Heron	Sch-IV
<i>Artamus fuscus</i>	Ashy Swallow Shrike	Sch-IV
<i>Astur badius</i>	Shikra	Sch-IV
<i>Aythya feroma</i>	White eyed Pochard	Sch-IV
<i>Brachypternus bengalensis</i>	Malabar Golden backed wood	Sch-IV
<i>Bubo bubo</i>	Indian great horned Owl	Sch-IV
<i>Bubulcus ibis</i>	Cattle Egret	Sch-IV
<i>Caprimulgus asiaticus</i>	Common Indian jar	Sch-IV
<i>Centropus sinensis</i>	Crow Pheasant	Sch-IV

Technical Name	Local name	Conservation status as per wildlife protection act, 1972
<i>Chalcophaps indica</i>	Emerald Dove	Sch-IV
<i>Cinnyris asiatica</i>	Purple Sunbird	Sch-IV
<i>Cinnyris lotensis</i>	Loten's sunbird	Sch-IV
<i>Circus aeruginosus</i>	Marsh harrier	Sch-IV
<i>Columbus livibus</i>	Rock Pigeon	Sch-IV
<i>Copsychus saularis</i>	Magpie Robin	Sch-IV
<i>Coracias benghalensis</i>	Indian Roller	Sch-IV
<i>Corvus corvus</i>	Jungle crow	Sch-IV
<i>Corvus splendens</i>	House crow	Sch-V
<i>Coryllis vaeralis</i>	Lorikeet	Sch-IV
<i>Dicrurus longicaudatus</i>	Grey Drongo	Sch-IV
<i>Dicrurus macrocerus</i>	Black Drongo	Sch-IV
<i>Dissemurus paradiseus</i>	Rackete tailed Drongo	Sch-IV
<i>Egretta garzetta</i>	Little Egret	Sch-IV
<i>Eudynamis scolopaceus</i>	Koel	Sch-IV
<i>Gallinula chloropus</i>	Moore hen	Sch-IV
<i>Gallus gallus</i>	Red Jungle fowl	Sch-IV
<i>Haliastur indus</i>	Brahmny kite	Sch-IV
<i>Hierococys varius</i>	Common Hawk Cuckoo	Sch-IV
<i>Hirundo daurica</i>	Redrumped Swallow	Sch-IV
<i>Lalage sykesi</i>	Black headed cochoo Shrike	Sch-IV
<i>Lobpluvia malabaraica</i>	Yellow wattled Lapwing	Sch-IV
<i>Lobvanella indicus</i>	Redwattled Lapwing	Sch-IV
<i>Megalaima merulinus</i>	Indian Cuckoo	Sch-IV
<i>Merops leschenaulti</i>	Chestnut headed Bee Eater	Sch-IV
<i>Merops orinetalis</i>	Common Bee Eater	Sch-IV
<i>Milvus migrans</i>	Pariah kite	Sch-IV
<i>Milyus migrans</i>	Common Kite	Sch-IV
<i>Motacilla cinerea</i>	Grey wagtail	Sch-IV
<i>Motacilla maderaspatensis</i>	Large pied wagtail	Sch-IV
<i>Oriolus oriolus</i>	Indian Oriole	Sch-IV
<i>Oriolus xanthornus</i>	Black Headed Oriole	Sch-IV
<i>Passer domesticus</i>	House Sparrow	Sch-IV
<i>Ploceus philippines</i>	Weaver bird	Sch-IV
<i>Psittacula Krammeri</i>	Rose ringed parakeet	Sch-IV
<i>Pycnonotus cafer</i>	Red vented bulbul	Sch-IV
<i>Pycnonotus jokokus</i>	White browed Bulbul	Sch-IV
<i>Quills contronix</i>	Grey quail	Sch-IV
<i>Saxicoloides fulicata</i>	Indian robin	Sch-IV
<i>Sterna albifrons</i>	Indian River Tern	Sch-IV
<i>Tchitrea paradisi</i>	Paradise Flycatcher	Sch-IV

Technical Name	Local name	Conservation status as per wildlife protection act, 1972
<i>Temenuchus pagodarum</i>	Brahmny Myna	Sch-IV
<i>Tephrodornis ondiceraiianus</i>	Common Wood shrike	Sch-IV
<i>Turdoides striatus</i>	White headed babler	Sch-IV
<i>Tylo alba</i>	Barn Owl	Sch-IV
<i>Uroloncha striata</i>	Spotted munia	Sch-IV
Butterflies		
<i>Euploca cora</i>	-	Sch-IV
<i>Euploca crassa</i>	-	Sch-IV
<i>Oeuploca dicciotianua</i>	-	Sch-IV
<i>Graphium agamemnos</i>	Tailed jay	Sch-IV
<i>Papilo polymnstor</i>	Blue mormon	Sch-IV
<i>Junonia atlites</i>	Grey pansey	Sch-IV
<i>Juninia almana</i>	Peacock pansey	Sch-IV
<i>Pelopides assemensis</i>	-	Sch-IV
<i>Polytrema discreta</i>	-	Sch-IV

* Data collected through interactions with local elderly personnel and forest officials of respective forest ranges

TABLE
LIST OF PLANKTONIC FLORA AND FAUNA FROM STUDY AREA

Phytoplankton	Zooplankton
<i>Gyrosigma sp</i>	<i>Keratella monospina</i>
<i>Achananthes affinis</i>	<i>Brachirous caudatus</i>
<i>Gyrosigma accuminatus</i>	<i>Asplancha brighwell</i>
<i>Pandorina sp</i>	<i>Colpidium colpoda</i>
<i>Ankistrodesmus falcatus</i>	<i>Daphnia sp</i>
<i>Ankistrodesmus var. tumidus</i>	<i>Ceriodaphnia reticulata</i>
<i>Pediastrum boryanum</i>	<i>Mesocyclops leuckarti</i>
<i>Scenedesmus bijuga</i>	<i>Mesocyclops hyalinus</i>
<i>Melosira granulata</i>	<i>Coleps hirsutus</i>
<i>Cyclotella meneghiana</i>	<i>Arcella sp</i>
<i>Microcystis sp</i>	<i>Actinophyros sp</i>
<i>Navicula gracilis</i>	<i>Asplancha sp</i>
<i>Nitzschia gracilis</i>	<i>Ceriodaphnia sp</i>
<i>Chroococcus minutus</i>	<i>Mesocyclops sp</i>
<i>Spirulina princeps</i>	-
<i>Pinnularia braunii</i>	-
<i>Synedra tabulata</i>	-
<i>Ophora sp</i>	-
<i>Cymbella sp</i>	-
<i>Navicula radiosa</i>	-

TABLE
GRADING SCHEME USED FOR ASSESSMENT OF ECOLOGICAL SENSITIVITY

Parameters		Grade weightage
Wildlife importance (endangere species*)	Number of Schedule-I & II (> 20 numbers)	100
	Number of Schedule-I & II (10-20 numbers)	50
	Number of Schedule-I & II (<10 numbers)	25
Floral endemcity	High(>10 species)	100
	Medium(5-10 species)	50
	Low(>5 species)	25
Faunal endemcity	High(>10 species)	100
	Medium(5-10 species)	50
	Low(>5 species)	25
State of terrestrial vegetation	Relatatively undisturbed forest (govt/private)	100
	Totally manged estate with three type os vegetation	50
	Totally managed estate such as coffee and cardomom	25
	Agricultural land with crops such as coconut	0
State of wetland vegetation	Relatively undisurbed wetland visited by migratory waterfowl	100
	Relataively undisturbed wetland not known to be visited by migratory waterfowl	50
	Other wetlands with frequent human activity	25
	Agricutural land with crops such as paddy	10
Legal status	National part	100
	Wildlife sanctuary	50
	Reserve forest/wetland	25
	Agricultural land	0
Conservation importance	Location unique in terms of habitat(world heriage site) or species	100
	Habitat although present elsewhere is under threat in those places	75
	Habitat present elsewhere and is not under any serious threat	50
	Habitat is very common elsewhere	25

DEMOGRAPHIC PROFILE OF THE STUDY AREA (10 km radius)																			ANNEXURE - 3E		
Name	Total/ Rural/ Urban	Number of households	Total population				population			SC population				ST population							
			Total	Male	Female	Sex ratio	Total	Male	Female	SC%	Total	Male	Female	ST%	Total	Male	Female				
0.5 km																					
0.5-3.0 km																					
Nitturu	Rural	211	851	428	423	988	115	65	50	29.8	254	124	130	20	2.4	9	11				
Chintalapalle	Rural	397	1635	830	805	970	137	71	66	30.9	506	262	244	0	0.0	0	0				
Kottala	Rural	301	1231	617	614	995	148	70	78	18.7	230	113	117	22	1.8	12	10				
	Sub Total	909	3717	1875	1842	982	400	206	194	26.63	990	499	491	20	0.5	9	11				
3.0-5.0 km																					
Kamalapadu	Rural	846	3214	1648	1566	950	413	212	201	20.0	643	325	318	7	0.2	4	3				
Kundanakota	Rural	65	261	117	144	1231	14	5	9	1.5	4	2	2	0	0.0	0	0				
Gudipadu	Rural	348	1455	739	716	969	198	109	89	3.4	49	26	23	0	0.0	0	0				
Akkajampalle	Rural	46	165	93	72	774	12	7	5	3.6	6	3	3	0	0.0	0	0				
	Sub Total	1305	5095	2597	2498	962	637	333	304	13.8	702	356	346	7	0.1	4	3				
5.0-7.0 km																					
Ayyavaripalle	Rural	246	1080	540	540	1000	106	56	50	21.3	230	116	114	37	3.4	19	18				
Venkatampalle	Rural	245	981	501	480	958	107	62	45	7.8	77	37	40	18	1.8	10	8				
Brahmanapalle	Rural	649	2594	1309	1285	982	288	142	146	13.1	339	174	165	0	0.0	0	0				
Obulapuram	Rural	329	1449	771	678	879	148	78	70	9.3	135	75	60	145	10.0	81	64				
Kona Uppalapadu	Rural	315	1198	592	606	1024	148	70	78	18.6	223	112	111	0	0.0	0	0				
	Sub Total	1784	7302	3713	3589	967	797	408	389	13.7	1004	514	490	200	2.7	110	90				
7-10 km																					
Kondampalle	Rural	289	1163	609	554	910	126	64	62	0.1	1	1	0	555	47.7	294	261				
Kammavaripalle	Rural	696	2807	1408	1399	994	271	132	139	19.1	535	281	254	93	3.3	42	51				
Bhogasamudram	Rural	939	3870	1935	1935	1000	495	261	234	22.7	877	449	428	362	9.4	171	191				
Gangadevipalle	Rural	391	1640	860	780	907	215	123	92	24.9	409	205	204	0	0.0	0	0				
Bandarlapalle	Rural	9	42	24	18	750	3	2	1	0.0	0	0	0	0	0.0	0	0				
Yadiki	Rural	13941	56122	28411	27711	975	6194	3249	2945	14.7	8227	4167	4060	766	1.4	390	376				
Chennarayunipalle	Rural	11	50	25	25	1000	7	3	4	2.0	1	0	1	0	0.0	0	0				
	Sub Total	16276	65694	33272	32422	974	7311	3834	3477	15.3	10050	5103	4947	1776	2.7	897	879				
	Grand Total	20274	81808	41457	40351	1025	9145	4781	4364	15.6	12746	6472	6274	2003	2.4	1020	983				

					ANNEXURE - 3E CONTD..		
LITERACY STATUS (10 km radius)							
Name	Total/ Rural/ Urban	No of Literates			No of illiterates		
		Total	Male	Female	Total	Male	Female
0.5 km							
0.5-3.0 km							
Nitturu	Rural	390	233	157	461	195	266
Chintalapalle	Rural	823	484	339	812	346	466
Kottala	Rural	600	352	248	631	265	366
	Sub Total	1813	1069	744	1904	806	1098
3.0-5.0 km							
Kamalapadu	Rural	1684	1018	666	1530	630	900
Kundanakota	Rural	153	85	68	108	32	76
Gudipadu	Rural	619	369	250	836	370	466
Akkajampalle	Rural	96	64	32	69	29	40
	Sub Total	2552	1536	1016	2543	1061	1482
5.0-7.0 km							
Ayyavaripalle	Rural	670	386	284	410	154	256
Venkatampalle	Rural	491	301	190	490	200	290
Brahmanapalle	Rural	1440	880	560	1154	429	725
Obulapuram	Rural	785	505	280	664	266	398
Kona Uppalapadu	Rural	595	343	252	603	249	354
	Sub Total	3981	2415	1566	3321	1298	2023
7-10 km							
Kondampalle	Rural	566	359	207	597	250	347
Kammavaripalle	Rural	1562	947	615	1245	461	784
Bhogasamudram	Rural	2072	1221	851	1798	714	1084
Gangadevipalle	Rural	942	583	359	698	277	421
Bandarlapalle	Rural	34	18	16	8	6	2
Yadiki	Rural	31045	18424	12621	25077	9987	15090
Chennarayunipalle	Rural	12	8	4	38	17	21
	Sub Total	36233	21560	14673	29461	11712	17749
	Total	44579	26580	17999	37229	14877	22352

ANNEXURE - 3E CONTD..													
OCCUPATIONAL STRUCTURE OF THE STUDY AREA (10 km Radius)													
Name	Total/ Rural/ Urban	Total Working Population			Total Non Working Population			Total Main Worker			Total Marginal Worker		
		Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female
0.5 km													
0.5-3.0 km													
Nitturu	Rural	526	272	254	325	156	169	464	265	199	62	7	55
Chintalapalle	Rural	875	489	386	760	341	419	781	444	337	94	45	49
Kottala	Rural	795	402	393	436	215	221	777	395	382	18	7	11
Sub Total		2196	1163	1033	1521	712	809	2022	1104	918	174	59	115
3.0-5.0 km													
Kamalapadu	Rural	1650	980	670	1564	668	896	1350	887	463	300	93	207
Kundanakota	Rural	173	85	88	88	32	56	138	79	59	35	6	29
Gudipadu	Rural	872	454	418	583	285	298	549	423	126	323	31	292
Akkajampalle	Rural	103	56	47	62	37	25	38	38	0	65	18	47
Sub Total		2798	1575	1223	2297	1022	1275	2075	1427	648	723	148	575
5.0-7.0 km													
Ayyavaripalle	Rural	809	417	392	271	123	148	147	136	11	662	281	381
Venkatampalle	Rural	584	314	270	397	187	210	481	306	175	103	8	95
Brahmanapalle	Rural	1341	813	528	1253	496	757	1234	775	459	107	38	69
Obulapuram	Rural	723	429	294	726	342	384	716	427	289	7	2	5
Kona Uppalapadu	Rural	693	369	324	505	223	282	189	125	64	504	244	260
Sub Total		4150	2342	1808	3152	1371	1781	2767	1769	998	1383	573	810
7-10 km													
Kondampalle	Rural	627	340	287	536	269	267	623	338	285	4	2	2
Kammavaripalle	Rural	1478	862	616	1329	546	783	889	555	334	589	307	282
Bhogasamudram	Rural	2056	1145	911	1814	790	1024	1739	1097	642	317	48	269
Gangadevipalle	Rural	966	506	460	674	354	320	709	461	248	257	45	212
Bandarlapalle	Rural	14	12	2	28	12	16	8	6	2	6	6	0
Yadiki	Rural	30327	17116	13211	25795	11295	14500	27972	16504	11468	2355	612	1743
Chennarayunipalle	Rural	36	19	17	14	6	8	36	19	17	0	0	0
Sub Total		35504	20000	15504	30190	13272	16918	31976	18980	12996	3528	1020	2508
GRAND TOTAL		44648	25080	19568	37160	16377	20783	38840	23280	15560	5808	1800	4008

|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|

METEOROLOGICAL DATA INPUTS FOR MODELLING

YEAR	MONTH	DAY	HOUR	WIND SPEED	WIND DIRECTION
16	12	1	1	1.8	297
16	12	1	2	1.3	324
16	12	1	3	1.2	329
16	12	1	4	1.2	327
16	12	1	5	1.2	326
16	12	1	6	2.3	328
16	12	1	7	3.1	317
16	12	1	8	2.5	322
16	12	1	9	1.8	334
16	12	1	10	0.9	340
16	12	1	11	0.7	216
16	12	1	12	0.8	27
16	12	1	13	1.2	34
16	12	1	14	1.4	36
16	12	1	15	1.6	32
16	12	1	16	1.8	29
16	12	1	17	1.6	29
16	12	1	18	0.8	123
16	12	1	19	0.8	318
16	12	1	20	1.0	298
16	12	1	21	1.4	288
16	12	1	22	1.4	295
16	12	1	23	0.9	317
16	12	1	24	0.8	318
16	12	2	1	1.0	313
16	12	2	2	1.4	306
16	12	2	3	1.3	304
16	12	2	4	0.9	306
16	12	2	5	0.9	314
16	12	2	6	0.8	297
16	12	2	7	0.5	270
16	12	2	8	0.3	211
16	12	2	9	1.7	167
16	12	2	10	1.7	168
16	12	2	11	1.6	167
16	12	2	12	1.6	155
16	12	2	13	1.4	144
16	12	2	14	1.3	133
16	12	2	15	1.2	115
16	12	2	16	1.4	93
16	12	2	17	1.7	85
16	12	2	18	0.9	78
16	12	2	19	0.1	31
16	12	2	20	0.0	253
16	12	2	21	0.1	297
16	12	2	22	0.1	208
16	12	2	23	0.0	313
16	12	2	24	0.0	45
16	12	3	1	0.4	286
16	12	3	2	0.7	306
16	12	3	3	0.8	310
16	12	3	4	0.7	305
16	12	3	5	0.7	312
16	12	3	6	0.7	323
16	12	3	7	0.9	320
16	12	3	8	0.4	332
16	12	3	9	0.1	66
16	12	3	10	0.7	79
16	12	3	11	1.4	76
16	12	3	12	2.1	71
16	12	3	13	2.3	64
16	12	3	14	2.9	58
16	12	3	15	3.4	55
16	12	3	16	4.2	51
16	12	3	17	4.0	47
16	12	3	18	5.1	46
16	12	3	19	5.1	47
16	12	3	20	4.4	46
16	12	3	21	3.3	46
16	12	3	22	2.3	44
16	12	3	23	1.7	33
16	12	3	24	0.5	45
16	12	4	1	0.1	115
16	12	4	2	0.1	33
16	12	4	3	0.4	351
16	12	4	4	0.8	329
16	12	4	5	1.2	331
16	12	4	6	1.8	333

YEAR	MONTH	DAY	HOUR	WIND SPEED	WIND DIRECTION
16	12	4	7	2.5	332
16	12	4	8	1.8	346
16	12	4	9	0.8	36
16	12	4	10	0.1	79
16	12	4	11	0.3	74
16	12	4	12	0.5	72
16	12	4	13	0.7	63
16	12	4	14	1.0	56
16	12	4	15	1.4	48
16	12	4	16	2.1	37
16	12	4	17	2.2	19
16	12	4	18	2.7	359
16	12	4	19	3.4	347
16	12	4	20	3.3	349
16	12	4	21	2.6	354
16	12	4	22	2.1	89
16	12	4	23	2.0	312
16	12	4	24	1.6	352
16	12	5	1	1.2	341
16	12	5	2	0.9	328
16	12	5	3	0.7	340
16	12	5	4	0.8	338
16	12	5	5	0.9	337
16	12	5	6	1.2	335
16	12	5	7	1.4	325
16	12	5	8	1.4	311
16	12	5	9	0.0	174
16	12	5	10	0.1	97
16	12	5	11	0.3	159
16	12	5	12	0.3	150
16	12	5	13	0.1	143
16	12	5	14	0.1	121
16	12	5	15	0.5	113
16	12	5	16	0.9	112
16	12	5	17	1.2	124
16	12	5	18	0.7	151
16	12	5	19	0.0	157
16	12	5	20	0.0	209
16	12	5	21	0.1	328
16	12	5	22	0.8	223
16	12	5	23	0.5	241
16	12	5	24	0.3	273
16	12	6	1	0.5	294
16	12	6	2	0.7	304
16	12	6	3	0.1	257
16	12	6	4	0.7	174
16	12	6	5	1.3	186
16	12	6	6	1.7	197
16	12	6	7	1.8	206
16	12	6	8	2.3	187
16	12	6	9	1.3	175
16	12	6	10	0.5	130
16	12	6	11	0.8	114
16	12	6	12	0.9	100
16	12	6	13	0.8	86
16	12	6	14	1.0	79
16	12	6	15	1.6	78
16	12	6	16	2.2	76
16	12	6	17	2.2	82
16	12	6	18	3.5	108
16	12	6	19	6.0	116
16	12	6	20	4.9	114
16	12	6	21	4.0	114
16	12	6	22	3.5	118
16	12	6	23	2.9	127
16	12	6	24	3.1	133
16	12	7	1	2.7	143
16	12	7	2	2.5	148
16	12	7	3	2.5	146
16	12	7	4	2.3	143
16	12	7	5	1.6	143
16	12	7	6	1.2	132
16	12	7	7	0.8	111
16	12	7	8	2.9	102
16	12	7	9	3.6	104
16	12	7	10	3.6	102
16	12	7	11	3.6	93
16	12	7	12	3.5	83

METEOROLOGICAL DATA INPUTS FOR MODELLING

YEAR	MONTH	DAY	HOUR	WIND SPEED	WIND DIRECTION
16	12	7	13	3.6	76
16	12	7	14	4.0	72
16	12	7	15	4.7	71
16	12	7	16	4.8	72
16	12	7	17	4.7	78
16	12	7	18	5.3	90
16	12	7	19	5.2	107
16	12	7	20	4.6	110
16	12	7	21	3.3	107
16	12	7	22	1.3	106
16	12	7	23	0.5	143
16	12	7	24	0.5	147
16	12	8	1	0.5	156
16	12	8	2	0.8	153
16	12	8	3	1.2	154
16	12	8	4	1.2	148
16	12	8	5	1.2	141
16	12	8	6	1.0	136
16	12	8	7	0.9	130
16	12	8	8	2.3	117
16	12	8	9	3.6	112
16	12	8	10	4.2	111
16	12	8	11	4.3	110
16	12	8	12	4.6	111
16	12	8	13	5.2	111
16	12	8	14	6.0	110
16	12	8	15	6.4	109
16	12	8	16	5.3	110
16	12	8	17	5.1	111
16	12	8	18	5.6	111
16	12	8	19	5.1	109
16	12	8	20	4.3	104
16	12	8	21	3.4	97
16	12	8	22	2.3	90
16	12	8	23	1.2	84
16	12	8	24	1.0	78
16	12	9	1	1.2	71
16	12	9	2	2.0	72
16	12	9	3	2.9	70
16	12	9	4	3.4	61
16	12	9	5	3.8	50
16	12	9	6	4.3	38
16	12	9	7	4.6	29
16	12	9	8	5.2	54
16	12	9	9	6.1	67
16	12	9	10	5.6	71
16	12	9	11	4.8	69
16	12	9	12	4.3	66
16	12	9	13	4.0	63
16	12	9	14	4.0	59
16	12	9	15	4.2	57
16	12	9	16	4.4	57
16	12	9	17	4.2	56
16	12	9	18	4.9	63
16	12	9	19	5.1	78
16	12	9	20	4.7	84
16	12	9	21	4.3	72
16	12	9	22	4.0	60
16	12	9	23	3.5	50
16	12	9	24	3.4	46
16	12	10	1	3.1	48
16	12	10	2	2.5	55
16	12	10	3	2.0	60
16	12	10	4	1.2	40
16	12	10	5	1.2	25
16	12	10	6	1.6	25
16	12	10	7	1.8	22
16	12	10	8	2.7	63
16	12	10	9	3.5	84
16	12	10	10	3.9	95
16	12	10	11	3.4	97
16	12	10	12	2.9	96
16	12	10	13	2.3	93
16	12	10	14	2.1	91
16	12	10	15	2.0	85
16	12	10	16	2.1	78
16	12	10	17	1.4	72
16	12	10	18	0.9	68

YEAR	MONTH	DAY	HOUR	WIND SPEED	WIND DIRECTION
16	12	10	19	0.5	94
16	12	10	20	0.8	118
16	12	10	21	0.3	189
16	12	10	22	0.5	208
16	12	10	23	0.7	174
16	12	10	24	0.4	226
16	12	11	1	1.6	263
16	12	11	2	2.6	259
16	12	11	3	2.0	252
16	12	11	4	1.2	249
16	12	11	5	0.9	255
16	12	11	6	0.9	270
16	12	11	7	0.9	279
16	12	11	8	0.7	259
16	12	11	9	1.2	169
16	12	11	10	2.2	156
16	12	11	11	3.0	159
16	12	11	12	3.1	162
16	12	11	13	2.9	164
16	12	11	14	2.9	166
16	12	11	15	2.7	171
16	12	11	16	2.7	178
16	12	11	17	2.2	182
16	12	11	18	1.8	190
16	12	11	19	1.6	202
16	12	11	20	1.4	204
16	12	11	21	2.0	195
16	12	11	22	2.9	179
16	12	11	23	3.4	176
16	12	11	24	4.2	182
16	12	12	1	4.3	184
16	12	12	2	3.9	180
16	12	12	3	3.4	173
16	12	12	4	3.0	169
16	12	12	5	2.0	155
16	12	12	6	2.0	150
16	12	12	7	1.8	167
16	12	12	8	3.6	149
16	12	12	9	3.9	158
16	12	12	10	3.6	160
16	12	12	11	2.9	170
16	12	12	12	2.3	181
16	12	12	13	2.3	183
16	12	12	14	2.5	183
16	12	12	15	2.7	181
16	12	12	16	3.1	173
16	12	12	17	3.5	155
16	12	12	18	3.6	151
16	12	12	19	2.7	154
16	12	12	20	1.8	154
16	12	12	21	1.3	152
16	12	12	22	1.8	142
16	12	12	23	2.5	126
16	12	12	24	2.2	117
16	12	13	1	1.8	117
16	12	13	2	1.7	136
16	12	13	3	2.7	147
16	12	13	4	3.1	153
16	12	13	5	3.0	157
16	12	13	6	3.0	158
16	12	13	7	2.9	160
16	12	13	8	2.6	165
16	12	13	9	3.1	154
16	12	13	10	3.3	156
16	12	13	11	3.3	151
16	12	13	12	3.0	150
16	12	13	13	2.7	149
16	12	13	14	2.3	150
16	12	13	15	2.1	152
16	12	13	16	2.1	158
16	12	13	17	1.7	178
16	12	13	18	1.4	198
16	12	13	19	1.3	205
16	12	13	20	1.2	174
16	12	13	21	1.7	147
16	12	13	22	1.8	136
16	12	13	23	1.6	109
16	12	13	24	1.3	96

METEOROLOGICAL DATA INPUTS FOR MODELLING

YEAR	MONTH	DAY	HOUR	WIND SPEED	WIND DIRECTION
16	12	14	1	0.9	58
16	12	14	2	0.5	15
16	12	14	3	0.4	272
16	12	14	4	0.0	330
16	12	14	5	0.9	64
16	12	14	6	0.9	66
16	12	14	7	0.8	86
16	12	14	8	2.9	101
16	12	14	9	3.5	108
16	12	14	10	3.9	118
16	12	14	11	4.0	122
16	12	14	12	4.2	120
16	12	14	13	4.2	118
16	12	14	14	4.2	118
16	12	14	15	4.3	116
16	12	14	16	4.6	113
16	12	14	17	4.0	117
16	12	14	18	4.8	122
16	12	14	19	5.2	127
16	12	14	20	4.6	130
16	12	14	21	3.8	125
16	12	14	22	3.4	119
16	12	14	23	3.0	117
16	12	14	24	2.3	126
16	12	15	1	1.3	142
16	12	15	2	1.2	147
16	12	15	3	1.8	129
16	12	15	4	2.1	115
16	12	15	5	1.8	111
16	12	15	6	1.6	116
16	12	15	7	1.2	127
16	12	15	8	5.2	112
16	12	15	9	6.4	112
16	12	15	10	6.2	111
16	12	15	11	5.9	111
16	12	15	12	5.5	112
16	12	15	13	5.3	116
16	12	15	14	5.1	118
16	12	15	15	4.8	119
16	12	15	16	4.6	121
16	12	15	17	3.8	127
16	12	15	18	4.0	126
16	12	15	19	4.7	118
16	12	15	20	5.3	111
16	12	15	21	4.7	107
16	12	15	22	4.2	105
16	12	15	23	3.6	110
16	12	15	24	2.7	114
16	12	16	1	2.1	122
16	12	16	2	2.3	136
16	12	16	3	2.6	140
16	12	16	4	2.5	139
16	12	16	5	2.1	133
16	12	16	6	2.1	125
16	12	16	7	2.2	117
16	12	16	8	4.7	119
16	12	16	9	5.3	118
16	12	16	10	4.9	118
16	12	16	11	4.7	119
16	12	16	12	4.8	115
16	12	16	13	4.8	112
16	12	16	14	4.9	108
16	12	16	15	5.1	106
16	12	16	16	5.1	107
16	12	16	17	4.6	114
16	12	16	18	5.5	117
16	12	16	19	5.5	117
16	12	16	20	4.9	110
16	12	16	21	4.7	104
16	12	16	22	4.2	107
16	12	16	23	3.3	109
16	12	16	24	2.5	109
16	12	17	1	2.0	108
16	12	17	2	1.8	113
16	12	17	3	1.8	117
16	12	17	4	1.8	117
16	12	17	5	1.6	129
16	12	17	6	1.6	122

YEAR	MONTH	DAY	HOUR	WIND SPEED	WIND DIRECTION
16	12	17	7	1.2	111
16	12	17	8	3.1	103
16	12	17	9	3.6	110
16	12	17	10	3.3	113
16	12	17	11	2.5	111
16	12	17	12	1.7	105
16	12	17	13	1.4	93
16	12	17	14	1.7	82
16	12	17	15	2.2	72
16	12	17	16	3.1	65
16	12	17	17	3.1	61
16	12	17	18	3.4	59
16	12	17	19	4.3	83
16	12	17	20	5.3	105
16	12	17	21	4.3	101
16	12	17	22	3.6	97
16	12	17	23	2.5	102
16	12	17	24	1.3	121
16	12	18	1	1.4	141
16	12	18	2	1.8	149
16	12	18	3	1.8	148
16	12	18	4	1.8	145
16	12	18	5	1.7	140
16	12	18	6	1.6	136
16	12	18	7	1.2	130
16	12	18	8	2.2	116
16	12	18	9	2.7	117
16	12	18	10	2.0	121
16	12	18	11	1.3	124
16	12	18	12	1.0	127
16	12	18	13	0.7	132
16	12	18	14	0.5	128
16	12	18	15	0.7	121
16	12	18	16	1.2	117
16	12	18	17	1.3	123
16	12	18	18	0.5	132
16	12	18	19	0.0	90
16	12	18	20	0.1	291
16	12	18	21	0.3	81
16	12	18	22	0.7	109
16	12	18	23	0.3	69
16	12	18	24	0.5	66
16	12	19	1	0.3	256
16	12	19	2	0.3	63
16	12	19	3	0.9	82
16	12	19	4	0.9	77
16	12	19	5	0.9	74
16	12	19	6	0.8	77
16	12	19	7	0.8	76
16	12	19	8	2.6	84
16	12	19	9	3.3	86
16	12	19	10	2.9	85
16	12	19	11	2.5	79
16	12	19	12	2.6	72
16	12	19	13	3.0	72
16	12	19	14	3.1	72
16	12	19	15	3.4	74
16	12	19	16	3.9	77
16	12	19	17	3.6	81
16	12	19	18	4.8	87
16	12	19	19	5.3	102
16	12	19	20	4.3	103
16	12	19	21	3.6	90
16	12	19	22	2.7	78
16	12	19	23	1.6	53
16	12	19	24	1.0	359
16	12	20	1	1.2	89
16	12	20	2	1.8	19
16	12	20	3	2.2	216
16	12	20	4	2.9	13
16	12	20	5	3.1	22
16	12	20	6	3.1	33
16	12	20	7	2.7	42
16	12	20	8	3.5	69
16	12	20	9	4.6	88
16	12	20	10	3.8	99
16	12	20	11	3.3	104
16	12	20	12	3.1	105

METEOROLOGICAL DATA INPUTS FOR MODELLING

YEAR	MONTH	DAY	HOUR	WIND SPEED	WIND DIRECTION
16	12	20	13	3.0	103
16	12	20	14	2.7	100
16	12	20	15	2.6	96
16	12	20	16	2.7	93
16	12	20	17	2.3	90
16	12	20	18	1.8	84
16	12	20	19	1.3	77
16	12	20	20	1.3	86
16	12	20	21	1.2	98
16	12	20	22	0.4	93
16	12	20	23	0.3	347
16	12	20	24	0.9	295
16	12	21	1	0.7	321
16	12	21	2	0.7	32
16	12	21	3	1.4	56
16	12	21	4	1.8	55
16	12	21	5	2.5	57
16	12	21	6	3.4	55
16	12	21	7	3.6	47
16	12	21	8	4.2	62
16	12	21	9	5.5	78
16	12	21	10	4.7	80
16	12	21	11	3.4	80
16	12	21	12	2.6	80
16	12	21	13	2.2	80
16	12	21	14	2.0	76
16	12	21	15	2.0	71
16	12	21	16	2.2	70
16	12	21	17	1.8	72
16	12	21	18	1.6	67
16	12	21	19	1.3	69
16	12	21	20	2.1	101
16	12	21	21	2.6	113
16	12	21	22	2.1	106
16	12	21	23	1.4	79
16	12	21	24	0.8	62
16	12	22	1	1.0	78
16	12	22	2	1.2	81
16	12	22	3	1.3	84
16	12	22	4	1.4	86
16	12	22	5	1.4	91
16	12	22	6	1.6	76
16	12	22	7	1.6	68
16	12	22	8	3.4	83
16	12	22	9	4.2	92
16	12	22	10	3.9	97
16	12	22	11	3.5	99
16	12	22	12	3.6	102
16	12	22	13	3.6	102
16	12	22	14	3.9	100
16	12	22	15	4.2	97
16	12	22	16	4.3	93
16	12	22	17	3.8	91
16	12	22	18	4.4	87
16	12	22	19	4.8	91
16	12	22	20	4.6	95
16	12	22	21	4.2	90
16	12	22	22	3.9	81
16	12	22	23	3.4	69
16	12	22	24	3.3	63
16	12	23	1	3.4	62
16	12	23	2	3.4	64
16	12	23	3	3.0	66
16	12	23	4	2.3	66
16	12	23	5	2.0	59
16	12	23	6	1.8	54
16	12	23	7	1.7	49
16	12	23	8	3.3	78
16	12	23	9	3.6	90
16	12	23	10	2.6	96
16	12	23	11	1.7	102
16	12	23	12	0.8	104
16	12	23	13	0.5	111
16	12	23	14	0.4	114
16	12	23	15	0.3	111
16	12	23	16	0.4	118
16	12	23	17	0.3	142
16	12	23	18	0.0	141

YEAR	MONTH	DAY	HOUR	WIND SPEED	WIND DIRECTION
16	12	23	19	0.0	95
16	12	23	20	0.1	328
16	12	23	21	0.4	347
16	12	23	22	0.7	360
16	12	23	23	1.0	89
16	12	23	24	2.1	157
16	12	24	1	3.4	333
16	12	24	2	3.9	353
16	12	24	3	3.5	357
16	12	24	4	4.2	0
16	12	24	5	4.8	21
16	12	24	6	4.8	28
16	12	24	7	4.4	32
16	12	24	8	4.0	47
16	12	24	9	5.2	65
16	12	24	10	4.8	69
16	12	24	11	4.4	71
16	12	24	12	4.2	72
16	12	24	13	4.3	75
16	12	24	14	4.4	76
16	12	24	15	4.7	78
16	12	24	16	4.4	80
16	12	24	17	4.2	84
16	12	24	18	4.9	94
16	12	24	19	5.1	102
16	12	24	20	4.6	92
16	12	24	21	3.8	73
16	12	24	22	3.4	53
16	12	24	23	3.6	41
16	12	24	24	4.2	37
16	12	25	1	4.9	38
16	12	25	2	5.2	39
16	12	25	3	5.3	39
16	12	25	4	5.3	38
16	12	25	5	5.5	36
16	12	25	6	5.5	35
16	12	25	7	5.3	34
16	12	25	8	5.3	49
16	12	25	9	6.1	59
16	12	25	10	5.6	61
16	12	25	11	5.5	61
16	12	25	12	5.3	57
16	12	25	13	5.3	55
16	12	25	14	5.3	54
16	12	25	15	5.3	52
16	12	25	16	4.2	49
16	12	25	17	3.5	45
16	12	25	18	3.3	43
16	12	25	19	2.9	32
16	12	25	20	3.3	16
16	12	25	21	3.4	267
16	12	25	22	3.0	347
16	12	25	23	2.7	332
16	12	25	24	2.7	336
16	12	26	1	3.4	340
16	12	26	2	4.0	343
16	12	26	3	4.6	349
16	12	26	4	5.1	356
16	12	26	5	5.1	359
16	12	26	6	4.8	358
16	12	26	7	4.2	359
16	12	26	8	3.0	15
16	12	26	9	3.4	65
16	12	26	10	3.1	77
16	12	26	11	2.7	85
16	12	26	12	2.5	87
16	12	26	13	2.7	89
16	12	26	14	2.9	87
16	12	26	15	3.0	86
16	12	26	16	3.3	82
16	12	26	17	3.5	80
16	12	26	18	4.6	81
16	12	26	19	4.7	85
16	12	26	20	3.6	80
16	12	26	21	2.1	56
16	12	26	22	1.4	354
16	12	26	23	1.8	321
16	12	26	24	2.0	309

METEOROLOGICAL DATA INPUTS FOR MODELLING

YEAR	MONTH	DAY	HOUR	WIND SPEED	WIND DIRECTION
16	12	27	1	2.1	307
16	12	27	2	1.8	319
16	12	27	3	1.6	335
16	12	27	4	1.8	344
16	12	27	5	2.1	350
16	12	27	6	2.5	354
16	12	27	7	2.7	349
16	12	27	8	2.2	350
16	12	27	9	1.4	33
16	12	27	10	1.0	52
16	12	27	11	0.8	60
16	12	27	12	0.9	62
16	12	27	13	1.0	65
16	12	27	14	1.2	62
16	12	27	15	1.2	61
16	12	27	16	1.3	65
16	12	27	17	0.7	81
16	12	27	18	0.1	56
16	12	27	19	0.3	55
16	12	27	20	1.4	73
16	12	27	21	0.9	37
16	12	27	22	1.4	355
16	12	27	23	2.6	349
16	12	27	24	3.1	333
16	12	28	1	3.1	324
16	12	28	2	2.9	340
16	12	28	3	3.3	357
16	12	28	4	4.2	216
16	12	28	5	4.9	216
16	12	28	6	4.8	360
16	12	28	7	4.6	341
16	12	28	8	3.5	339
16	12	28	9	2.5	21
16	12	28	10	2.3	48
16	12	28	11	2.3	59
16	12	28	12	2.6	60
16	12	28	13	3.3	61
16	12	28	14	3.8	58
16	12	28	15	4.7	57
16	12	28	16	3.9	58
16	12	28	17	5.1	59
16	12	28	18	5.9	59
16	12	28	19	5.5	55
16	12	28	20	5.1	46
16	12	28	21	4.4	32
16	12	28	22	4.0	13
16	12	28	23	3.4	355
16	12	28	24	3.4	157
16	12	29	1	4.2	351
16	12	29	2	5.1	13
16	12	29	3	5.6	19
16	12	29	4	5.6	16
16	12	29	5	5.6	216
16	12	29	6	5.6	189
16	12	29	7	5.6	355
16	12	29	8	4.9	89
16	12	29	9	7.0	44
16	12	29	10	6.9	44
16	12	29	11	7.3	43
16	12	29	12	7.4	44
16	12	29	13	7.0	44
16	12	29	14	6.8	43
16	12	29	15	6.8	42
16	12	29	16	4.6	42
16	12	29	17	4.8	35
16	12	29	18	5.2	25
16	12	29	19	5.3	25
16	12	29	20	5.3	28
16	12	29	21	5.2	29
16	12	29	22	5.1	32
16	12	29	23	4.8	42
16	12	29	24	4.8	63
16	12	30	1	4.9	71
16	12	30	2	4.8	67
16	12	30	3	4.6	71
16	12	30	4	4.7	74
16	12	30	5	4.9	75
16	12	30	6	5.1	71

YEAR	MONTH	DAY	HOUR	WIND SPEED	WIND DIRECTION
16	12	30	7	4.9	59
16	12	30	8	6.1	63
16	12	30	9	7.9	76
16	12	30	10	6.2	77
16	12	30	11	7.4	79
16	12	30	12	7.3	76
16	12	30	13	7.7	76
16	12	30	14	6.6	77
16	12	30	15	6.1	77
16	12	30	16	5.2	77
16	12	30	17	5.5	74
16	12	30	18	4.9	73
16	12	30	19	5.2	73
16	12	30	20	4.9	74
16	12	30	21	4.3	72
16	12	30	22	4.0	71
16	12	30	23	4.2	69
16	12	30	24	4.7	71
16	12	31	1	5.2	75
16	12	31	2	5.6	80
16	12	31	3	6.0	75
16	12	31	4	5.7	78
16	12	31	5	5.7	81
16	12	31	6	5.5	87
16	12	31	7	5.5	88
16	12	31	8	5.2	94
16	12	31	9	10.0	109
16	12	31	10	9.9	115
16	12	31	11	8.3	124
16	12	31	12	7.7	128
16	12	31	13	8.2	126
16	12	31	14	8.5	119
16	12	31	15	5.2	117
16	12	31	16	4.9	128
16	12	31	17	4.3	132
16	12	31	18	5.1	123
16	12	31	19	4.9	116
16	12	31	20	4.9	112
16	12	31	21	4.9	110
16	12	31	22	4.8	115
16	12	31	23	4.9	123
16	12	31	24	5.1	129
17	1	1	1	1.7	287
17	1	1	2	0.9	286
17	1	1	3	0.1	307
17	1	1	4	0.0	71
17	1	1	5	0.0	244
17	1	1	6	0.0	259
17	1	1	7	0.4	303
17	1	1	8	0.7	301
17	1	1	9	0.1	53
17	1	1	10	0.8	95
17	1	1	11	0.8	98
17	1	1	12	0.1	129
17	1	1	13	0.5	45
17	1	1	14	0.9	216
17	1	1	15	4.0	239
17	1	1	16	3.9	251
17	1	1	17	4.0	270
17	1	1	18	4.3	289
17	1	1	19	4.3	315
17	1	1	20	4.4	330
17	1	1	21	4.3	342
17	1	1	22	4.3	356
17	1	1	23	4.3	256
17	1	1	24	4.9	20
17	1	2	1	5.2	23
17	1	2	2	4.8	25
17	1	2	3	4.6	31
17	1	2	4	4.2	36
17	1	2	5	3.8	36
17	1	2	6	3.9	42
17	1	2	7	3.9	46
17	1	2	8	5.2	74
17	1	2	9	4.8	95
17	1	2	10	4.8	109
17	1	2	11	4.9	117
17	1	2	12	4.7	129

METEOROLOGICAL DATA INPUTS FOR MODELLING

YEAR	MONTH	DAY	HOUR	WIND SPEED	WIND DIRECTION
17	1	2	13	3.0	145
17	1	2	14	2.7	147
17	1	2	15	3.9	134
17	1	2	16	4.3	121
17	1	2	17	4.4	107
17	1	2	18	5.1	96
17	1	2	19	5.6	85
17	1	2	20	4.9	84
17	1	2	21	4.4	106
17	1	2	22	4.3	120
17	1	2	23	3.9	134
17	1	2	24	4.0	139
17	1	3	1	4.4	134
17	1	3	2	4.4	132
17	1	3	3	4.2	117
17	1	3	4	4.2	106
17	1	3	5	4.4	101
17	1	3	6	4.4	106
17	1	3	7	4.2	109
17	1	3	8	5.1	115
17	1	3	9	6.4	120
17	1	3	10	6.1	127
17	1	3	11	5.3	137
17	1	3	12	3.9	147
17	1	3	13	3.1	145
17	1	3	14	3.3	136
17	1	3	15	2.3	121
17	1	3	16	1.6	96
17	1	3	17	1.7	77
17	1	3	18	1.7	74
17	1	3	19	1.3	96
17	1	3	20	1.4	129
17	1	3	21	2.3	129
17	1	3	22	2.6	121
17	1	3	23	2.5	112
17	1	3	24	2.2	113
17	1	4	1	1.7	120
17	1	4	2	1.4	133
17	1	4	3	1.4	141
17	1	4	4	1.4	142
17	1	4	5	1.4	147
17	1	4	6	1.6	149
17	1	4	7	1.3	143
17	1	4	8	0.9	126
17	1	4	9	3.9	109
17	1	4	10	4.8	106
17	1	4	11	4.8	105
17	1	4	12	3.9	102
17	1	4	13	3.4	99
17	1	4	14	4.0	97
17	1	4	15	5.7	105
17	1	4	16	4.3	110
17	1	4	17	3.1	94
17	1	4	18	2.2	70
17	1	4	19	1.6	78
17	1	4	20	2.1	117
17	1	4	21	2.9	132
17	1	4	22	2.3	148
17	1	4	23	1.4	167
17	1	4	24	0.8	164
17	1	5	1	0.5	168
17	1	5	2	0.8	226
17	1	5	3	1.7	252
17	1	5	4	2.0	258
17	1	5	5	1.2	260
17	1	5	6	0.3	249
17	1	5	7	0.1	287
17	1	5	8	0.1	237
17	1	5	9	0.4	108
17	1	5	10	1.7	115
17	1	5	11	2.1	119
17	1	5	12	1.6	116
17	1	5	13	0.8	95
17	1	5	14	0.8	26
17	1	5	15	1.3	19
17	1	5	16	1.6	34
17	1	5	17	1.7	53
17	1	5	18	2.0	79

YEAR	MONTH	DAY	HOUR	WIND SPEED	WIND DIRECTION
17	1	5	19	2.5	94
17	1	5	20	4.3	102
17	1	5	21	4.9	113
17	1	5	22	4.0	119
17	1	5	23	3.5	129
17	1	5	24	2.7	132
17	1	6	1	1.3	152
17	1	6	2	1.0	136
17	1	6	3	1.3	110
17	1	6	4	1.4	87
17	1	6	5	1.4	123
17	1	6	6	1.3	109
17	1	6	7	1.2	89
17	1	6	8	3.4	87
17	1	6	9	4.3	86
17	1	6	10	4.3	88
17	1	6	11	4.3	91
17	1	6	12	4.3	93
17	1	6	13	4.2	93
17	1	6	14	4.6	92
17	1	6	15	5.2	90
17	1	6	16	5.7	90
17	1	6	17	4.9	89
17	1	6	18	5.5	90
17	1	6	19	5.3	92
17	1	6	20	4.9	87
17	1	6	21	4.4	85
17	1	6	22	3.6	86
17	1	6	23	3.0	94
17	1	6	24	3.1	107
17	1	7	1	3.1	121
17	1	7	2	3.0	123
17	1	7	3	3.0	116
17	1	7	4	2.6	103
17	1	7	5	2.3	83
17	1	7	6	2.0	51
17	1	7	7	2.3	157
17	1	7	8	3.1	38
17	1	7	9	3.4	56
17	1	7	10	3.0	66
17	1	7	11	2.5	71
17	1	7	12	2.3	77
17	1	7	13	2.5	78
17	1	7	14	2.7	77
17	1	7	15	3.4	78
17	1	7	16	4.2	77
17	1	7	17	4.0	75
17	1	7	18	5.1	79
17	1	7	19	4.9	91
17	1	7	20	4.4	97
17	1	7	21	3.5	90
17	1	7	22	2.5	81
17	1	7	23	1.0	56
17	1	7	24	0.3	56
17	1	8	1	0.1	172
17	1	8	2	0.1	85
17	1	8	3	0.3	71
17	1	8	4	0.4	60
17	1	8	5	0.8	38
17	1	8	6	1.6	23
17	1	8	7	2.3	189
17	1	8	8	2.6	32
17	1	8	9	2.7	51
17	1	8	10	2.6	61
17	1	8	11	2.6	59
17	1	8	12	2.6	57
17	1	8	13	2.7	57
17	1	8	14	2.9	59
17	1	8	15	3.3	62
17	1	8	16	3.8	65
17	1	8	17	3.3	73
17	1	8	18	3.9	89
17	1	8	19	5.1	108
17	1	8	20	4.4	110
17	1	8	21	3.1	94
17	1	8	22	2.5	67
17	1	8	23	2.0	39
17	1	8	24	1.8	356

METEOROLOGICAL DATA INPUTS FOR MODELLING

YEAR	MONTH	DAY	HOUR	WIND SPEED	WIND DIRECTION
17	1	9	1	2.1	353
17	1	9	2	2.1	345
17	1	9	3	1.7	348
17	1	9	4	1.3	347
17	1	9	5	0.9	338
17	1	9	6	0.8	338
17	1	9	7	0.9	337
17	1	9	8	0.7	256
17	1	9	9	1.4	80
17	1	9	10	2.0	84
17	1	9	11	2.0	83
17	1	9	12	1.8	81
17	1	9	13	1.6	81
17	1	9	14	1.4	84
17	1	9	15	1.6	93
17	1	9	16	2.0	106
17	1	9	17	2.0	122
17	1	9	18	2.1	138
17	1	9	19	3.5	136
17	1	9	20	4.3	132
17	1	9	21	3.4	125
17	1	9	22	2.1	115
17	1	9	23	1.2	115
17	1	9	24	0.7	116
17	1	10	1	0.3	97
17	1	10	2	0.7	354
17	1	10	3	1.2	356
17	1	10	4	1.3	216
17	1	10	5	1.7	256
17	1	10	6	1.8	312
17	1	10	7	1.4	356
17	1	10	8	0.7	189
17	1	10	9	0.4	105
17	1	10	10	1.4	120
17	1	10	11	1.2	120
17	1	10	12	0.5	108
17	1	10	13	0.1	45
17	1	10	14	0.4	58
17	1	10	15	1.0	51
17	1	10	16	2.1	37
17	1	10	17	2.3	23
17	1	10	18	2.7	256
17	1	10	19	2.2	25
17	1	10	20	1.8	88
17	1	10	21	2.6	96
17	1	10	22	2.0	91
17	1	10	23	0.7	101
17	1	10	24	0.7	59
17	1	11	1	0.9	281
17	1	11	2	1.7	302
17	1	11	3	2.1	331
17	1	11	4	2.5	349
17	1	11	5	4.9	357
17	1	11	6	5.3	355
17	1	11	7	4.8	353
17	1	11	8	3.5	17
17	1	11	9	2.5	34
17	1	11	10	1.6	56
17	1	11	11	1.4	66
17	1	11	12	1.6	68
17	1	11	13	1.7	61
17	1	11	14	2.0	50
17	1	11	15	2.5	41
17	1	11	16	3.0	32
17	1	11	17	3.0	22
17	1	11	18	3.6	89
17	1	11	19	4.0	360
17	1	11	20	4.2	17
17	1	11	21	3.9	44
17	1	11	22	2.9	60
17	1	11	23	1.8	75
17	1	11	24	0.8	77
17	1	12	1	0.1	79
17	1	12	2	0.7	337
17	1	12	3	1.6	189
17	1	12	4	2.7	21
17	1	12	5	4.0	17
17	1	12	6	4.9	16

YEAR	MONTH	DAY	HOUR	WIND SPEED	WIND DIRECTION
17	1	12	7	4.7	19
17	1	12	8	4.0	49
17	1	12	9	3.3	66
17	1	12	10	2.5	83
17	1	12	11	2.1	95
17	1	12	12	1.7	101
17	1	12	13	1.4	101
17	1	12	14	1.3	94
17	1	12	15	1.6	90
17	1	12	16	2.0	87
17	1	12	17	2.0	81
17	1	12	18	2.0	73
17	1	12	19	3.3	83
17	1	12	20	3.8	94
17	1	12	21	3.0	94
17	1	12	22	1.8	81
17	1	12	23	1.7	55
17	1	12	24	1.7	35
17	1	13	1	1.7	15
17	1	13	2	1.4	157
17	1	13	3	1.7	17
17	1	13	4	2.3	17
17	1	13	5	3.0	20
17	1	13	6	3.0	22
17	1	13	7	3.0	22
17	1	13	8	3.5	62
17	1	13	9	2.7	79
17	1	13	10	2.3	94
17	1	13	11	2.0	101
17	1	13	12	1.8	104
17	1	13	13	1.3	101
17	1	13	14	1.3	94
17	1	13	15	1.6	90
17	1	13	16	1.8	85
17	1	13	17	1.8	78
17	1	13	18	2.0	61
17	1	13	19	2.9	59
17	1	13	20	3.4	67
17	1	13	21	2.5	61
17	1	13	22	2.3	49
17	1	13	23	2.5	31
17	1	13	24	2.1	358
17	1	14	1	2.1	354
17	1	14	2	2.1	346
17	1	14	3	2.2	331
17	1	14	4	2.3	329
17	1	14	5	2.3	330
17	1	14	6	2.2	330
17	1	14	7	2.0	332
17	1	14	8	0.9	342
17	1	14	9	0.4	83
17	1	14	10	0.8	97
17	1	14	11	1.6	100
17	1	14	12	2.0	99
17	1	14	13	2.0	100
17	1	14	14	1.8	98
17	1	14	15	2.0	97
17	1	14	16	2.2	97
17	1	14	17	1.7	103
17	1	14	18	2.1	106
17	1	14	19	3.8	111
17	1	14	20	3.8	113
17	1	14	21	2.2	117
17	1	14	22	1.2	134
17	1	14	23	1.2	166
17	1	14	24	1.7	173
17	1	15	1	2.2	176
17	1	15	2	2.7	187
17	1	15	3	3.0	198
17	1	15	4	3.4	210
17	1	15	5	3.8	218
17	1	15	6	3.9	218
17	1	15	7	3.6	209
17	1	15	8	3.8	180
17	1	15	9	3.3	166
17	1	15	10	2.9	158
17	1	15	11	2.5	153
17	1	15	12	2.3	151

METEOROLOGICAL DATA INPUTS FOR MODELLING

YEAR	MONTH	DAY	HOUR	WIND SPEED	WIND DIRECTION
17	1	15	13	2.2	148
17	1	15	14	2.3	143
17	1	15	15	2.1	144
17	1	15	16	2.1	147
17	1	15	17	1.4	160
17	1	15	18	0.9	187
17	1	15	19	0.7	187
17	1	15	20	0.9	148
17	1	15	21	0.7	151
17	1	15	22	0.8	169
17	1	15	23	0.8	175
17	1	15	24	0.7	206
17	1	16	1	1.0	257
17	1	16	2	1.4	268
17	1	16	3	1.3	260
17	1	16	4	0.9	251
17	1	16	5	0.7	280
17	1	16	6	0.8	313
17	1	16	7	1.0	309
17	1	16	8	0.4	295
17	1	16	9	0.0	239
17	1	16	10	0.1	156
17	1	16	11	0.1	124
17	1	16	12	0.3	91
17	1	16	13	0.8	88
17	1	16	14	1.3	89
17	1	16	15	1.7	89
17	1	16	16	2.0	89
17	1	16	17	1.6	100
17	1	16	18	0.4	116
17	1	16	19	0.0	105
17	1	16	20	0.1	330
17	1	16	21	0.4	340
17	1	16	22	1.4	312
17	1	16	23	2.2	267
17	1	16	24	2.6	349
17	1	17	1	3.1	316
17	1	17	2	3.3	324
17	1	17	3	3.4	352
17	1	17	4	4.3	351
17	1	17	5	4.8	345
17	1	17	6	4.6	340
17	1	17	7	3.9	331
17	1	17	8	2.3	338
17	1	17	9	0.5	23
17	1	17	10	0.1	139
17	1	17	11	0.1	105
17	1	17	12	0.1	56
17	1	17	13	0.1	60
17	1	17	14	0.1	145
17	1	17	15	0.7	112
17	1	17	16	1.8	112
17	1	17	17	3.0	122
17	1	17	18	3.5	132
17	1	17	19	2.3	139
17	1	17	20	1.2	122
17	1	17	21	1.2	82
17	1	17	22	1.6	76
17	1	17	23	1.3	80
17	1	17	24	0.7	80
17	1	18	1	0.5	119
17	1	18	2	0.9	147
17	1	18	3	1.0	163
17	1	18	4	1.2	170
17	1	18	5	1.0	166
17	1	18	6	0.9	160
17	1	18	7	1.0	185
17	1	18	8	2.1	182
17	1	18	9	2.2	178
17	1	18	10	1.6	182
17	1	18	11	1.6	143
17	1	18	12	2.6	143
17	1	18	13	2.1	146
17	1	18	14	1.7	149
17	1	18	15	1.8	153
17	1	18	16	2.3	166
17	1	18	17	3.1	190
17	1	18	18	4.7	197

YEAR	MONTH	DAY	HOUR	WIND SPEED	WIND DIRECTION
17	1	18	19	5.2	191
17	1	18	20	4.9	174
17	1	18	21	4.2	161
17	1	18	22	3.0	165
17	1	18	23	3.6	179
17	1	18	24	2.9	180
17	1	19	1	2.0	201
17	1	19	2	2.1	220
17	1	19	3	2.5	215
17	1	19	4	2.7	209
17	1	19	5	2.9	208
17	1	19	6	2.7	207
17	1	19	7	2.6	204
17	1	19	8	3.3	181
17	1	19	9	2.9	171
17	1	19	10	2.6	168
17	1	19	11	2.3	170
17	1	19	12	2.3	167
17	1	19	13	2.2	160
17	1	19	14	1.8	151
17	1	19	15	1.6	144
17	1	19	16	1.7	137
17	1	19	17	2.1	139
17	1	19	18	2.1	147
17	1	19	19	1.7	164
17	1	19	20	2.1	175
17	1	19	21	2.7	184
17	1	19	22	3.6	192
17	1	19	23	4.8	198
17	1	19	24	4.7	194
17	1	20	1	4.9	192
17	1	20	2	4.7	195
17	1	20	3	4.7	201
17	1	20	4	4.7	205
17	1	20	5	4.4	210
17	1	20	6	3.8	209
17	1	20	7	3.3	200
17	1	20	8	3.8	186
17	1	20	9	3.0	183
17	1	20	10	2.1	181
17	1	20	11	1.2	178
17	1	20	12	0.9	159
17	1	20	13	0.9	138
17	1	20	14	0.9	118
17	1	20	15	1.3	90
17	1	20	16	2.1	72
17	1	20	17	2.7	68
17	1	20	18	2.6	59
17	1	20	19	1.8	35
17	1	20	20	1.2	358
17	1	20	21	1.0	324
17	1	20	22	1.2	285
17	1	20	23	0.4	297
17	1	20	24	0.1	316
17	1	21	1	0.3	296
17	1	21	2	0.1	323
17	1	21	3	0.0	291
17	1	21	4	0.1	104
17	1	21	5	0.7	158
17	1	21	6	0.8	182
17	1	21	7	1.2	198
17	1	21	8	2.5	176
17	1	21	9	2.0	159
17	1	21	10	1.7	141
17	1	21	11	1.3	124
17	1	21	12	1.6	101
17	1	21	13	1.7	84
17	1	21	14	2.2	71
17	1	21	15	3.1	64
17	1	21	16	3.9	61
17	1	21	17	3.5	62
17	1	21	18	4.9	69
17	1	21	19	4.9	78
17	1	21	20	4.0	75
17	1	21	21	3.4	64
17	1	21	22	2.6	59
17	1	21	23	1.4	47
17	1	21	24	0.7	28

METEOROLOGICAL DATA INPUTS FOR MODELLING

YEAR	MONTH	DAY	HOUR	WIND SPEED	WIND DIRECTION
17	1	22	1	0.4	12
17	1	22	2	0.1	47
17	1	22	3	0.5	111
17	1	22	4	0.8	110
17	1	22	5	0.8	129
17	1	22	6	0.8	142
17	1	22	7	0.9	150
17	1	22	8	2.6	151
17	1	22	9	2.9	148
17	1	22	10	2.9	149
17	1	22	11	2.6	151
17	1	22	12	2.2	147
17	1	22	13	1.7	135
17	1	22	14	1.4	120
17	1	22	15	1.7	108
17	1	22	16	2.2	101
17	1	22	17	2.5	101
17	1	22	18	3.5	107
17	1	22	19	5.2	115
17	1	22	20	4.3	112
17	1	22	21	3.1	109
17	1	22	22	2.1	113
17	1	22	23	0.9	150
17	1	22	24	1.2	169
17	1	23	1	1.8	175
17	1	23	2	2.3	181
17	1	23	3	2.6	185
17	1	23	4	2.6	190
17	1	23	5	2.6	193
17	1	23	6	2.7	189
17	1	23	7	2.7	190
17	1	23	8	3.9	172
17	1	23	9	4.6	168
17	1	23	10	4.4	172
17	1	23	11	3.9	174
17	1	23	12	3.6	172
17	1	23	13	3.3	169
17	1	23	14	2.7	167
17	1	23	15	2.6	164
17	1	23	16	2.6	166
17	1	23	17	2.9	178
17	1	23	18	2.7	193
17	1	23	19	2.3	206
17	1	23	20	1.4	208
17	1	23	21	0.8	165
17	1	23	22	1.3	143
17	1	23	23	1.6	149
17	1	23	24	1.6	155
17	1	24	1	2.1	161
17	1	24	2	2.6	164
17	1	24	3	2.7	168
17	1	24	4	2.6	169
17	1	24	5	2.6	166
17	1	24	6	2.6	164
17	1	24	7	2.3	164
17	1	24	8	4.4	147
17	1	24	9	4.8	147
17	1	24	10	4.4	145
17	1	24	11	4.0	140
17	1	24	12	3.4	138
17	1	24	13	3.0	132
17	1	24	14	3.0	126
17	1	24	15	3.1	120
17	1	24	16	3.8	116
17	1	24	17	3.5	118
17	1	24	18	4.8	116
17	1	24	19	5.7	111
17	1	24	20	5.1	105
17	1	24	21	4.3	103
17	1	24	22	3.5	105
17	1	24	23	2.5	106
17	1	24	24	1.7	108
17	1	25	1	1.6	116
17	1	25	2	1.4	124
17	1	25	3	1.6	133
17	1	25	4	1.8	140
17	1	25	5	2.0	144
17	1	25	6	2.2	148

YEAR	MONTH	DAY	HOUR	WIND SPEED	WIND DIRECTION
17	1	25	7	2.2	154
17	1	25	8	4.4	140
17	1	25	9	5.3	141
17	1	25	10	5.2	139
17	1	25	11	4.9	134
17	1	25	12	4.6	130
17	1	25	13	4.3	124
17	1	25	14	4.3	119
17	1	25	15	4.4	114
17	1	25	16	4.8	114
17	1	25	17	4.2	117
17	1	25	18	5.7	114
17	1	25	19	6.0	107
17	1	25	20	5.2	106
17	1	25	21	4.7	110
17	1	25	22	3.9	115
17	1	25	23	3.0	121
17	1	25	24	2.2	135
17	1	26	1	2.0	144
17	1	26	2	1.8	150
17	1	26	3	2.0	154
17	1	26	4	1.8	150
17	1	26	5	1.7	162
17	1	26	6	1.3	164
17	1	26	7	1.3	164
17	1	26	8	3.0	150
17	1	26	9	3.5	152
17	1	26	10	3.1	150
17	1	26	11	2.5	139
17	1	26	12	2.3	127
17	1	26	13	2.0	119
17	1	26	14	1.6	111
17	1	26	15	1.4	106
17	1	26	16	1.4	103
17	1	26	17	0.8	117
17	1	26	18	0.3	188
17	1	26	19	0.0	298
17	1	26	20	0.5	89
17	1	26	21	1.3	83
17	1	26	22	1.0	82
17	1	26	23	1.2	77
17	1	26	24	1.0	44
17	1	27	1	0.9	59
17	1	27	2	0.7	71
17	1	27	3	0.8	164
17	1	27	4	0.9	119
17	1	27	5	1.2	126
17	1	27	6	1.6	129
17	1	27	7	1.6	129
17	1	27	8	3.9	115
17	1	27	9	4.4	119
17	1	27	10	4.4	120
17	1	27	11	3.9	116
17	1	27	12	3.8	110
17	1	27	13	3.4	102
17	1	27	14	3.4	96
17	1	27	15	3.9	93
17	1	27	16	4.6	91
17	1	27	17	4.0	93
17	1	27	18	5.3	98
17	1	27	19	5.2	105
17	1	27	20	4.4	109
17	1	27	21	3.6	112
17	1	27	22	2.2	133
17	1	27	23	2.1	168
17	1	27	24	2.5	173
17	1	28	1	2.5	178
17	1	28	2	2.3	181
17	1	28	3	2.1	188
17	1	28	4	2.0	198
17	1	28	5	1.7	205
17	1	28	6	2.0	228
17	1	28	7	2.7	240
17	1	28	8	2.1	200
17	1	28	9	2.6	190
17	1	28	10	2.3	180
17	1	28	11	2.3	155
17	1	28	12	2.2	157

METEOROLOGICAL DATA INPUTS FOR MODELLING

YEAR	MONTH	DAY	HOUR	WIND SPEED	WIND DIRECTION
17	1	28	13	2.1	157
17	1	28	14	1.7	156
17	1	28	15	1.6	155
17	1	28	16	1.6	161
17	1	28	17	1.8	181
17	1	28	18	2.2	202
17	1	28	19	2.2	224
17	1	28	20	2.2	173
17	1	28	21	1.8	251
17	1	28	22	1.7	258
17	1	28	23	1.6	266
17	1	28	24	0.9	297
17	1	29	1	0.9	322
17	1	29	2	0.8	309
17	1	29	3	0.4	283
17	1	29	4	0.3	307
17	1	29	5	0.5	329
17	1	29	6	0.7	325
17	1	29	7	0.7	314
17	1	29	8	0.1	131
17	1	29	9	0.9	123
17	1	29	10	1.3	130
17	1	29	11	1.3	133
17	1	29	12	1.3	130
17	1	29	13	1.6	124
17	1	29	14	1.4	125
17	1	29	15	1.3	125
17	1	29	16	1.3	128
17	1	29	17	1.2	143
17	1	29	18	0.5	177
17	1	29	19	0.3	234
17	1	29	20	0.0	89
17	1	29	21	0.5	119
17	1	29	22	1.3	127
17	1	29	23	2.1	137
17	1	29	24	2.7	135
17	1	30	1	3.1	132
17	1	30	2	2.7	143
17	1	30	3	2.2	159
17	1	30	4	2.1	164
17	1	30	5	2.2	159
17	1	30	6	2.2	155
17	1	30	7	2.0	151
17	1	30	8	3.1	134
17	1	30	9	3.3	135
17	1	30	10	2.9	138
17	1	30	11	2.3	135
17	1	30	12	1.7	126
17	1	30	13	2.0	113
17	1	30	14	2.0	107
17	1	30	15	2.2	104
17	1	30	16	2.7	103
17	1	30	17	2.5	104
17	1	30	18	2.9	111
17	1	30	19	4.8	117
17	1	30	20	4.6	119
17	1	30	21	3.4	118
17	1	30	22	2.3	127
17	1	30	23	1.7	151
17	1	30	24	1.6	167
17	1	31	1	1.8	163
17	1	31	2	1.7	163
17	1	31	3	1.6	156
17	1	31	4	1.4	148
17	1	31	5	1.3	139
17	1	31	6	1.2	130
17	1	31	7	0.9	128
17	1	31	8	2.5	121
17	1	31	9	3.0	123
17	1	31	10	2.9	126
17	1	31	11	2.5	121
17	1	31	12	2.5	113
17	1	31	13	2.3	109
17	1	31	14	2.5	107
17	1	31	15	3.3	110
17	1	31	16	4.2	114
17	1	31	17	4.3	120
17	1	31	18	5.6	120

YEAR	MONTH	DAY	HOUR	WIND SPEED	WIND DIRECTION
17	1	31	19	5.2	117
17	1	31	20	4.2	116
17	1	31	21	2.9	125
17	1	31	22	2.0	148
17	1	31	23	1.4	174
17	1	31	24	1.8	191
17	2	1	1	2.1	191
17	2	1	2	1.8	194
17	2	1	3	1.3	197
17	2	1	4	1.0	209
17	2	1	5	0.8	238
17	2	1	6	1.0	268
17	2	1	7	0.9	293
17	2	1	8	0.1	152
17	2	1	9	0.9	124
17	2	1	10	2.1	115
17	2	1	11	2.9	105
17	2	1	12	2.9	92
17	2	1	13	2.9	87
17	2	1	14	3.3	89
17	2	1	15	3.6	90
17	2	1	16	4.3	90
17	2	1	17	3.6	92
17	2	1	18	4.6	95
17	2	1	19	5.1	106
17	2	1	20	4.6	118
17	2	1	21	2.7	125
17	2	1	22	0.8	183
17	2	1	23	0.7	208
17	2	1	24	0.3	135
17	2	2	1	0.7	123
17	2	2	2	0.7	145
17	2	2	3	0.9	148
17	2	2	4	0.8	155
17	2	2	5	0.8	167
17	2	2	6	0.8	184
17	2	2	7	0.8	231
17	2	2	8	1.4	185
17	2	2	9	1.6	155
17	2	2	10	1.8	144
17	2	2	11	1.7	130
17	2	2	12	1.6	113
17	2	2	13	1.3	100
17	2	2	14	1.7	91
17	2	2	15	2.1	87
17	2	2	16	2.6	83
17	2	2	17	2.5	84
17	2	2	18	2.7	93
17	2	2	19	4.7	109
17	2	2	20	4.7	116
17	2	2	21	2.9	119
17	2	2	22	1.2	155
17	2	2	23	0.8	175
17	2	2	24	1.0	211
17	2	3	1	1.3	223
17	2	3	2	1.6	181
17	2	3	3	1.8	168
17	2	3	4	2.0	167
17	2	3	5	1.8	172
17	2	3	6	1.4	176
17	2	3	7	1.0	180
17	2	3	8	1.8	153
17	2	3	9	2.2	130
17	2	3	10	2.5	121
17	2	3	11	2.7	108
17	2	3	12	2.9	98
17	2	3	13	2.7	91
17	2	3	14	3.3	91
17	2	3	15	3.8	95
17	2	3	16	4.6	100
17	2	3	17	4.3	109
17	2	3	18	5.7	115
17	2	3	19	5.2	118
17	2	3	20	4.4	119
17	2	3	21	3.6	125
17	2	3	22	2.7	144
17	2	3	23	2.1	172
17	2	3	24	2.3	182

METEOROLOGICAL DATA INPUTS FOR MODELLING

YEAR	MONTH	DAY	HOUR	WIND SPEED	WIND DIRECTION
17	2	4	1	2.3	181
17	2	4	2	2.1	172
17	2	4	3	1.7	172
17	2	4	4	1.4	176
17	2	4	5	0.8	194
17	2	4	6	0.4	261
17	2	4	7	0.7	306
17	2	4	8	0.0	213
17	2	4	9	0.4	135
17	2	4	10	0.7	125
17	2	4	11	0.8	110
17	2	4	12	0.9	100
17	2	4	13	1.2	87
17	2	4	14	1.6	78
17	2	4	15	2.0	73
17	2	4	16	2.5	69
17	2	4	17	2.2	74
17	2	4	18	1.2	65
17	2	4	19	0.1	354
17	2	4	20	0.9	152
17	2	4	21	2.0	151
17	2	4	22	2.6	154
17	2	4	23	2.6	158
17	2	4	24	2.9	191
17	2	5	1	3.4	199
17	2	5	2	3.3	190
17	2	5	3	2.5	171
17	2	5	4	1.6	150
17	2	5	5	0.9	99
17	2	5	6	0.9	71
17	2	5	7	1.0	59
17	2	5	8	2.2	99
17	2	5	9	2.5	117
17	2	5	10	2.5	130
17	2	5	11	2.3	128
17	2	5	12	2.6	119
17	2	5	13	2.3	108
17	2	5	14	2.5	100
17	2	5	15	2.6	97
17	2	5	16	3.0	95
17	2	5	17	3.3	103
17	2	5	18	5.1	111
17	2	5	19	5.5	112
17	2	5	20	4.3	104
17	2	5	21	3.8	96
17	2	5	22	3.1	94
17	2	5	23	2.0	87
17	2	5	24	1.3	91
17	2	6	1	1.8	97
17	2	6	2	2.1	103
17	2	6	3	2.2	107
17	2	6	4	2.2	109
17	2	6	5	2.3	106
17	2	6	6	2.2	102
17	2	6	7	2.0	105
17	2	6	8	4.0	109
17	2	6	9	3.8	115
17	2	6	10	3.1	118
17	2	6	11	2.7	115
17	2	6	12	2.6	111
17	2	6	13	2.5	105
17	2	6	14	2.2	99
17	2	6	15	2.3	94
17	2	6	16	2.5	89
17	2	6	17	2.3	81
17	2	6	18	2.2	66
17	2	6	19	3.0	64
17	2	6	20	3.5	73
17	2	6	21	3.5	75
17	2	6	22	3.1	67
17	2	6	23	2.7	55
17	2	6	24	2.2	36
17	2	7	1	2.0	26
17	2	7	2	1.4	39
17	2	7	3	0.8	84
17	2	7	4	0.7	128
17	2	7	5	0.7	137
17	2	7	6	0.7	125

YEAR	MONTH	DAY	HOUR	WIND SPEED	WIND DIRECTION
17	2	7	7	0.3	104
17	2	7	8	1.4	113
17	2	7	9	1.7	120
17	2	7	10	1.7	126
17	2	7	11	1.2	118
17	2	7	12	1.2	106
17	2	7	13	1.3	105
17	2	7	14	1.3	107
17	2	7	15	1.6	114
17	2	7	16	2.0	123
17	2	7	17	2.1	139
17	2	7	18	1.8	158
17	2	7	19	1.3	166
17	2	7	20	2.1	139
17	2	7	21	3.0	132
17	2	7	22	3.0	129
17	2	7	23	3.1	124
17	2	7	24	2.7	136
17	2	8	1	2.9	155
17	2	8	2	3.0	163
17	2	8	3	2.9	159
17	2	8	4	2.2	143
17	2	8	5	1.7	109
17	2	8	6	2.0	77
17	2	8	7	2.0	67
17	2	8	8	2.9	88
17	2	8	9	3.9	112
17	2	8	10	3.6	114
17	2	8	11	2.7	115
17	2	8	12	2.9	109
17	2	8	13	2.9	102
17	2	8	14	3.0	93
17	2	8	15	3.3	84
17	2	8	16	3.6	75
17	2	8	17	3.5	70
17	2	8	18	4.0	64
17	2	8	19	5.1	76
17	2	8	20	4.8	89
17	2	8	21	3.8	82
17	2	8	22	2.9	73
17	2	8	23	1.7	52
17	2	8	24	0.7	22
17	2	9	1	0.3	91
17	2	9	2	0.9	115
17	2	9	3	0.8	128
17	2	9	4	0.1	84
17	2	9	5	0.8	333
17	2	9	6	1.6	332
17	2	9	7	2.0	334
17	2	9	8	0.5	28
17	2	9	9	0.3	100
17	2	9	10	0.4	109
17	2	9	11	0.4	114
17	2	9	12	1.2	110
17	2	9	13	0.9	104
17	2	9	14	0.7	87
17	2	9	15	1.2	69
17	2	9	16	2.0	56
17	2	9	17	2.6	48
17	2	9	18	3.4	44
17	2	9	19	4.6	50
17	2	9	20	4.9	55
17	2	9	21	4.4	46
17	2	9	22	4.4	26
17	2	9	23	4.6	18
17	2	9	24	4.3	12
17	2	10	1	3.8	360
17	2	10	2	3.3	356
17	2	10	3	3.1	356
17	2	10	4	3.4	354
17	2	10	5	1.3	354
17	2	10	6	1.4	345
17	2	10	7	1.6	345
17	2	10	8	1.6	49
17	2	10	9	2.1	85
17	2	10	10	2.6	97
17	2	10	11	2.6	102
17	2	10	12	2.2	100

METEOROLOGICAL DATA INPUTS FOR MODELLING

YEAR	MONTH	DAY	HOURL	WIND SPEED	WIND DIRECTION
17	2	10	13	2.1	97
17	2	10	14	2.1	95
17	2	10	15	2.1	96
17	2	10	16	2.2	99
17	2	10	17	1.7	111
17	2	10	18	0.9	125
17	2	10	19	0.7	129
17	2	10	20	1.4	121
17	2	10	21	1.0	131
17	2	10	22	0.3	196
17	2	10	23	0.7	196
17	2	10	24	0.8	204
17	2	11	1	1.2	181
17	2	11	2	1.8	158
17	2	11	3	1.7	145
17	2	11	4	1.2	160
17	2	11	5	0.9	163
17	2	11	6	0.7	149
17	2	11	7	0.1	106
17	2	11	8	0.9	140
17	2	11	9	1.6	143
17	2	11	10	1.8	129
17	2	11	11	2.7	120
17	2	11	12	3.0	116
17	2	11	13	3.1	110
17	2	11	14	3.3	105
17	2	11	15	3.5	103
17	2	11	16	3.5	99
17	2	11	17	3.5	104
17	2	11	18	4.6	107
17	2	11	19	5.5	108
17	2	11	20	4.6	103
17	2	11	21	3.4	92
17	2	11	22	2.3	91
17	2	11	23	1.7	101
17	2	11	24	0.5	155
17	2	12	1	0.8	170
17	2	12	2	1.0	160
17	2	12	3	1.2	171
17	2	12	4	1.0	172
17	2	12	5	0.9	164
17	2	12	6	0.8	168
17	2	12	7	0.7	198
17	2	12	8	1.3	172
17	2	12	9	0.3	139
17	2	12	10	0.1	125
17	2	12	11	0.4	105
17	2	12	12	0.5	88
17	2	12	13	0.5	69
17	2	12	14	0.9	52
17	2	12	15	1.8	34
17	2	12	16	3.0	256
17	2	12	17	3.4	355
17	2	12	18	4.2	354
17	2	12	19	4.2	357
17	2	12	20	3.5	355
17	2	12	21	3.0	360
17	2	12	22	2.3	357
17	2	12	23	1.0	343
17	2	12	24	0.7	338
17	2	13	1	0.9	308
17	2	13	2	1.7	294
17	2	13	3	2.0	299
17	2	13	4	1.4	304
17	2	13	5	0.8	307
17	2	13	6	0.1	312
17	2	13	7	0.1	313
17	2	13	8	0.0	47
17	2	13	9	0.0	43
17	2	13	10	0.1	102
17	2	13	11	0.8	99
17	2	13	12	1.4	107
17	2	13	13	1.7	111
17	2	13	14	2.0	105
17	2	13	15	1.7	109
17	2	13	16	1.8	119
17	2	13	17	2.3	127
17	2	13	18	2.7	135

YEAR	MONTH	DAY	HOURL	WIND SPEED	WIND DIRECTION
17	2	13	19	3.5	131
17	2	13	20	5.1	119
17	2	13	21	5.1	115
17	2	13	22	4.7	119
17	2	13	23	4.7	132
17	2	13	24	4.8	141
17	2	14	1	4.4	143
17	2	14	2	4.8	145
17	2	14	3	5.2	145
17	2	14	4	5.9	142
17	2	14	5	5.7	141
17	2	14	6	5.2	140
17	2	14	7	4.9	144
17	2	14	8	5.5	150
17	2	14	9	5.6	155
17	2	14	10	5.2	159
17	2	14	11	4.9	159
17	2	14	12	4.7	161
17	2	14	13	4.2	165
17	2	14	14	3.6	168
17	2	14	15	3.1	168
17	2	14	16	2.9	167
17	2	14	17	2.5	170
17	2	14	18	2.1	179
17	2	14	19	1.4	179
17	2	14	20	1.0	155
17	2	14	21	2.1	143
17	2	14	22	3.1	138
17	2	14	23	3.3	148
17	2	14	24	3.6	158
17	2	15	1	4.3	172
17	2	15	2	4.7	178
17	2	15	3	4.3	177
17	2	15	4	4.0	173
17	2	15	5	3.1	163
17	2	15	6	3.0	156
17	2	15	7	2.9	164
17	2	15	8	4.8	177
17	2	15	9	4.7	196
17	2	15	10	3.8	197
17	2	15	11	2.9	191
17	2	15	12	2.2	177
17	2	15	13	2.1	165
17	2	15	14	2.2	158
17	2	15	15	2.9	151
17	2	15	16	3.4	149
17	2	15	17	3.6	147
17	2	15	18	4.3	146
17	2	15	19	4.3	137
17	2	15	20	4.3	129
17	2	15	21	4.2	139
17	2	15	22	4.3	154
17	2	15	23	4.0	173
17	2	15	24	4.0	176
17	2	16	1	4.3	176
17	2	16	2	4.2	179
17	2	16	3	4.0	180
17	2	16	4	4.0	178
17	2	16	5	4.0	173
17	2	16	6	3.9	173
17	2	16	7	4.2	173
17	2	16	8	4.9	179
17	2	16	9	5.1	206
17	2	16	10	4.3	215
17	2	16	11	3.9	224
17	2	16	12	3.0	238
17	2	16	13	2.5	240
17	2	16	14	1.7	251
17	2	16	15	0.9	289
17	2	16	16	2.1	315
17	2	16	17	1.3	326
17	2	16	18	0.4	211
17	2	16	19	1.6	237
17	2	16	20	2.7	264
17	2	16	21	2.3	287
17	2	16	22	1.0	317
17	2	16	23	0.5	326
17	2	16	24	0.1	320

METEOROLOGICAL DATA INPUTS FOR MODELLING

YEAR	MONTH	DAY	HOUR	WIND SPEED	WIND DIRECTION
17	2	17	1	0.3	269
17	2	17	2	0.3	251
17	2	17	3	0.1	233
17	2	17	4	0.1	228
17	2	17	5	0.7	207
17	2	17	6	0.7	201
17	2	17	7	0.5	210
17	2	17	8	2.0	182
17	2	17	9	1.3	170
17	2	17	10	0.5	144
17	2	17	11	0.5	128
17	2	17	12	0.3	83
17	2	17	13	0.3	80
17	2	17	14	0.0	237
17	2	17	15	0.0	92
17	2	17	16	0.8	312
17	2	17	17	1.4	318
17	2	17	18	1.6	327
17	2	17	19	1.7	325
17	2	17	20	1.4	315
17	2	17	21	0.9	297
17	2	17	22	0.3	275
17	2	17	23	0.1	141
17	2	17	24	0.0	205
17	2	18	1	0.5	180
17	2	18	2	3.1	181
17	2	18	3	4.3	190
17	2	18	4	4.3	186
17	2	18	5	4.0	184
17	2	18	6	3.8	182
17	2	18	7	3.8	183
17	2	18	8	4.3	185
17	2	18	9	4.0	188
17	2	18	10	3.5	191
17	2	18	11	3.1	192
17	2	18	12	3.3	188
17	2	18	13	3.3	181
17	2	18	14	3.3	173
17	2	18	15	3.4	166
17	2	18	16	3.8	159
17	2	18	17	4.0	149
17	2	18	18	4.4	146
17	2	18	19	3.4	149
17	2	18	20	2.3	153
17	2	18	21	1.7	163
17	2	18	22	2.5	154
17	2	18	23	3.5	161
17	2	18	24	3.9	180
17	2	19	1	4.3	180
17	2	19	2	4.8	172
17	2	19	3	5.1	172
17	2	19	4	4.9	173
17	2	19	5	4.4	178
17	2	19	6	3.9	188
17	2	19	7	3.6	189
17	2	19	8	4.8	177
17	2	19	9	4.9	176
17	2	19	10	4.7	173
17	2	19	11	4.6	169
17	2	19	12	4.4	166
17	2	19	13	4.3	163
17	2	19	14	4.3	162
17	2	19	15	4.3	159
17	2	19	16	4.6	156
17	2	19	17	3.9	149
17	2	19	18	4.8	144
17	2	19	19	5.3	139
17	2	19	20	5.1	132
17	2	19	21	4.9	119
17	2	19	22	4.8	113
17	2	19	23	4.4	124
17	2	19	24	4.6	129
17	2	20	1	4.2	130
17	2	20	2	3.6	135
17	2	20	3	3.6	134
17	2	20	4	3.4	136
17	2	20	5	2.3	149
17	2	20	6	2.5	152

YEAR	MONTH	DAY	HOUR	WIND SPEED	WIND DIRECTION
17	2	20	7	2.6	154
17	2	20	8	3.8	144
17	2	20	9	3.5	142
17	2	20	10	3.4	153
17	2	20	11	3.5	169
17	2	20	12	3.6	183
17	2	20	13	2.6	183
17	2	20	14	3.6	190
17	2	20	15	3.9	205
17	2	20	16	4.3	241
17	2	20	17	3.9	270
17	2	20	18	3.8	284
17	2	20	19	4.3	298
17	2	20	20	3.9	311
17	2	20	21	2.6	321
17	2	20	22	0.3	189
17	2	20	23	1.2	111
17	2	20	24	2.2	123
17	2	21	1	2.5	133
17	2	21	2	3.1	138
17	2	21	3	3.4	139
17	2	21	4	3.9	141
17	2	21	5	3.4	143
17	2	21	6	2.2	142
17	2	21	7	1.3	139
17	2	21	8	2.0	152
17	2	21	9	1.2	163
17	2	21	10	0.1	193
17	2	21	11	0.1	40
17	2	21	12	0.1	25
17	2	21	13	0.5	60
17	2	21	14	0.7	69
17	2	21	15	0.8	52
17	2	21	16	1.7	36
17	2	21	17	2.3	29
17	2	21	18	3.3	27
17	2	21	19	3.9	38
17	2	21	20	4.8	72
17	2	21	21	4.3	82
17	2	21	22	3.9	82
17	2	21	23	3.5	91
17	2	21	24	2.9	106
17	2	22	1	2.1	124
17	2	22	2	1.4	113
17	2	22	3	1.4	97
17	2	22	4	1.8	77
17	2	22	5	2.2	76
17	2	22	6	2.6	72
17	2	22	7	2.6	64
17	2	22	8	4.3	83
17	2	22	9	4.3	86
17	2	22	10	3.6	85
17	2	22	11	3.5	83
17	2	22	12	3.5	81
17	2	22	13	3.5	72
17	2	22	14	3.6	65
17	2	22	15	4.3	61
17	2	22	16	4.8	59
17	2	22	17	4.2	60
17	2	22	18	4.9	58
17	2	22	19	5.2	67
17	2	22	20	5.1	80
17	2	22	21	4.6	88
17	2	22	22	4.0	86
17	2	22	23	3.8	89
17	2	22	24	3.3	97
17	2	23	1	2.9	103
17	2	23	2	2.3	117
17	2	23	3	1.8	137
17	2	23	4	1.4	139
17	2	23	5	0.9	135
17	2	23	6	0.8	97
17	2	23	7	0.8	51
17	2	23	8	2.1	82
17	2	23	9	2.1	92
17	2	23	10	2.2	90
17	2	23	11	2.7	89
17	2	23	12	2.6	85

METEOROLOGICAL DATA INPUTS FOR MODELLING

YEAR	MONTH	DAY	HOURL	WIND SPEED	WIND DIRECTION
17	2	23	13	2.2	85
17	2	23	14	2.0	91
17	2	23	15	2.0	102
17	2	23	16	2.0	116
17	2	23	17	2.5	135
17	2	23	18	3.5	129
17	2	23	19	4.3	111
17	2	23	20	4.3	117
17	2	23	21	3.3	133
17	2	23	22	2.0	144
17	2	23	23	0.8	145
17	2	23	24	0.4	156
17	2	24	1	0.5	157
17	2	24	2	0.9	161
17	2	24	3	0.9	163
17	2	24	4	0.8	163
17	2	24	5	0.7	168
17	2	24	6	0.1	274
17	2	24	7	0.4	333
17	2	24	8	0.4	83
17	2	24	9	0.9	70
17	2	24	10	1.6	60
17	2	24	11	1.8	59
17	2	24	12	2.0	62
17	2	24	13	1.8	68
17	2	24	14	1.7	72
17	2	24	15	2.0	75
17	2	24	16	2.3	76
17	2	24	17	2.5	82
17	2	24	18	3.1	97
17	2	24	19	5.1	112
17	2	24	20	5.1	114
17	2	24	21	4.0	106
17	2	24	22	4.0	104
17	2	24	23	3.5	108
17	2	24	24	2.7	120
17	2	25	1	2.5	150
17	2	25	2	2.9	172
17	2	25	3	3.1	178
17	2	25	4	3.0	180
17	2	25	5	3.1	165
17	2	25	6	3.0	165
17	2	25	7	3.0	168
17	2	25	8	3.8	159
17	2	25	9	3.0	162
17	2	25	10	3.0	168
17	2	25	11	2.6	164
17	2	25	12	1.8	157
17	2	25	13	1.6	155
17	2	25	14	1.4	156
17	2	25	15	1.6	159
17	2	25	16	1.7	159
17	2	25	17	2.5	164
17	2	25	18	3.1	166
17	2	25	19	3.3	168
17	2	25	20	2.6	166
17	2	25	21	2.3	161
17	2	25	22	2.5	153
17	2	25	23	3.1	146
17	2	25	24	2.9	159
17	2	26	1	3.0	179
17	2	26	2	3.1	179
17	2	26	3	2.9	175
17	2	26	4	2.3	174
17	2	26	5	1.8	177
17	2	26	6	1.6	180
17	2	26	7	1.3	184
17	2	26	8	2.6	159
17	2	26	9	1.8	147
17	2	26	10	1.0	132
17	2	26	11	0.4	96
17	2	26	12	0.4	71
17	2	26	13	0.7	76
17	2	26	14	1.0	81
17	2	26	15	0.9	83
17	2	26	16	1.2	87
17	2	26	17	0.9	89
17	2	26	18	1.3	71

YEAR	MONTH	DAY	HOURL	WIND SPEED	WIND DIRECTION
17	2	26	19	4.4	63
17	2	26	20	4.3	64
17	2	26	21	4.3	95
17	2	26	22	4.2	143
17	2	26	23	3.9	142
17	2	26	24	4.6	139
17	2	27	1	4.6	150
17	2	27	2	4.4	167
17	2	27	3	4.4	176
17	2	27	4	4.0	180
17	2	27	5	3.9	172
17	2	27	6	3.6	164
17	2	27	7	4.0	162
17	2	27	8	4.7	165
17	2	27	9	5.1	166
17	2	27	10	4.7	162
17	2	27	11	3.9	161
17	2	27	12	3.4	159
17	2	27	13	2.9	164
17	2	27	14	2.6	168
17	2	27	15	2.6	169
17	2	27	16	2.7	164
17	2	27	17	2.9	136
17	2	27	18	4.4	116
17	2	27	19	5.6	111
17	2	27	20	4.9	110
17	2	27	21	4.4	106
17	2	27	22	4.3	109
17	2	27	23	4.4	126
17	2	27	24	4.0	140
17	2	28	1	3.4	153
17	2	28	2	3.1	169
17	2	28	3	3.3	178
17	2	28	4	3.1	181
17	2	28	5	2.6	190
17	2	28	6	2.3	203
17	2	28	7	2.5	191
17	2	28	8	2.3	180
17	2	28	9	2.2	171
17	2	28	10	1.7	153
17	2	28	11	1.4	139
17	2	28	12	1.0	135
17	2	28	13	1.3	127
17	2	28	14	1.6	110
17	2	28	15	1.3	97
17	2	28	16	2.0	106
17	2	28	17	3.6	109
17	2	28	18	4.8	96
17	2	28	19	4.3	89
17	2	28	20	3.9	84
17	2	28	21	4.3	77
17	2	28	22	3.8	71
17	2	28	23	4.0	82
17	2	28	24	3.8	88

PREDICTED HIGH 50 24-HOURLY AVERAGE CUMULATIVE INCREMENTAL GROUNDLEVEL CONCENTRATIONS OF PARTICULATE MATTER (PM10) DUE TO EXPANSION OF CEMENT PLANT AND CAPTIVE LIMESTONE MINE
CLINKER: 1.5 to 4.0 Million Tonnes per Annum
CEMENT: 2.0 to 4.6 Million Tonnes per Annum &
LIMESTONE ; 2.3 TO 5.3 MTPA Million Tonnes per Annum

RANK	CONC	ON	AT	RECEPTOR (XR,YR) OF (m,m) UTM coordinates	TYPE	RANK	CONC	ON	AT	RECEPTOR (XR,YR) OF (m,m) UTM coordinates	TYPE
	µg/m3						µg/m3				
1	18.01928b	17021224	AT	(171755.48, 1670771.55)	GP	26	2.38077	17022324	AT	(169295.75, 1671389.63)	GP
2	5.26815c	17022424	AT	(171322.47, 1671021.55)	GP	27	2.33439c	16121824	AT	(170235.44, 1671047.61)	GP
3	3.72105b	17021224	AT	(171322.47, 1671021.55)	GP	28	2.30784b	17020124	AT	(173304.52, 1669588.54)	GP
4	3.48212c	17021124	AT	(171322.47, 1671021.55)	GP	29	2.27016b	17020124	AT	(173437.54, 1669700.16)	GP
5	3.29290c	17022424	AT	(170889.46, 1671271.55)	GP	30	2.26495b	17021224	AT	(170889.46, 1671271.55)	GP
6	3.24463	17020224	AT	(171322.47, 1671021.55)	GP	31	2.25939b	17021724	AT	(173225.53, 1669551.70)	GP
7	3.15589b	17021724	AT	(173437.54, 1669700.16)	GP	32	2.24445b	17021724	AT	(173554.52, 1670021.55)	GP
8	3.08334b	17021724	AT	(173487.53, 1669771.55)	GP	33	2.23408b	17020124	AT	(173487.53, 1669771.55)	GP
9	2.94462b	17011624	AT	(174661.49, 1668106.44)	GP	34	2.22568b	17010524	AT	(175352.65, 1668093.19)	GP
10	2.90996b	17021724	AT	(173375.91, 1669638.53)	GP	35	2.22197	17021024	AT	(173304.52, 1669588.54)	GP
11	2.88692	17011824	AT	(171755.48, 1670771.55)	GP	36	2.18338	17011824	AT	(171322.47, 1671021.55)	GP
12	2.84567b	17021724	AT	(173524.37, 1669850.54)	GP	37	2.17838b	17021724	AT	(173920.55, 1669521.55)	GP
13	2.80146b	17010524	AT	(174304.52, 1667856.49)	GP	38	2.13842	17011524	AT	(172733.13, 1670404.57)	GP
14	2.75122	17020224	AT	(171755.48, 1670771.55)	GP	39	2.11660b	17021724	AT	(173994.21, 1669679.53)	GP
15	2.63467c	17021124	AT	(170889.46, 1671271.55)	GP	40	2.10696b	17020124	AT	(172883.51, 1669551.70)	GP
16	2.62873	16121224	AT	(170235.44, 1671047.61)	GP	41	2.10291c	16120224	AT	(175804.52, 1665258.41)	GP
17	2.62465	16121124	AT	(172967.70, 1669529.15)	GP	42	2.09654c	17022424	AT	(171755.48, 1670771.55)	GP
18	2.59849b	17021724	AT	(173304.52, 1669588.54)	GP	43	2.07781	17020224	AT	(170889.46, 1671271.55)	GP
19	2.55211	16121124	AT	(172883.51, 1669551.70)	GP	44	2.07487b	17020124	AT	(172804.52, 1669588.54)	GP
20	2.51459	17021024	AT	(173225.53, 1669551.70)	GP	45	2.068	16121124	AT	(172804.52, 1669588.54)	GP
21	2.51349b	17021724	AT	(173697.31, 1669255.51)	GP	46	2.06623b	17021224	AT	(172188.49, 1670521.55)	GP
22	2.49732	17021024	AT	(173141.34, 1669529.15)	GP	47	2.04830b	17011624	AT	(175652.60, 1668521.55)	GP
23	2.42492b	17020124	AT	(173375.91, 1669638.53)	GP	48	2.04169b	17011624	AT	(174969.63, 1668414.58)	GP
24	2.42017b	17021724	AT	(173546.92, 1669934.73)	GP	49	2.02661b	17021724	AT	(173546.92, 1670108.37)	GP
25	2.38520b	17021724	AT	(173820.56, 1669378.76)	GP	50	2.02632c	16121824	AT	(169295.75, 1671389.63)	GP

ANNEXURE - 4 B (Contd)

PREDICTED HIGH 50 24-HOURLY AVERAGE CUMULATIVE INCREMENTAL GROUNDLEVEL CONCENTRATIONS OF PARTICULATE MATTER (PM2.5) DUE TO EXPANSION OF CEMENT PLANT AND CAPTIVE LIMESTONE MINE CLINKER: 1.5 to 4.0 Million Tonnes per Annum CEMENT: 2.0 to 4.6 Million Tonnes per Annum & LIMESTONE ; 2.3 TO 5.3 MTPA Million Tonnes per Annum

RANK	CONC	ON	AT	RECEPTOR (XR, YR) OF (m,m) UTM coordinates	TYPE	RANK	CONC	ON	AT	RECEPTOR (XR, YR) OF (m,m) UTM coordinates	TYPE
	µg/m3						µg/m3				
1	2.40580b	17021224	AT	(171755.48, 1670771.55)	GP	26	0.7544	17021024	AT	(173225.53, 1669551.70)	GP
2	1.58064c	17022424	AT	(171322.47, 1671021.55)	GP	27	0.75407b	17021724	AT	(173697.31, 1669255.51)	GP
3	1.29623b	17010524	AT	(174554.52, 1672619.63)	GP	28	0.74921	17021024	AT	(173141.34, 1669529.15)	GP
4	1.19601b	16120424	AT	(174304.52, 1672186.61)	GP	29	0.73828b	17011624	AT	(174554.52, 1672619.63)	GP
5	1.16439b	17020424	AT	(174554.52, 1672619.63)	GP	30	0.72749b	17020124	AT	(173375.91, 1669638.53)	GP
6	1.11633b	17021224	AT	(171322.47, 1671021.55)	GP	31	0.72684c	16121824	AT	(170235.44, 1671047.61)	GP
7	1.04465c	17021124	AT	(171322.47, 1671021.55)	GP	32	0.72608b	17021724	AT	(173546.92, 1669934.73)	GP
8	0.98814c	17022424	AT	(170889.46, 1671271.55)	GP	33	0.71926	17010724	AT	(173909.57, 1672370.78)	GP
9	0.9734	17020224	AT	(171322.47, 1671021.55)	GP	34	0.71558b	17021724	AT	(173820.56, 1669378.76)	GP
10	0.94679b	17021724	AT	(173437.54, 1669700.16)	GP	35	0.71427	17022324	AT	(169295.75, 1671389.63)	GP
11	0.92503b	17021724	AT	(173487.53, 1669771.55)	GP	36	0.69237b	17020124	AT	(173304.52, 1669588.54)	GP
12	0.90344b	17011024	AT	(174304.52, 1672186.61)	GP	37	0.68606c	17010824	AT	(173909.57, 1672370.78)	GP
13	0.88622b	17011024	AT	(173909.57, 1672370.78)	GP	38	0.68503c	17012224	AT	(174080.58, 1672840.63)	GP
14	0.88376b	17011624	AT	(174661.49, 1668106.44)	GP	39	0.68194	16121124	AT	(174554.52, 1672619.63)	GP
15	0.87301b	17021724	AT	(173375.91, 1669638.53)	GP	40	0.68106b	17020124	AT	(173437.54, 1669700.16)	GP
16	0.867	16121924	AT	(173909.57, 1672370.78)	GP	41	0.67950b	17021224	AT	(170889.46, 1671271.55)	GP
17	0.86608	17011824	AT	(171755.48, 1670771.55)	GP	42	0.67784b	17021724	AT	(173225.53, 1669551.70)	GP
18	0.85373b	17021724	AT	(173524.37, 1669850.54)	GP	43	0.67636c	16121824	AT	(174080.58, 1672840.63)	GP
19	0.84044b	17010524	AT	(174304.52, 1672619.63)	GP	44	0.67337b	17021724	AT	(173554.52, 1670021.55)	GP
20	0.82538	17020224	AT	(171755.48, 1670771.55)	GP	45	0.67305c	16122724	AT	(173909.57, 1672370.78)	GP
21	0.79042c	17021124	AT	(170889.46, 1671271.55)	GP	46	0.67024b	17020124	AT	(173487.53, 1669771.55)	GP
22	0.78862	16121224	AT	(170235.44, 1671047.61)	GP	47	0.66771b	17010524	AT	(173552.65, 1668093.19)	GP
23	0.7874	16121124	AT	(172967.70, 1669529.15)	GP	48	0.66662	17021024	AT	(173304.52, 1669588.54)	GP
24	0.77957b	17021724	AT	(173304.52, 1669588.54)	GP	49	0.66369	16120824	AT	(174080.58, 1672840.63)	GP
25	0.76564	16121124	AT	(172883.51, 1669551.70)	GP	50	0.65502	17011824	AT	(171322.47, 1671021.55)	GP

ANNEXURE - 4 B(Contd)

PREDICTED HIGH 50 24-HOURLY AVERAGE CUMULATIVE INCREMENTAL GROUNDLEVEL CONCENTRATIONS OF SULPHUR DIOXIDE (SO₂) DUE TO EXPANSION OF CEMENT PLANT AND CAPTIVE LIMESTONE MINE CLINKER: 1.5 to 4.0 Million Tonnes per Annum CEMENT: 2.0 to 4.6 Million Tonnes per Annum & LIMESTONE ; 2.3 TO 5.3 MTPA Million Tonnes per Annum

RANK	CONC	AT	RECEPTOR (XR,YR) OF	TYPE	RANK	CONC	ON	AT	RECEPTOR (XR,YR) OF	TYPE
	ug/m3	ON	(m,m) UTM coordinates			ug/m3			(m,m) UTM coordinates	
1	1.91560b	17021224AT	(170831.39, 1676129.55)	GP	26	0.9581	16121224AT		(168841.28, 1673556.88)	GP
2	1.81244b	17021224AT	(170660.38, 1676599.40)	GP	27	0.95618	17013024AT		(169990.34, 1672592.70)	GP
3	1.73244b	17021224AT	(171002.40, 1675659.71)	GP	28	0.95244	17013024AT		(169197.79, 1674617.82)	GP
4	1.69957b	17021224AT	(170489.37, 1677069.24)	GP	29	0.95122	17013124AT		(169804.52, 1675650.72)	GP
5	1.57287b	17021224AT	(170318.36, 1677539.09)	GP	30	0.93861	17020324AT		(170304.52, 1674784.69)	GP
6	1.46016b	17021224AT	(170147.35, 1678008.94)	GP	31	0.93631b	17020424AT		(170554.52, 1674351.68)	GP
7	1.44973	17012324AT	(173054.52, 1673521.55)	GP	32	0.92511	17010424AT		(168841.28, 1673556.88)	GP
8	1.44638	17012324AT	(173054.52, 1673021.55)	GP	33	0.92372c	17022424AT		(169554.52, 1676083.73)	GP
9	1.33472b	17021224AT	(169976.34, 1678478.78)	GP	34	0.91908	17013124AT		(169554.52, 1676083.73)	GP
10	1.26176b	17021224AT	(171173.41, 1675189.86)	GP	35	0.91544b	17021224AT		(171344.42, 1674720.01)	GP
11	1.20697b	17021224AT	(169805.33, 1678948.63)	GP	36	0.91211c	17021124AT		(169054.52, 1676949.75)	GP
12	1.11641	17012324AT	(173054.52, 1674021.55)	GP	37	0.91066c	17022424AT		(168554.52, 1677815.78)	GP
13	1.11598c	17022424AT	(168804.52, 1677382.77)	GP	38	0.90386	17021824AT		(169224.30, 1673235.49)	GP
14	1.10574	17012324AT	(173054.52, 1672521.55)	GP	39	0.90058	17020324AT		(170804.52, 1673918.66)	GP
15	1.10013c	17022424AT	(169054.52, 1676949.75)	GP	40	0.89446c	17021124AT		(169304.52, 1676516.74)	GP
16	1.07419b	17021224AT	(169634.32, 1679418.48)	GP	41	0.89153c	17021124AT		(168804.52, 1677382.77)	GP
17	1.07072	16121224AT	(168458.25, 1673878.28)	GP	42	0.88674	17022624AT		(172099.46, 1675437.99)	GP
18	1.06897	17022624AT	(172186.28, 1674945.59)	GP	43	0.88515	17012324AT		(173054.52, 1674521.55)	GP
19	1.02664	17013024AT	(169519.19, 1674234.79)	GP	44	0.87721	17013124AT		(170054.52, 1675217.70)	GP
20	1.01759c	17022424AT	(169304.52, 1676516.74)	GP	45	0.86896b	17020424AT		(170054.52, 1675217.70)	GP
21	0.98728	17020324AT	(170554.52, 1674351.68)	GP	46	0.86477b	17021224AT		(169292.30, 1680358.17)	GP
22	0.98176	17013024AT	(169840.58, 1673851.77)	GP	47	0.86436	17021824AT		(169607.32, 1672914.09)	GP
23	0.96728b	17020424AT	(170304.52, 1674784.69)	GP	48	0.85748	17013124AT		(170161.98, 1673468.75)	GP
24	0.96608	17012424AT	(169990.34, 1672592.70)	GP	49	0.85169	17011524AT		(172099.46, 1675437.99)	GP
25	0.96410b	17021224AT	(169463.31, 1679888.32)	GP	50	0.85139c	17022424AT		(169804.52, 1675650.72)	GP

ANNEXURE - 4 B(Contd)

PREDICTED HIGH 50 24-HOURLY AVERAGE CUMULATIVE INCREMENTAL GROUNDLEVEL CONCENTRATIONS OF OXIDES OF NITROGEN (NO_x) DUE TO EXPANSION OF CEMENT PLANT AND CAPTIVE LIMESTONE MINE

CLINKER: 1.5 to 4.0 Million Tonnes per Annum

CEMENT: 2.0 to 4.6 Million Tonnes per Annum & LIMESTONE ; 2.3 TO 5.3 MTPA Million Tonnes per Annum

RANK	CONC	AT	RECEPTOR (XR,YR) OF	TYPE	RANK	CONC	ON	AT	RECEPTOR (XR,YR) OF	TYPE
	µg/m3	ON	(m,m) UTM coordinates			µg/m3			(m,m) UTM coordinates	
1	11.50358b	17021224AT	(170831.39, 1676129.55)	GP	26	5.75358	16121224AT		(168841.28, 1673556.88)	GP
2	10.88408b	17021224AT	(170660.38, 1676599.40)	GP	27	5.74208	17013024AT		(169990.34, 1672592.70)	GP
3	10.40366b	17021224AT	(171002.40, 1675659.71)	GP	28	5.71959	17013024AT		(169197.79, 1674617.82)	GP
4	10.20629b	17021224AT	(170489.37, 1677069.24)	GP	29	5.71226	17013124AT		(169804.52, 1675650.72)	GP
5	9.44545b	17021224AT	(170318.36, 1677539.09)	GP	30	5.63654	17020324AT		(170304.52, 1674784.69)	GP
6	8.76858b	17021224AT	(170147.35, 1678008.94)	GP	31	5.62277b	17020424AT		(170554.52, 1674351.68)	GP
7	8.70593	17012324AT	(173054.52, 1673521.55)	GP	32	5.55551	17010424AT		(168841.28, 1673556.88)	GP
8	8.68583	17012324AT	(173054.52, 1673021.55)	GP	33	5.54715c	17022424AT		(169554.52, 1676083.73)	GP
9	8.01530b	17021224AT	(169976.34, 1678478.78)	GP	34	5.51925	17013124AT		(169554.52, 1676083.73)	GP
10	7.57715b	17021224AT	(171173.41, 1675189.86)	GP	35	5.49741b	17021224AT		(171344.42, 1674720.01)	GP
11	7.24810b	17021224AT	(169805.33, 1678948.63)	GP	36	5.47741c	17021124AT		(169054.52, 1676949.75)	GP
12	6.70431	17012324AT	(173054.52, 1674021.55)	GP	37	5.46870c	17022424AT		(168554.52, 1677815.78)	GP
13	6.70173c	17022424AT	(168804.52, 1677382.77)	GP	38	5.42789	17021824AT		(169224.30, 1673235.49)	GP
14	6.64024	17012324AT	(173054.52, 1672521.55)	GP	39	5.4082	17020324AT		(170804.52, 1673918.66)	GP
15	6.60651c	17022424AT	(169054.52, 1676949.75)	GP	40	5.37145c	17021124AT		(169304.52, 1676516.74)	GP
16	6.45076b	17021224AT	(169634.32, 1679418.48)	GP	41	5.35386c	17021124AT		(168804.52, 1677382.77)	GP
17	6.42991	16121224AT	(168458.25, 1673878.28)	GP	42	5.32505	17022624AT		(172099.46, 1675437.99)	GP
18	6.41939	17022624AT	(172186.28, 1674945.59)	GP	43	5.31551	17012324AT		(173054.52, 1674521.55)	GP
19	6.16522	17013024AT	(169519.19, 1674234.79)	GP	44	5.26787	17013124AT		(170054.52, 1675217.70)	GP
20	6.11084c	17022424AT	(169304.52, 1676516.74)	GP	45	5.21831b	17020424AT		(170054.52, 1675217.70)	GP
21	5.92885	17020324AT	(170554.52, 1674351.68)	GP	46	5.19313b	17021224AT		(169292.30, 1680358.17)	GP
22	5.89571	17013024AT	(169840.58, 1673851.77)	GP	47	5.19069	17021824AT		(169607.32, 1672914.09)	GP
23	5.80871b	17020424AT	(170304.52, 1674784.69)	GP	48	5.14937	17013124AT		(170161.98, 1673468.75)	GP
24	5.80152	17012424AT	(169990.34, 1672592.70)	GP	49	5.11461	17011524AT		(172099.46, 1675437.99)	GP
25	5.78961b	17021224AT	(169463.31, 1679888.32)	GP	50	5.11278c	17022424AT		(169804.52, 1675650.72)	GP

LIST OF POLLUTION CONTROL EQUIPMENT INSTALLED IN THE EXISTING PLANT

Sr No.	LOCATION	NO.OF BAGS	Motar KWh	CAPACITY M3/Hr	Stack height in Meter above from ground level	Stack dia in MM	Temp.in Deg.C	Nos
1	LIME STONE TP-1 (STACKER FEEDING)	72	15	10000	3	496	70	1
2	LIME STONE TP-2 (STACKER BYPASS RECLAIMER FEEDING)	72	15	10000	2.5	496	70	1
3	LIME STONE TP-3 (RECLAIMER DISCHARGE)	72	15	10000	6	496	70	1
4	IRON ORE FEEDING	72	22	10000	3	494	70	1
5	BAUXITE FEEDING	72	15	10000	3	494	70	1
6	ADDITIVE DUMP HOPPER	72	15	10000	3.5	518	70	1
7	AL.LATERITE CRUSHER	72	22	10000	7	500	70	1
8	ADDITIVE STOCKPILE REVERSE BELT	72	15	10000	13.5	500	70	1
9	RAW MILL HOPPER TOP FOR LIME	72	15	10000	31.05	500	70	2

	STONE HOPPER							
10	RAW MILL HOPPER BOTTOM (UBF FOR W/F + TP-8)	30	7.5	30000	12	500	70	3
11	RAW MILL .VRM INLET	72	15	10000	31.05	240	70	1
12	RAWMEAL SILO TOP	120	30	18000	60	560	70	1
13	RAW MEAL SILO BIN (K/F BIN)	108	22	10000	7	300	70	1
14	PREHEATER TOP	72	15	10000	111	240	70	1
15	COAL DUMP HOPPER	72	15	10000			70	1
16	COAL CRUSHER	72	15	10000	3.5	500	70	1
17	COAL TRANSFER POINT (TP-10)	72	15	10000	2	496	70	1
18	RAW COAL HOPPER TOP- 1	72	15	10000	26.5	500	70	1
19	COALMILL FK PUMP BAGFILTER	30	7.5	30000	33.5	1650	70	1
20	CSP TOP - DDPC#1 VENT	120	30	18000	28	700	70	2

		NO.OF BAGS	Motar KWh	CAPACITY M3/Hr	Stack height in Meter above from ground level	Stack dia in MM	Temp.in Deg.C	Nos
21	DDPC #2&3 (Tunnel & Discharge)	72	15	10000	5.477	494	70	4
22	SLAG	72	15	10000	33	500	70	

	HOPPER TOP							
23	CEMENTMILL HOPPER TOP	72	15	10000	22	250	70	1
24	CEMENTMILL HOPPER BOTTOM CLINKER WEIGH FEEDER DISCHARGE	72	15	10000	10	500	70	1
25	CEMENT SILO 1	72	15	10000	45	200	70	1
26	CEMENT SILO-2	72	15	10000	45	200	70	1
27	CEMENT SILO-3	72	15	10000	45	200	70	1
28	CEMENT SILO-4	72	15	10000	45	200	70	1
29	GGBS BELNDING SYSTEM	48	11	6000	22.5	200	70	1
30	GGBS + OPC SILO'S BIN VENT SYSTEM	48	11	6000	12	200	70	1
31	PACKING PLANT- PACKER 1	210	55	30000	25.18	900	70	1
32	PACKING PLANT- PACKER 2	210	55	30000	25.18	900	70	1
33	PACKING PLANT- PACKER 3	210	55	30000	25.18	900	70	1
34	PACKING PLANT- PACKER 4	210	55	30000	25.18	900	70	1
35	BULK LOADING SYSTEM 1	72	11	10000	10	500	70	1
36	BULK LOADING SYSTEM 2	72	11	10000	10	500	70	1
37	CEMENT	48	11	6000	22.5	200	70	1

	WAGON LOADING PLATFORM							
38	WAGON TIPPLER	48	11	6000	22.5	200	70	1
39	WAGON TIPPLER JUMBO CRUSHER	72	55	10000	22	250	70	1
40	WTC-5 DISCHARGE	48	11	6000	22.5	200	70	1
41	FLYASH SILO TOP	72	15	10000	38	250	70	1

LIST OF PROCESS BAG FILTERS

Sr No.	LOCATION	NO.OF BAGS	Motar KWh	CAPACITY M3/Hr	Stack height in Meter above from ground level	Stack dia in MM	Temp.in Deg.C	Nos
1	CEMENT MILL O Sepa	672	750	90000	37.40	1700	112	1
2	CEMENT MILL VENTING	588	90	60000		1700	120	1
3	VRM SLAG VENTING	3360	1100	360000	30.00	3600	80-120	1
4	COOLER ESP(9084Collecting area)	896	350	500000	37.40	3500	310	1
5	COAL MILL	1008	350	110000	47.50	1700	90	1
6	KILN / RAWMILL RABH	3696	1100	935000	120.00	4750	240	1

ANNEXURE – 4D

LIST OF BROAD LEAVED NATIVE SPECIES PROPOSED FOR PLANTATION IN 4 HA AND ALSO IN THE GAP FILLING OF EXISTING GREENBELT

	Scientific Name	Common Name
1	<i>Aegle marmelos</i>	Mareedu
2	<i>Ailanthus excels</i>	Peddamaanu
3	<i>Alangium chinense</i>	-
4	<i>Albizia procera</i> Benth	Tellachinduga
5	<i>Alnus nepalensis</i>	Indian or Nepalese
6	<i>Alstonia scholaris</i>	Devil tree
7	<i>Anogeissus latifolia</i>	Axle Wood Tree Chirumaanu
8	<i>Aphanamixis polystachya</i>	Chawamanu
9	<i>Artocarpus heterophyllus</i>	Jack fruit tree
10	<i>Artocarpus lacucha</i>	Kammaregu
11	<i>Barringtonia acutangula</i>	Kanapachettu
12	<i>Bauhinia Semla</i> Wanderlin	Nlrpa
13	<i>Bischofia javanica</i>	Nalupumusti
14	<i>Broussonetia papyrifera</i>	Paper mulberrys
15	<i>Ceiba pentandra</i>	Kapok
16	<i>Citrus taitensis</i>	Indian Rough Lemon, Jambhiri orange
17	<i>Citrus aurantifolia</i>	Lime, Common lime, sour lime
18	<i>Cordia dichotoma</i>	Chinn – anakkeru
19	<i>Derris indica</i>	Gaanugachettu, Punguchettu
20	<i>Diospyros melanoxylon</i>	Tumki
21	<i>Ficus religiosa</i> Linn	Ashavatham
22	<i>Ficus virens</i> Ait	Badiju
23	<i>Ficus benghalensis</i> Linn	Peddamarri
24	<i>Ficus benjamina</i> Linn	
25	<i>Ficus elastic</i> Roxb	Indian Rubber tree
26	<i>Ficus gibbosa</i> Blume	Tella-barinika
27	<i>Ficus racemose</i>	Cluster fig
28	<i>Ficus hispida</i>	Vettiyati
29	<i>Ficus arnottiana</i>	Indian Rock Fig, rock pipal, waved-leaved fig tree, wild pipal
30	<i>Gardenia resinifera</i> Roth	Erubikki
31	<i>Madhuca longifolia</i> var. <i>latifolia</i>	Indian Butter Tree
32	<i>Madhuca longifolia</i> var. <i>longifolia</i>	South Indian Mahua, Indian Butter Tree

	Scientific Name	Common Name
33	<i>Mallotus philippensis</i>	Sinduri
34	<i>Mangifera indica</i>	Maamidichettu
35	<i>Millingtonia hortensis</i>	Indian cork- tree, Buch
36	<i>Mimusops elengi</i> Linn	Vakulamu
37	<i>Mimusops hexandra</i> Roxb	Pala
38	<i>Murraya paniculata</i>	Nagagolunga
39	<i>Polyalthia longifolia</i>	Asokamu
40	<i>Populus nigra</i> Linn	Lombardy – poplar
41	<i>Salix tetrasperma</i>	Eetipaala
42	<i>Saraca asoka</i> Roxb	Asokamu
43	<i>Soyimida febrifuga</i>	Sumi, Sonidamaanu
44	<i>Spathodea campanulata</i> Beauv	Indian Tulip tree
45	<i>Spondias pinnata</i>	Amratakamul
46	<i>Strychnos nux-vomica</i>	Mushti
47	<i>Syzygium cumini</i>	Neereedu
48	<i>Tectona grandis</i>	Adaviteeku
49	<i>Terminalia elliptica</i>	Asan, Indian Laurel, Silver grey wood, White chuglam
50	<i>Terminalia calamansanai</i>	Philippine Almond, Yellow Terminalia
51	<i>Terminalia arjuna</i>	Yerramaddi
52	<i>Terminalia chebula</i>	Karakkaaya
53	<i>Terminalia catappa</i>	Indian Almond

**SUMMARY OF HEALTH STATUS REPORT
PENNA CEMENT INDUSTRIES LIMITED :: BOYAREDDYPALLI**

S.NO.	ACC_ID	PTNT_FNM	ABO	BP	LUNGFT	AUDIO	XR1	ECG1	OPHTAL	MEDICAL OFFICER OPINION
1	0194PG001703	S.MADHUSUDHAN/ EMP ID	TYPE AB	150/90 mmHg	WITHIN NORMAL LIMITS	BILATERAL N.H	NORMAL	WITHIN NORMAL LIMITS	WITHIN NORMAL LIMITS	
2	0194PG001704	J.ANIL KUMAR REDDY/ EMP ID	TYPE B	0	ABNORMAL	BILATERAL N.H	NORMAL	WITHIN NORMAL LIMITS	WITHIN NORMAL LIMITS	
3	0194PG001705	D.MAHO BASHA/ EMP ID	TYPE B	130/80 MM HG (SITTING)	ABNORMAL	BILATERAL N.H	NORMAL	WITHIN NORMAL LIMITS	WITHIN NORMAL LIMITS	
4	0194PG001706	B.SIVA LAXMI REDDY/ EMP ID 1219	TYPE A	130/80 MM HG (SITTING)	ABNORMAL	BILATERAL N.H	BLUNTING OF LT CP ANGLE IS NOTED. -NEEDS DEFINITIVE CORRELATION WITH USG AND CLINICALLY TO R/O PLEURAL THICKENING/EFFUSION/SUBSEGMENTAL COLLAPSE.	WITHIN NORMAL LIMITS	WITHIN NORMAL LIMITS	
5	0194PG001707	C.RAM MOHAN/ EMP ID	TYPE O	130/90 mmHg	WITHIN NORMAL LIMITS	BILATERAL N.H	NORMAL	WITHIN NORMAL LIMITS	WITHIN NORMAL LIMITS	
6	0194PG001709	G.RAVI KUMAR/ EMP ID 2159	TYPE O	120/80 MM HG (SITTING)	ABNORMAL	BILATERAL N.H	NORMAL	WITHIN NORMAL LIMITS	WITHIN NORMAL LIMITS	
7	0194PG001710	P.MALLIKARJUNA REDDY/ EMP ID	TYPE A	110/70 MM HG (SITTING)	ABNORMAL	BILATERAL N.H	NORMAL	WITHIN NORMAL LIMITS	WITHIN NORMAL LIMITS	
8	0194PG001711	S.SUDHAKAR/ EMP ID	TYPE B	130/80 MM HG (SITTING)	ABNORMAL	BILATERAL N.H	NORMAL	WITHIN NORMAL LIMITS	WITHIN NORMAL LIMITS	
9	0194PG001712	M.SRINIVASULU/ EMP ID	TYPE B	120/80 MM HG (SITTING)	ABNORMAL	BILATERAL N.H	NORMAL	WITHIN NORMAL LIMITS	WITHIN NORMAL LIMITS	
10	0194PG001714	E.NARASIMHULU/ EMP ID 1282	TYPE O	140/90	WITHIN NORMAL LIMITS	BILATERAL N.H	NORMAL	WITHIN NORMAL LIMITS	WITHIN NORMAL LIMITS	
11	0194PG001716	L.GOPAL/ EMP ID	TYPE O	110/60 MM HG (SITTING)	ABNORMAL	RT EAR- S.N.H.L WITH 4K NATCH	NORMAL	WITHIN NORMAL LIMITS	WITH GLASS WITHIN NORMAL	

S.NO.	ACC_ID	PTNT_FNM	ABO	BP	LUNGFT	AUDIO	XR1	ECG1	OPHTHAL	MEDICAL OFFICER OPINION
						LT EAR- NH			LIMITS	
12	0194PG001718	T.CHINNA RAMUDU/ EMP ID	TYPE A	150/80 MM HG (SITTING)	ABNORMAL	BILATERAL NH	NORMAL	WITHIN NORMAL LIMITS	WITH GLASS WITHIN NORMAL LIMITS	
13	0194PG001857	C.RAMANJENEYULU	TYPE B	100/60 MM HG (SITTING)	WITHIN NORMAL LIMITS	BILATERAL NH	RIGHT HILUM APPEARS DENSE IMP: DENSE RIGHT HILUM ADVISED FURTHER EVALUTION	ABNORMAL	WITHIN NORMAL LIMITS	
14	0194PG001860	CHANDESWAR KUMAR	TYPE O	110/70 MM HG (SITTING)	ABNORMAL	BILATERAL NH	NORMAL	WITHIN NORMAL LIMITS	WITHIN NORMAL LIMITS	
15	0194PG001863	C.BALANNA	TYPE O	140/80	WITHIN NORMAL LIMITS	BILATERAL NH	NORMAL	WITHIN NORMAL LIMITS	WITH GLASS WITHIN NORMAL LIMITS	

Note : above report is part report

**J R LABS**

(AN ISO 9001 : 2008 CERTIFIED LAB)

ENVIRONMENT & OCCUPATIONAL HEALTH SERVICES

8

Health Questionnaire cum Physical Examination Form**M/s. Penna Cement Industries Ltd.,****Gudipadu Limestone Mine**

Boyareddypalli - Village, Kamalapadu, Yadiki Mandal, Ananthapur - District, Andhra Pradesh

Name : Mr. Ranjeeth Sarma

Date of Employment : 02.06.2006

Staff / B R No : 21

Date of Birth : 01.06.1980

Designation : H E M M Operator

Age in years : 36

Department : Mines

Date of Med. Exam : 17.09.2016

RESIDENTIAL ADDRESS

Village: Muradpur Post: Baghi Dist: Bhaypur, Bihar.

Stays at PCL colony

FAMILY HISTORY	Age	Health	Cause & Year. of Death
Father: Alive / Dead	59	NI	
Mother: Alive / Dead	56	NI	
Blood Relatives			
▽ NIL		B	S Ch.

PREVIOUS

OCCUPATIONAL
DETAILS

① Reservoir Dam works as Helper at Asijabad.
Near Kaganagar for 3 yrs. ② Pioneer Builders.
Change at Hyderabad and Hyderabad as Mechanic
for 1 yr.

PERSONAL HEALTH HISTORY

Normal

- ☐ Anemia ☐ Diabetes ☐ Allergies ☐ Lung Disease ☐ Heart Trouble ☐ Hives / Rashes
☐ Cancer / Tumor ☐ High Blood Pressure ☐ Kidney / Bladder Trouble
☐ Liver Disease / Hepatitis ☐ Allergic to ☐ Fever with Painful Joints
☐ Family History of Hearing Loss ☐ Ear Pain / Ear Discharge
☐ Ringing Sound in Ears ☐ Difficulty in understanding Speech in noisy situations / Crowd
☐ Difficulty in Telephonic Conversation ☐ Others

Height : 150 cms., Weight : 55 Kgs., Sex: Male, Marital Status: Married / Unmarried, Build: sm. (med) Obese

INVESTIGATIONS:

Blood Pressure : 120/90 mm of Hg

Blood Group : B+ve Hemoglobin : 15.8 gm% TLC : 6100 /c mm DLC : P 55 L 40 E 1 M 4 B

ESR. in mm: 1st Hour 15 2nd Hour 30 FBS : 100 mg% PLBS : 118 mg%

Blood Urea : 19 mg%, Serum Creatinine : 0.6 mg%

LIPID PROFILE :-

Total Cholesterol : 205 mg%, HDL Cholesterol : 40 mg%, LDL Cholesterol : 125 mg%,

VLDL Cholesterol : 40 mg%, Triglycerides : 200 mg%

URINE : Normal or Abnormal : Albumin : NIL Fasting Urine Sugar : NIL Post Lunch Urine Sugar : NIL

PFT : (Report Enclosed) Within Normal Limits

ECG : (Report Enclosed) Within Normal Limits (LAO)

VISION : (Report Enclosed) Within Normal Limits

AUDIOMETRY : (Report Enclosed) Within Normal Limits

CHEST X Ray PA View : Report Enclosed Within Normal Limits

HABITS

	YES	NO
1. Do you smoke Cigarettes / Beedies ?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
If Yes : How many a day?		
How many years have you smoked Cigarettes/Beedies?		
If No: Did you ever smoke Cigarettes / Beedies ?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
How many a day ?		
For how many years did you smoke Cigarettes / Beedies ?		
Please write the year when you stopped		
2. Do you chew pan (with Tobacco)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
If Yes : How many per day?		
For how many years did you chew Pan?		
3. Do you chew Ghutka? <i>Khain</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
If Yes : How many packets a day?	<i>4 pkts</i>	
For how many years did you chew Ghutka ?	<i>4 yrs</i>	
4. Do you take Alcoholic drinks ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
If Yes : How often?	<i>2 times a month</i>	
How much quantity?	<i>90 ml</i>	
For how many years did you take Alcoholic drinks ?	<i>2 yrs</i>	
If No : Did you ever take Alcoholic drinks ?	<input type="checkbox"/>	<input checked="" type="checkbox"/>
How often?		
How much quantity ?		
For how many years did you take Alcoholic drinks ?		
Please write the year when you stopped ?		

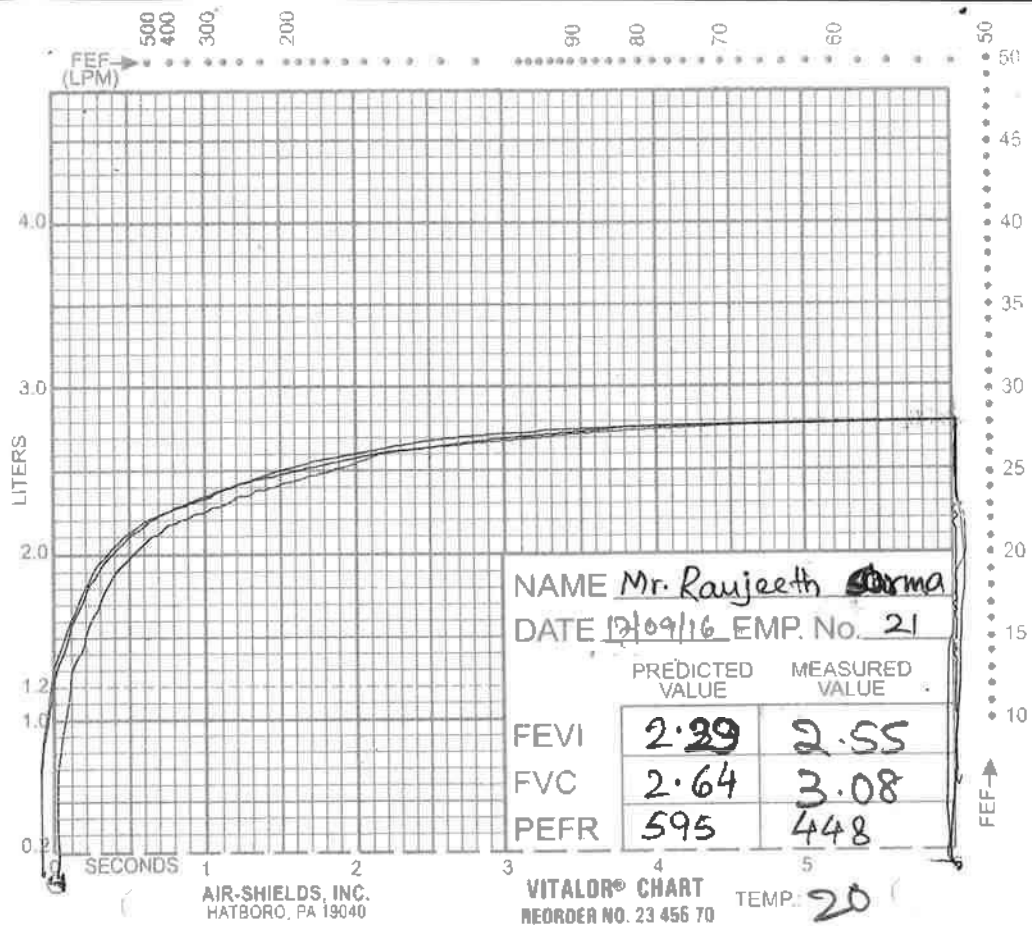
Signature of Employee *Ranjeet*

SUMMARY & COMMENTS:

Diet control and exercise for Hyperlipidemia

Signature of Occupational Health Physician *[Signature]*

Dr. S. KAUSHIK
 MBBS, DHI (Cal) PhD (OH)
 Occupational Health Physician
 Regn. No. 25618 (BMC)





JR LABS



(AN ISO 9001 : 2008 CERTIFIED LAB)

ENVIRONMENT & OCCUPATIONAL HEALTH SERVICES

OPHTHALMOLOGY 8

EMPLOYEE NAME : *Mr. Ranjeeth*

DATE : *17/9/16*

DESIGNATION :

BR / EMP No. : *21*

SEX :

M/F

AGE : *36*

ADDRESS : M/s.

VISION	RIGHT EYE	LEFT EYE
DISTANT VISION	<i>00 6/6</i>	<i>00 6/6</i>
NEAR VISION	<i>00 6/6</i>	<i>00 6/6</i>

COMMENTS : *normal*

[Signature]
OPTOMETRIST

B - 305 & 309,
Vasudha Apartments,
Qutbullapur Road,
New Jeedimetla,
Hyderabad - 500 055
Telangana, India.

Phone : 040-27230750 / 27230966

Fax : 27230750

E-mail : jrlabs@rediffmail.com

jrlabs@gmail.com



JR LABS

ENVIRONMENT & OCCUPATIONAL HEALTH SERVICES

JRL SI No.:- 8

Date of Examination :- 17.09.2016

B R No. :- 21

Name :- Mr. Ranjeeth Sarma

Designation :- HEMM Operator

Age :- 36 Yrs.

X - RAY CHEST P A VIEW REPORT

CARDIAC SIZE AND CONTOUR ARE NORMAL.

BOTH HILA ARE NORMAL.

BOTH LUNG FIELDS ARE CLEAR.

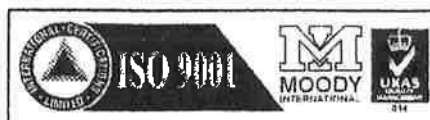
BOTH DOMES AND CP ANGLES ARE CLEAR.

IMPRESSION : NORMAL STUDY.

RADIOLOGIST

DR. K. SRINIVASAN
M.B.B.S., DMR
Reg. No. 35486

B-305 & 309, Vasudha Apartments,
Quthubullapur Road, New Jeedimetla,
HYDERABAD - 500 055.
ANDHRA PRADESH, INDIA



AN ISO 9001 : 2000 CERTIFIED LAB

☎ : 040 27230750, 42300546, 27230966.

E-mail : jrlabs@rediffmail.com

jrlabs@gmail.com

JR LABS

(AN ISO 9001 : 2000 CERTIFIED LAB)

ENVIRONMENT & OCCUPATIONAL HEALTH SERVICES

AUDIOGRAM

DATE : 17-09-2016.

EMPLOYEE NAME: Mr. Ranjeeth Saama

DESIGNATION : HEMM Operator EMP.No.: 21

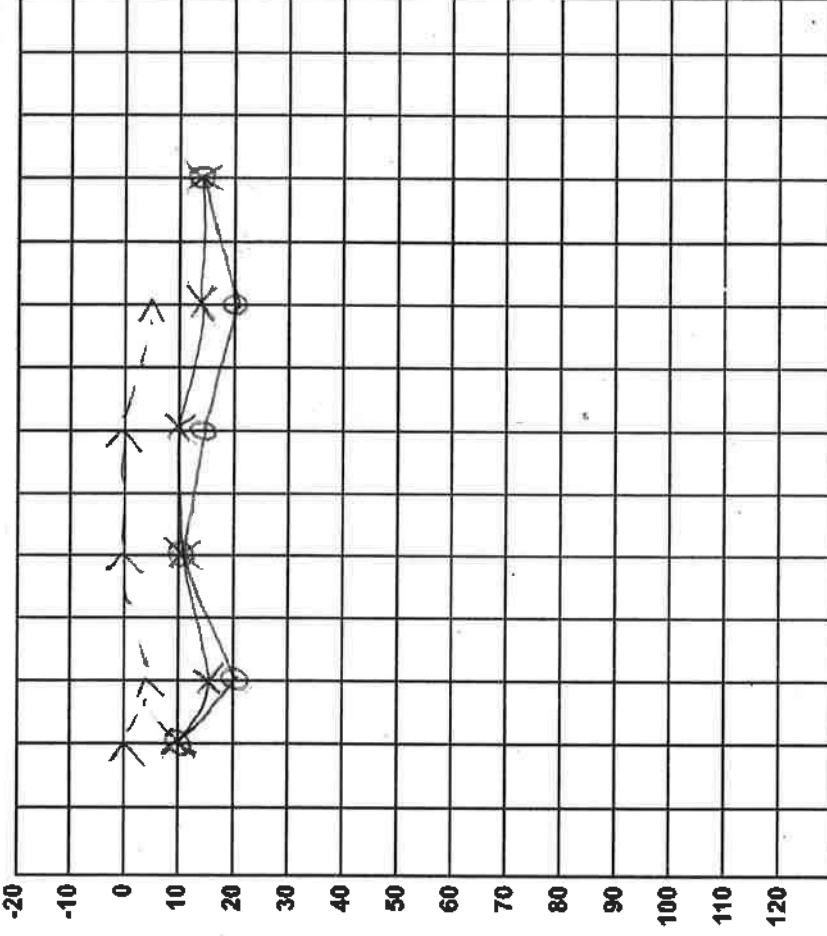
SEX : M/F AGE : 36

ADDRESS

M/s. Penna Cement Industries Limited, Gudipadu Limestone Mines, Boyanreddypalli

1964 ISO VALUES 125 250 500 750 1K 1.5K 2K 3K 4K 6K 8K 10K 12K Hz.

TEST	Right Ear (Red)	Left Ear (Blue)
AIR	0-0	X-X
AIR OPP	Δ-Δ	□-□
NO RESPONSE	↻	X ↗
BONE	<	>
BONE OPP	[]
EAR MASKED		
HEARING EVALUATION		
AVE P.T.	15dB	11.6dB
SRT		
PB% CORRECT		
MCL	NO	



TEST	Right Ear	Left Ear
RINNE		
WEBER		
BING		
SPECIAL TEST		
RECRU-		
ITMENT		
SISI		
T.T.S		

Hearing Threshold Level in dB

Remarks : Hearing sensitivity within normal limits

DOCTOR/AUDIOLOGIST
JR LABS



JR LABS

ENVIRONMENT & OCCUPATIONAL HEALTH SERVICES

JRL SI No.:- 8

Date of Examination :- 17.09.2016

B R No. :- 21

Name :- Mr. Ranjeeth Sarma

Designation :- HEMM Operator

Age :- 36 Yrs.

ELECTROCARDIOGRAPH REPORT

NSR

Lab.

Dr. G. SURYA PRAKASH
MD, DM, FACC, FSCAI (USA) FESC
Consultant Cardiologist
Regd. No. HMC16442
CARE HOSPITAL

B-305 & 309, Vasudha Apartments,
Quthubullapur Road, New Jeedimetla,
HYDERABAD - 500 055.
ANDHRA PRADESH, INDIA



AN ISO 9001 : 2000 CERTIFIED LAB

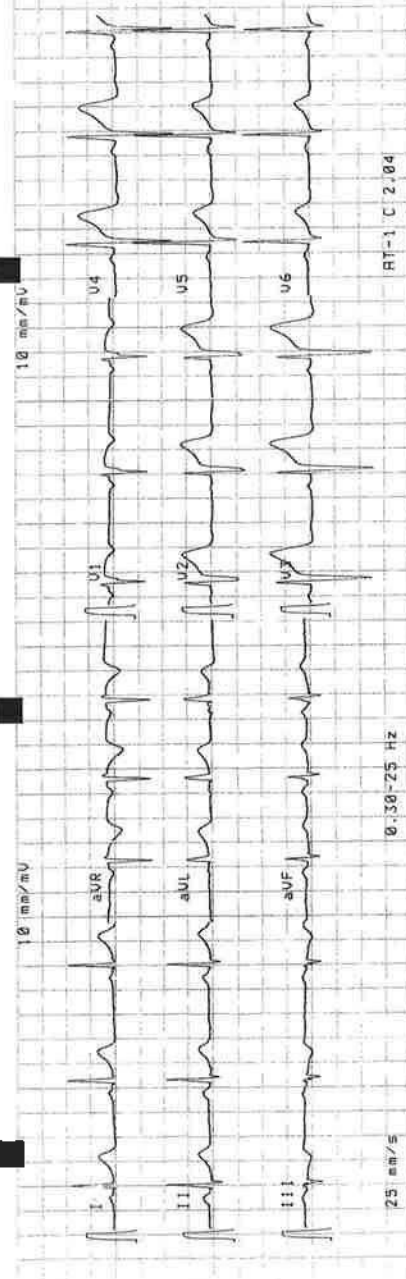
☎ : 040 27230750, 42300546, 27230966.

E-mail : jrlabs@rediffmail.com

jrlabs@gmail.com

Patient Name: **Mr. Ranjeeth Sarma**

Patient No: **362/04**
Date: **14/9/16**
Sex: **M**
Height: **170 cm**
Weight: **70 kg**
BP: **120/80 mmHg**
HR: **70/min**
ECG Interval: **0.08 sec**
PR: **120 ms**
QR: **120 ms**
QT: **380 ms**
QTc: **380 ms**
QTd: **380 ms**
QTs: **480 ms**
QRS: **160 ms**
P (U1): **0.11 mV**
S (U1): **-1.05 mV**
R (U5): **2.11 mV**



MINUTES OF THE ENVIRONMENTAL PUBLIC HEARING OF M/S PENNA CEMENT INDUSTRIES LIMITED FOR THE EXPANSION FOR INCREASING THE CLINKER PRODUCTION CAPACITY FROM 1.5 MILLION TPA TO 4.0 MILLION TPA, CEMENT PRODUCTION CAPACITY FROM 2.0 MILLION TPA TO 4.6 MILLION TPA AND ALSO FOR INCREASING THE CAPACITY OF WASTE HEAT RECOVERY POWER PLANT FROM 10 MW TO 20 MW IN THEIR EXISTING CEMENT PLANT AT BOYAREDDYPALLI (V), KAMALAPADU PANCHYAT, YADIKI (M), ANANTAPURAM DISTRICT ANDHRA PRADESH HELD ON 02-08-2017 AT 11.00 A.M AT EXISTING CEMENT PLANT PREMISES AT BOYAREDDYPALLI (V), KAMALAPADU PANCHYAT, YADIKI (M).

A. THE FOLLOWING PANEL MEMBERS ATTENDED ENVIRONMENTAL PUBLIC HEARING PROCESS.

- | | |
|--|-----------------|
| 1. Smt. TK Rama Rani, I.A.S,
The Joint Collector & Addl. District Magistrate,
Anantapuram District. | Chairman |
| 2. Dr P.Prasada Rao,
Environmental Engineer,
A.P. Pollution Control Board,
Regional Office, Kurnool | Member |

B. REPRESENTATIVES OF THE INDUSTRY

- | | |
|-------------------------------|---|
| 1. Sri D.Lakshmi Kantham | Director (Technical)
M/s Penna Cement Industries Ltd, |
| 2. Sri. B. Ramachandra Murthy | Environmental Consultant,
B.S. Envi-Tech Pvt. Ltd.,
Hyderabad |

The list of Officers and Public present at the meeting is appended as Annexure -A

At the outset the Environmental Engineer, A.P. Pollution Control Board, Regional Office, Kurnool welcomed the Joint Collector & Addl. District Magistrate, Anantapuram District, Smt.Ellamma, Tahasildhar(I/C), Yadiki. Surrounding villagers, Farmers, N.G.O's, the Public gathered at the venue, Media and officials of Police department and other officials. The Environmental Engineer informed the gathering that the present Public Hearing is for the proposal of M/s Penna Cement Industries Ltd., for expansion activity i.e., for increasing the Clinker Production capacity from 1.5 Million TPA to 4.0 Million TPA, Cement production capacity from 2.0 Million TPA to 4.6 Million TPA and also for increasing the capacity of Waste Heat Recovery Power Plant

from 10 MW to 20 MW in their existing Cement Plant premises at Boyareddypalli (V), Kamalapadu Panchayat, Yadiki (M), Anantapuram District with an additional investment of Rs.800.6 Crores. He explained the salient features of the notification S.O.No.1533 (E), dated 14.09.2006 & its amendments thereof issued by the Ministry of Environment and Forests (MoE&F), Govt. of India under the Environment (Protection) Act, 1986. He stated that projects listed in the schedule of EIA Notification dated 14.09.2006 are required to obtain the environmental clearance under the provisions of Environment Protection Act, 1986. He also informed that the proposed expansion activity of the M/s Penna Cement Industries Ltd., requires Environmental Clearance from the MoE&F, Govt. of India, New Delhi and for which Environmental Public Hearing is mandatory for the expansion project of the industry.

He informed that a Press Notification pertaining to the proposed Public Hearing was published in "Sakshi" & "Indian Express" daily newspapers on 02.07.2017 and also the draft EIA/EMP report, Executive Summaries in Telugu & English were displayed at offices of (i) Collector & District Magistrate, Anantapuram (ii) Zilla Parishad, Anantapuram (iii) General Manager, District Industries Centre, Anantapuram (iv) MoEF&CC, Govt. South Eastern Zone, Chennai (v) Grampanchayats of Boyareddypalli village & Kamalapadu village and also (vi) Tahsildar, Yadiki (M), Anantapuram District for information of the Public to offer suggestions, views, comments and objections if any, within 30 days from the date of publication.

He also informed that no written representation was received from the villagers till now raising objections, suggestions, views etc., on the proposed expansion project. He said that, an opportunity will be given to the public attended for the public hearing to express their views, suggestions, comments and objections if any on the proposed project. He informed that the Audio & Video of proceedings of the public Hearing will be recorded and the minutes will be communicated to MoE&F, Govt. of India for examination of the proposal while issuing Environmental Clearance. He then requested the Joint Collector & Addl. District Magistrate, Chairman of the public hearing panel to conduct the proceedings of the meeting.

The Joint Collector & Addl. District Magistrate, Anantapuram District welcomed the public gathered at the venue, NGO's, Media, Representatives of M/s. Penna Cement Industries Ltd., to the hearing and she informed that M/s. Penna Cement Industries Ltd., is operating their cement plant in Boyareddypalli village and has proposed

for expansion activity in the existing premises. She informed that an Environmental Impact Assessment study was conducted by them to know the impacts of the proposed expansion activity on the surrounding villages, crops etc., and the same was kept open for Public at the Grampanchayat offices, Tahasildhar Office etc. She also informed that paper notification for the proposed public hearing was published and the present hearing is being arranged to obtain the suggestions, views, objections of the surrounding villagers on the proposed expansion activity.

She has requested the proponent to explain briefly salient features of the proposed expansion activity, its impacts on surrounding environment and also details of pollution control measures proposed by them to meet the standards. She has informed that the suggestions, views of the public gathered on the proposed expansion activity will be video recorded and will be submitted to the MoEF&CC, Govt., of India along with minutes for taking necessary action.

Mr. B S Rama Chandra Murthy, Environmental Consultant, M/s B S Envi-Tech (P) Ltd. He informed that M/s. Penna Cement Industries Limited., have established their first cement plant in Talaricherevu, Anantapuram District and later on established the present cement plant at Boyareddypalli village in the year 2008. The management of M/s. Penna Cement Industries Limited., is anticipating a raise for cement demand in the nearby future and they have proposed to expand the existing cement plant by establishing another similar line with an additional investment of Rs.800.0 Crores. The proposed expansion is for increasing the production capacity of Clinker from 1.5 Million TPA to 4.0 Million TPA, Cement from 2.0 Million TPA to 4.6 Million TPA and also for increasing the capacity of Waste Heat Recovery Power Plant from 10 MW to 20 MW in their existing Cement Plant premises at Boyareddypalli (V), Kamalapadu Panchayat, Yadiki (M), Anantapuram District. The industry has proposed to carryout the expansion activity in the existing premises of 60.0 Ha and has proposed to provide pollution control measures with a capital expenditure of 120.0 Crores. The management have approached the MoEF &CC, GoI for the Environmental Clearance for the expansion activity and obtained Terms of Reference (TOR) from the MoEF &CC, GoI for the proposed expansion activity. He has informed that a draft Environmental Impact Assessment study has been conducted for knowing the baseline data regarding quality of water, air and soil etc., in the area and also an estimation was also made regarding the impacts of the proposed expansion activity on the surrounding environment. The present Public Hearing is being

arranged to obtain the objections, suggestions, views etc., of the surrounding villagers of the proposed expansion activity. He has informed that, the present concentrations particulate matter, SO_2 , NO_x in the surrounding of the plant are within the National Ambient Air Quality standards and the values of the Ambient Air Quality standards are not exceeding the stipulated standards due to expansion activity when the contribution of the expansion is added to the baseline concentrations. He has informed that the management of the industry has proposed to provide APCs i.e., bag house for the kiln, ESP for the cooler, bag filter for coal mill and cement mills and the pollution control devices have been designed keeping view of recent stringent standard of 30 Mg/Nm^3 notified by the MoEF&CC, Govt. He informed that, the present water requirement for the plant is $930 \text{ M}^3/\text{day}$ and the additional water requirement for the proposed expansion activity is $500 \text{ M}^3/\text{day}$, which is being sourced from the mine pit/Borewell in the premises. The existing quality of the ground water is meeting the IS: 1050 standards and assured the gathering that there will not be any impact of the expansion activity on the surrounding crops.

He also informed that the existing cement plant have provided employment opportunity to about 750 members and the proposed expansion will provide employment to another 450 members. The waste water is anticipated only from the domestic usage from the canteen & township and the management has provided sewage treatment plant for the treatment of the domestic waste water generated during the expansion also. He informed that treated domestic waste water will be used for gardening as well as for dust suppression. He has informed that the lime stone requirement for the expansion will be met from their existing mines in the area, coal from Singareni colonies, Gypsum from Coromandal fertilizers. He has informed that the management is implementing the CSR activities in the nearby villages on the need based study conducted by them and also on the suggestions from the villagers. He has informed that, the industry has developed greenbelt over an extent of 16.0 Ha in the premises and will develop greenbelt in another 12.0 Ha for expansion activity. He has informed that the management is operating the cement industry in the area since more than 24 years and implemented various developmental activities in the surrounding villages such as providing drinking water facility, schools etc., in the area. He has informed the gathering that the villagers have supported the factory till now and requested them to further extend their support to the expansion activity proposed by the management.

The Joint Collector & Addl. District Magistrate, Anantapuram requested the public to elicit their views, suggestions and objections if any, on the proposed expansion of the activity of the industry and informed that each and every person gathered at the venue would be granted an opportunity to express their views, suggestions, objections etc., on the expansion activity of the industry.

Views, Suggestions, Comments and Objections of the Public :

- 1) **Sri. Govinda Reddy, Kamalapadu Village:** He has informed that the rainfall in the area has decreased drastically impacting the agricultural sector and informed that the industry has not provided any employment/job opportunities to the local villagers in their existing cement plant. He has informed that the management has provided education facility by constructing school and also provided medical facility to the villagers by constructing the hospital in the area. He has urged the management to provide employment opportunities to the local villagers in the expansion activity.
- 2) **Sri. Sanjeeva Reddy, Boyareddypalli:** He has informed that the industry has constructed school, hospital in the area apart from providing employment to about 150 persons from the surrounding villagers. He has informed that the land given to the factory majorly belongs to the farmers of the Boyareddypalli village and requested the management to give priority to the Boyareddypalli village in the developmental activities. He requested the management to consider for providing employment opportunities to the educated youth in their village in the expansion activity. He has also requested the management to provide water supply to the Boyareddypalli village by tankers/borewells and urged the management to provide the water supply to the village on priority basis.
- 3) **Sri. Shivaranga Rao, Boyareddypalli:** He has informed that the crops in the area are being damaged due to the existing factory and informed that the industry has not provided any employment opportunity to the Boyareddypalli villagers. He has informed that villagers have given their lands to the factory based on commitment given by the industry for supply of drinking water and also other developmental activities in the village. He also informed that the admissions to the school for the villagers is being based on the recommendation only and the management has not

implemented any developmental activity in their village except construction of the Raovalayam in their village. He has cited that the management has not even provided priest in the temple for performing the pooja regularly and also not providing employment to the local villagers in the factory.

- 4) **Sri. Vijaya Reddy, NGO:** He has requested the MoEF&CC, Govt to sanction permission for the proposed expansion activity of the industry and requested the authorities to safe guard the historical monuments existing in the area and also for the conservation of the natural resources like water, air and soil existing in the area. He has requested the management to take measures for avoiding contamination of air and water in the area. He has requested the management to develop the greenbelt in another 20.0 Ha for the expansion activity either by acquiring additional land or avenue plantation in the waste lands/ agricultural lands of the farmers. He has informed that drought conditions are prevailing in the Anantapuram District and requested the management to implement the measures for harvesting of the rain water in the area for increasing the ground water levels in the area. He suggested the management to spend CSR funds i.e., 5% of their profits in the effected villages for the inclusive development of the village and requested the authorities to recommend to MoEF&CC, Govt for issuing approval to the industry with conditions.
- 5) **Sri. Janardhan Reddy, NGO:** He has informed that M/s. Penna Cement Industries Limited., has incurred an amount of 2.0 crores since 2008 for the implementing various developmental activities in the surrounding villages and informed that they will spend another 20.0 crores for the expansion project for the developmental activities in the surrounding villages. He has also informed that the present cement plant has provided employment to about 750 members and envisaged that expansion project will provide the employment to about 450 members. He has requested the management to give at least 50% of the employment opportunities in the expansion project to the local villagers and requested the authorities to give permission in the expansion project proposed by the industry.
- 6) **Sri. Bheemeswar Reddy, Sarpanch, Kamalapadu:** He informed that the management of the industry have implemented developmental activities in the area by constructing schools and check dams for the preservation of rain water in the area. He informed that the villagers are facing problems due to the drought

conditions prevailing in the area and requested the management to provide employment opportunities to the surrounding villagers based on their qualification. He has informed that the management of the industry is taking all possible steps including the laying the pipeline from Yadiki for the supply of water to the Boyareddypalli village and requested the villagers to support the expansion project of the industry.

- 7) **Sri. P.L.N.Rao, NGO:** He informed that the management of the industry have implemented advanced technologies in their cement plants in Naigonda & Anantapuram District to abate the pollution levels. He has informed that they made survey for the last one week in the area and informed that there are no complainants from the surrounding villagers regarding pollutions problems from the industry. He has requested the management to provide employment to the local villagers and to carry out the developmental activities in the surrounding villages.
- 8) **Mr. Ramanjaneya Reddy, Nittur:** He has informed that the villagers have given their agricultural lands to the factory for laying of the railway line and informed that the management have implemented developmental activities in their village by providing RO plant for drinking water, constructing culvert to their village. He has urged the management to provide further employment opportunities to their villagers on par with other villages existing in the area.
- 9) **Sri. Srinivasulu, Boyareddypalli:** He has informed that he has completed Industrial Training Institute (ITI) course & he has requested the management to provide employment to him.
- 10) **Sri. Uthama Reddy, Chinthalayapalli:** He informed that the Management is providing employment to the nearby villagers and requested the management to constitute village committees in the surrounding villages for carrying out developmental activities and also for providing employment opportunities to the surrounding villages.
- 11) **Sri. Raghavendra, Boyareddypalli:** He has informed that the management of the industry has not carried out any developmental activities in their village and also not provided employment to the villagers. He informed that only 3 villagers were provided employment in the existing cement plant till now though there are about 20 graduates in their village. He has informed that the management has not taken any

effective steps for providing drinking water to their village. He informed the authorities that admission to the school for the children of their village will be given based on the recommendations only and reiterated that the industry is not providing the employment opportunities to the villagers. Sri Sanjeeva Reddy of the village has intervened and urged the management of the industry to provide employment opportunities to the villagers in the expansion activity as the villagers have given their land to the industry and also there is no much cultivation in the area due to scarcity of the rainfall. Sri Shiva Ramireddy, Sarpanch of the village has assured the gathering that the laying of the pipeline from Yadiki to the Boyareddipalli is in the advance stage and the villagers will be provided with water within a month.

- 12) **Sri. Chalanareddy, Veerareddypalli:** He informed that there is no proper road connectivity to their village and requested the authorities to provide road connectivity to their village. The Joint Collector has informed him the issues raised by him is not related to the present public hearing and requested him to give separate representation to the District administration for consideration for laying road to their village.

The Joint Collector & Addl. District Magistrate, Anantapuram District she has summarized the issues raised by public as i) providing water supply to the surrounding villages ii) providing employment opportunities to the local villagers iii) providing education facilities to the children in the nearby villages iv) measures for the rain water harvesting, development of the temple in the village and other CSR activities for the development of the surrounding village and also v) measures proposed by them for pollution control in the expansion activity. She requested the management to clarify briefly to the public on the above issues.

RESPONSE OF THE MANAGEMENT:

Mr. D.Lakshmikantham, Director (Technical): He has informed that they have acquired the land for the industry in the year 2006, commissioned the unit in the year 2008 and since then they are operating the industry with outmost care by meeting the environmental standards. He has also informed that they have provided online continuous emission monitoring systems for all the stacks and also provided connectivity to APPCB and CPCB websites. He has informed that, they have provided RO plants to the surrounding villages and also constructed check dams in co-ordination with RDT at

Kundankota, Shivaramapuram, chandrayam palli villages for perseveration of rain water to increase the ground water levels in the area. He assured that the management has constructed the school with a motive to provide education to this children in the surrounding villages and requested the villagers to avail this opportunity. He has also informed that the management is planning to construct college in the area with new courses viz., B.Sc (Cement Technology) with motive to provide free education with stipend of Rs.5000/- to the youth in the surrounding villages. He has also assured the gathering that the management will take the responsibility of providing water supply to the Boyareddypalli village and will provide priest to Ramayalam Temple in the Boyareddipalli village. He has assured the gathering the employment opportunities will be provided local villagers based on the skill / qualification and requested the villagers to extend their support for the expansion activity.

Finally, the meeting ended with vote of thanks by Environmental Engineer, A.P. Pollution Control Board, Regional Office, Kurnool

P. Prasanna Kumar
Environmental Engineer,
Regional office, APPCB,
Kurnool.

T. K. M. 3/9/17
Joint Collector & Addl. District Magistrate,
Anantapuram District

1. Representation dated: 02.08.2017 received from PLN Rao Front Line Environment Safe Guard society Nalgonda Dist.
2. Representation dated: 02.08.2017 received from Sri.D.Ramulu, Social Worker, Choutupal (M), Yadadri, Bhuvanagiri Dist.
3. Representation dated: 02.08.2017 received from Sri.B.Shiva Shunkar, NGO.
4. Representation of Sri.G.Janardhan Reddy, Coordinator, Telangana State, Paryavaran Praja Patrikshana Samithi
5. Representation date: 02.08.2017 received from Sri.K.Satish Kumar, Green Guard Society, Hyderabad.
6. Representation dated: 02.08.2017 received from Sri.B.Venkatesham, Prakruthi Rund Development Society, Nalgonda Dist.
7. Representation dated: 02.08.2017 received from Sri.H.Madhubabu, President REFHAS, Hyderabad.
8. Representation received on 08.08.2017 from Sri.N.Ramesh Naidu and others Ayyavaripalli (V), Anantapuram Dist.



ANDHRA PRADESH POLLUTION CONTROL BOARD

REGIONAL OFFICE, 1st Floor, Sankar Shopping complex,
Krishna Nagar, KURNOOL-518002, Ph: 08512-235800

ENVIRONMENTAL PUBLIC HEARING NOTIFICATION

In accordance with the Notification No. S.O.1533, dated: 14.09.2006 and circular issued thereof by the Ministry of Environment & Forest, Government of India, A.P. Pollution Control Board hereby notifies an Environmental Public Consultation on the proposal of M/s. Penna Cement Industries Ltd., for expansion of lime stone production capacity from 2.30 MTPA to 5.30 MTPA in the existing mine lease area of 392.62 Ha at Gudipadu & Kundanakota Villages, Yadiki (M), Ananthapuram District, Andhra Pradesh. The details of the proposed activity are as follows:

1. Name of the company with Address & Phone Number.	M/s Penna Cement Industries Ltd., Head Office, Lakshmi Nivas, 705, Road No.3, Banjara Hills, Hyderabad - 500 034, Telangana. Ph: 040-44565100/400.
2. Location of the proposed Establishment & Extent of land	Sy.No.57, 58, 60 to 67, 79.99 to 102, 105, 124 etc at Gudipadu Village & Sy.No.1 to 10 etc at Kundanakota Village, Yadiki Mandal, Ananthapur District, in an extent of 392.62 Ha
3. Name & Address of the Authorised person to be contacted	Mr. G.Sudhakar Reddy, Chief General Manager (works), M/s Penna Cement Industries Ltd., Head Office, Lakshmi Nivas, 705, Road No.3, Banjara Hills, Hyderabad - 500 034, Telangana. Cont:9440941028
4. Capital cost of the Proposed project:	Rs. 6.0 Crores
5. Proposed Line of Activity	Expansion of lime stone production capacity from 2.30 Million TPA to 5.30 Million TPA in the existing mine lease area of 392.62 Ha at Gudipadu & Kundanakota Villages, Yadiki (M), Ananthapuram District, Andhra Pradesh
6. Date, Time & Venue of the Public Hearing	Date: 03.08.2017, Time 11:00 AM, Venue: At Proposed project site, i.e. at Gudipadu Village, Yadiki (M), Ananthapuram District.

7. Place of the availability of Executive Summary (Telugu & English) & Draft EIA on the proposed project which are kept open for general public.

- Office of Collector & District Magistrate, Ananthapuram, Ananthapuram District.
- Office of the Chief Executive Officer, Zilla Pranshad, Ananthapuram, Ananthapuram District.
- Office of the Joint Chief Environmental Engineer, APPCB, Zonal office, Kurnool.
- Office of the Environmental Engineer, APPCB, Regional Office Kurnool.
- Office of the General Manager, District Industries Center, Ananthapuram, Ananthapuram Dist
- Office of the MoEF & CC, Gol, Regional Office, (South Eastern zone) 1st & 2nd Floor, HEPC Building, No.34, Cathedral Garden Road, Nungambakkam, Chennai. Tamilnadu -600034
- Office of the Tahsildar, Yadiki Mandal, Ananthapuram District.
- Office of the Gram Panchayath, Gudipadu Village, Yadiki Mandal, Ananthapuram District.

The concerns of the local affected people, if any, on the proposed project are invited within 30 days from the date of publication of this notification in writing to the undersigned officer of the A.P. Pollution Control Board, Kurnool and /or they can participate in the proceedings of the public hearing on the date and venue specified above.

Place : Kurnool
Date : 02.07.2017

Sd/-
Environmental Engineer, A.P. Pollution Control Board,
Regional Office, Kurnool



ఆంధ్రప్రదేశ్ కాలుష్య నియంత్రణ మండలి

ప్రాంతీయ కార్యాలయం, 1వ లంకెపల్లి, శంకర్ పాపింగ్ కాంప్లెక్స్, క్రీష్ణ నగర్, కడప జిల్లా - 518002, ఫోన్ : 08512-235800

విద్యావిరోధ ప్రజాభివ్యక్తికి సాక్షిగా ప్రకటన

భారత ప్రభుత్వము, మహావనము మరియు అభివృద్ధి మంత్రిత్వ శాఖ, ప్రకటన నెం.ఎన్.డి. 1533, తేది: 14.09.2006 మరియు తరువాతి నర్మలబద్ధత అనుగుణంగా, ఆంధ్రప్రదేశ్ కాలుష్య నియంత్రణ మండలి వారు మెస్సేజ్ పెన్సా సిమెంట్ ఇంటర్నేషల్ లిమిటెడ్ - ప్రతిపాదక క్లింట్ ఉత్పత్తి సామర్థ్యం 1.50 ఎంటిసిపి నుండి 4.0 ఎంటిసిపి వరకు, సిమెంటు ఉత్పత్తి సామర్థ్యం 2.0 ఎంటిసిపి నుండి 4.6 ఎంటిసిపి మరియు వేర్ హిల్ రిజర్వ్ వవర్ ప్లాంటు యొక్క సామర్థ్యం 10 మెగావాట్ల నుండి 20 మెగావాట్లకు పెంపుదల గురించి ప్రకాశిప్రాయ సేకరణ ప్రకటన తారీ చేయబడినది. వరకు ప్రతిపాదక ప్రాజెక్టుకు సంబంధించిన వివరములు క్రింద తెలుపబడినవి.

1. కంపెనీ పేరు, రిజిస్ట్రేషన్ నెం. మరియు దిరువాచా	మెస్సేజ్ పెన్సా సిమెంట్ ఇంటర్నేషల్ లిమిటెడ్, హిల్ ఆఫీస్, లక్ష్మీనగర్, 705, రోడ్డునెం.3 బంజారా హిల్స్, హైదరాబాద్-500034, తెలంగాణ. ఫోన్ : 040-44565100/400
2. ప్రతిపాదక ఎన్వైర్మెంటులో ప్రదేశం మరియు భూమి విస్తీర్ణం	వస్తీనెం.09 నుండి 72 వరకు, 442 నుండి 462 వరకు మెం. బోయరెడ్డిపల్లి గ్రామం, కమలపాడు మండలానికి, యాచికి మండలం, అనంతపురం జిల్లా, విస్తీర్ణం : సుమారు 60 హెక్టార్లు
3. సంప్రదించబడిన అధికారి పేరు, దిరువాచా మరియు ఫోన్ నెం.	శ్రీ జి.నరసాచార్య, రిఫ్ట్ ఇంజనీరింగ్ కంట్రీ (ఇంజీ), మెస్సేజ్ పెన్సా సిమెంట్ ఇంటర్నేషల్ లిమిటెడ్, హిల్ ఆఫీస్, లక్ష్మీనగర్, 705, రోడ్డునెం.3, బంజారా హిల్స్, హైదరాబాద్-500034, తెలంగాణ. ఫోన్ : 9440941838
4. ప్రతిపాదక ప్రాజెక్టుకు కేటాయించిన పెట్టుబడి	రూ.800 కోట్లు
5. ప్రతిపాదక కార్యకలాపాలు	ప్రతిపాదక క్లింట్ ఉత్పత్తి సామర్థ్యం 1.50 ఎంటిసిపి నుండి 4.0 ఎంటిసిపి వరకు, సిమెంటు ఉత్పత్తి సామర్థ్యం 2.0 ఎంటిసిపి నుండి 4.6 ఎంటిసిపి మరియు హిల్ రిజర్వ్ వవర్ ప్లాంటు యొక్క సామర్థ్యం 10 మెగావాట్ల నుండి 20 మెగావాట్లకు పెంపుదల
6. ప్రకాశిప్రాయ సేకరణ తేది, నమయం మరియు ప్రదేశం	తేది: 02.08.2017, నమయం: ఊ 11.00 గంటలకు, ప్రదేశం: ప్రతిపాదక అనూ ప్రాజెక్టు సిమెంటు ప్లాంటు అవరణ బోయరెడ్డిపల్లి గ్రామం, కమలపాడు మండలానికి, యాచికి మండలం, అనంతపురం జిల్లా, ఆంధ్రప్రదేశ్.

7. ప్రతిపాదక ప్రాజెక్టుకు సంబంధించిన వివరములు వరకు ప్రాజెక్ట్ ఎన్వైర్మెంటు వర్షుర్ (తెలుగు & ఇంగ్లీష్) & భాష EIA రిపోర్టు ప్రజల పాఠశాలకు ఈ క్రింద కార్యాలయములో ఉత్పాదకమైనది.
- i. జిల్లా కలెక్టరు మరియు జిల్లా మేజిస్ట్రేట్ వారి కార్యాలయము, అనంతపురం, అనంతపురం జిల్లా.
 - ii. ముఖ్య కార్యదర్శి/సహకారి వారి కార్యాలయము, జిల్లా పరిషత్, అనంతపురం, అనంతపురం జిల్లా.
 - iii. జాయింట్ రిఫ్ట్ ఎన్వైరాన్మెంటుల్ ఇంజనీర్, ఎసిసిసిసి, స్థానిక కార్యాలయము, కర్నూలు.
 - iv. ఎన్వైరాన్మెంటుల్ ఇంజనీర్, ఎసిసిసిసి, ప్రాంతీయ కార్యాలయము, కర్నూలు.
 - v. జనరల్ మేనేజర్ వారి కార్యాలయము, జిల్లా ఇంటర్నేషల్ సెంటర్, అనంతపురం, అనంతపురం జిల్లా.
 - vi. ప్రాంతీయ (పోక ఉత్పత్తి బోర్డు) మహావన, అటవీ & వాతావరణ మార్పు మంత్రిత్వ శాఖ, భారత ప్రభుత్వం, 1వ & 2వ అంతస్తులు, హిల్ ఆఫీస్ రిఫ్ట్, నెం.34, కెప్టెన్ గార్డెన్ రోడ్డు, మంగంబాపురం, చెన్నై, తమిళనాడు - 600034
 - vii. తహశీల్దార్ వారి కార్యాలయము, యాచికి మండలం, అనంతపురం జిల్లా
 - viii. గ్రామ పంచాయతీ పరిపాలయం, కమలపాడు గ్రామం, యాచికి మండలం, అనంతపురం జిల్లా

ప్రధానిక ప్రాంతం ప్రజలు తమ అభిప్రాయాలు, అభ్యంతరాలు ఏదైనా ఉన్నట్లయితే ఈ ప్రకటన ప్రచురించిన 30 రోజులలోగా ప్రాత పూర్వంగా ఆంధ్రప్రదేశ్ కాలుష్య నియంత్రణ మండలి కర్నూలు ప్రాంతీయ అధికారి వారికి సమపన్నును. మరియు/లేదా పైన తెలిపిన తేదీన, ప్రదేశమున విహారంగ ప్రకాశిప్రాయ సేకరణలో పాల్గొని తమ అభిప్రాయాలు, అభ్యంతరాలు తెలుపవచ్చును.

ప్రదేశం : కర్నూలు, నం/- ఎన్వైరాన్మెంటుల్ ఇంజనీర్, ఆంధ్రప్రదేశ్ కాలుష్య నియంత్రణ మండలి, ప్రాంతీయ కార్యాలయము, కర్నూలు
తేది: 02.07.2017

ANNEXURE - 7 A (CONTD..)

RESPONSE STATEMENT ALONG WITH ACTION PLAN AND BUDGET FOR THE PUBLIC HEARING ISSUES

S.NO	SPEAKER	MANAGEMENT RESPONSE	ACTION PLAN	BUDGET
1.	Mr.Govinda Reddy, Kamalapadu:- He has informed that the rainfall in the area has decreased drastically impacting the agricultural sector and informed that the industry has not provided any employment/Job opportunities to the local villagers in their existing cement plant. He has informed that the management has provided education facility by constructing school and also provided medical facility to the villagers by constructing the hospital in the area. He has urged the management to provide employment opportunities to the local villagers in the expansion activity.	About 80% of employees are locals It is also assured that only locals will be preferred for employment in the proposed plant. The industry is starting a college for Degree in Cement Technology. The students will and permitted free of cost, Free hostel and boarding with a stipend of Rs 5000/ per month. The college will start functioning from next academic year.	At the time of implementation of expansion, preference to the locals will be given for all unskilled and skilled jobs depending on their suitability. Providing the training for locals, so that employability opportunities are created.	Rs 5.0 lacs for the training in different trades. Rs 2.0 crores for college and Rs 50 lacs annually for the college and students.
2.	Mr. Sanjeeva Boyareddypalli:- He has informed that the industry has constructed school, hospital in the area apart from providing employment to about 150 persons from the surrounding villagers. He has informed that the land given to the factory majorly belongs to the	About 80% of employees are locals Locals will be preferred for employment in the expansion phase also. Penna has already been providing water supply through tankers and will continue the same.	Preferring the locals for all unskilled and skilled jobs depending on their suitability. Providing the training for locals , so that employability opportunities are created. .	Rs 15 lacs for drinking water supply.

S.NO	SPEAKER	MANAGEMENT RESPONSE	ACTION PLAN	BUDGET
	farmers of the Boyareddypalli village and requested the management to give priority to the Boyareddypalli village in the developmental activities. He requested the management to consider for providing employment opportunities to the educated youth in their village in the expansion activity. He has also requested the management to provide water supply to the Boyareddypalli village by tankers/borewells and urged the management to provide the water supply to the village on priority basis.		To draw a scheme for continuous water supply of drinking water to villages nearby.	
3.	Mr. ShivarangaRao, Boyareddypalli:- He has informed that the crops in the area are being damaged due to the existing factory and informed that the industry has not provided any employment opportunity to the Boyareddypalli villagers. He has informed that villagers have given their lands to the factory based on commitment given by the industry for supply of drinking water and also other developmental activities in the village. He also informed that the admissions to the school for the villagers is being based on the	There was no complaint from any villager about the damage to the crops, and as the emissions are far below the specified norms. The greenery in the colony is also maintained and there was no damage reported. The priest discontinued in the temple as no one was visiting the temple. The management is prepared to reappoint	The priest was appointed for the temple. The management is ready to induct any no.of students from the villages for admission into school. No recommendation is required.	Rs 2 lacs for the temple and Rs 20 lacs for the school development

S.NO	SPEAKER	MANAGEMENT RESPONSE	ACTION PLAN	BUDGET
	recommendation only and the management has not implemented any developmental activity in their village except construction of 114 Ramalayam in their village. He has cited that the management has not even provided priest in the temple for performing the pooja regularly and also not providing employment to the local villagers in the factory.	him and requested the locals to keep visiting the temple. 80% of employees are locals and they will be preferred for expansion activity also.		
4.	Mr. Vijaya Reddy, NGO:- He has requested the MoEF&CC, Gol to sanction permission for the proposed expansion activity of the industry and requested the authorities to safe guard the historical monuments existing in the area and also for the conservation of the natural resources like water, air and soil existing in the area. He has requested the management to take measures for avoiding contamination of air and water in the area. He has requested the management to develop the greenbelt in another 20.0 Ha for the expansion activity either by acquiring additional land or avenue plantation in the waste lands/ agricultural lands of the farmers. He has informed that drought conditions are prevailing in	The management agreed with the suggestions of the speaker. The rain water harvesting was implemented and about 20 pits are already in place. 4 check dams were also constructed. Which is helping the recharge of ground water. Check dam near chintalayapalli for storing of rain water has been constructed and PCIL has initiated Checkdam construction	Rainwater harvesting works were already initiated Pollution control measures of the expansion plan will be made ready prior to commissioning of expansion PCIL has carriedout need based study and will initiate implementation of the same from the year	Rs 4.0 crores for rainwater harvesting Rs 120 crores EMP budget was allotted to control the pollution from expansion Rs 3.0 crore budget provided

S.NO	SPEAKER	MANAGEMENT RESPONSE	ACTION PLAN	BUDGET
	the Anantapuram District and requested the management to implement the measures for harvesting of the rain water in the area for increasing the ground water levels in the area. He suggested the management to spend CSR funds i.e., 5% of their profits in the effected villages for the inclusive development of the village and requested the authorities to recommend to MoEF&CC, Gol for issuing approval to the industry with conditions.	<p>at Kundanakota</p> <p>The emission levels are maintained far below the norms.</p> <p>Plantation is taken up along the roads outside premises also.</p> <p>Funds are never a constraint and the villagers are happy with the CSR activities taken up.</p>	2018 onwards	
5.	<p>Mr. Janardhan Reddy, NGO:-</p> <p>He has informed that M/s. Penna Cement Industries Limited., has incurred an amount of 2.0 crores since 2008 for the implementing various developmental activities in the surrounding villages and informed that they will spend another 20.0 crores for the expansion project for the developmental activities in the surrounding villages. He has also informed that the present cement plant has provided</p>	<p>80% employees are locals and they will be preferred in expansion phase also.</p> <p>Rs 20 crores have been earmarked for the CSR activities in the next ten years .</p>	<p>Locals are to be preferred in the expansion phase.</p> <p>Based on their eligibility ,training also will be provided, so that at the time of commissioning ,they are also considered for employment.</p>	Rs 20 crores for CSR activities in next 10 years.

S.NO	SPEAKER	MANAGEMENT RESPONSE	ACTION PLAN	BUDGET
	employment to about 750 members and envisaged that expansion project will provide the employment to about 450 members. He has requested the management to give at least 50% of the employment opportunities in the expansion project to the local villagers and requested the authorities to give permission in the expansion project proposed by the industry.			
6.	<p>Mr. Bheemeswar Reddy, Surpanch, Kamalapadu:-</p> <p>He informed that the management of the industry have implemented developmental activities in the area by constructing schools and check dams for the preservation of rain water in the area. He informed that the villagers are facing problems due to the drought conditions prevailing in the area and requested the management to provide employment opportunities to the surrounding villagers based on their qualification. He has informed that the management of the industry is taking all possible steps including the laying the pipeline from Yadiki for the supply of water to the Boyareddypalli village and requested the villagers to</p>	<p>The. management will provide assistance to the villagers for any needs.</p> <p>Drinking water is supplied regularly.</p> <p>A new scheme is being drawn to supply water from Yadki canal through pipelines to the villages</p> <p>New educational facilities are created.</p>	<p>Water supply through pipelines is being implemented. The college construction to be completed. , which in creating employability opportunities.</p> <p>2 more checkdams are planned in next year.</p>	<p>Rs 2.0 crores for the college</p> <p>Rs 25 lacs for pipelines.</p> <p>Rs 4.0 cores for checkdams i.e rainwater harvesting.</p>

S.NO	SPEAKER	MANAGEMENT RESPONSE	ACTION PLAN	BUDGET
	support the expansion project of the industry.			
7.	<p>Mr.P.L.N.Rao, NGO:-</p> <p>He informed that the management of the industry have implemented advanced technologies in their cement plants in Nalgonda & Anantapuram District to abate the pollution levels. He has informed that they made survey for the last one week in the area and informed that there are no complainants from the surrounding villagers regarding pollutions problems from the industry. He has requested the management to provide employment to the local villagers and to carry out the developmental activities in the surrounding villages.</p>	Locals were employed and they will be preferred in the expansion phase also.	-	-
8.	<p>Mr.RamanjaneyaReddy, Nittur:-</p> <p>He has informed that the villagers have given their agricultural lands to the factory for laying of the railway line and informed that the management have implemented developmental activities in their village by providing RO plant for drinking water, constructing culvert to their village. He has urged the management to provide further employment opportunities to their</p>	Management assured that the villagers from Nittur also will be considered for employment.	-	-

S.NO	SPEAKER	MANAGEMENT RESPONSE	ACTION PLAN	BUDGET
	villagers on par with other villages existing in the area.			
9.	Mr. Srinivasulu, Boyareddypalli: He has informed that he has completed Industrial Training Institute (ITI) course & he has requested the management to provide employment to him.	He was asked to submit the application to HR department.	-	-
10.	Mr. UthamaReddy, Chinthalayapalli: He informed that the Management is providing employment to the nearby villagers and requested the management to constitute village committees in the surrounding villages for carrying out developmental activities and also for providing employment opportunities to the surrounding villages.	Management requested the village heads of the nearby villages to form a committee and suggest the names for employment and for training. The process will be done on their recommendation.		
11.	Mr. Raghavendra Boyareddypalli:- He has informed that the management of the industry has not carried out any developmental activities in their village and also not provided employment to the villagers. He informed that only 3 villagers were provided employment in the existing cement plant till now though there are about 20 graduates in their village. He has informed that the management has not taken any	The eligible villagers were recruited as and when the need arises. The recently passed graduates will be considered for employment in expansion phase basing on their qualification. The management is		

S.NO	SPEAKER	MANAGEMENT RESPONSE	ACTION PLAN	BUDGET
	<p>effective steps for providing drinking water to their village. He informed to authorities that admission to the school for the children of their village will be given based on the recommendations only and reiterated that the industry is not providing the employment opportunities to the villagers. Sri Sanjeeva Reddy of the village has intervened and urged the management of the industry to provide employment opportunities to the villagers in the expansion activity as the villagers have given their land to the industry and also there is no much cultivation in the area due to scarcity of the rainfall. Sri Shiva Ramireddy, Sarpanch of the village has assured the gathering that the laying of the pipeline from Yadiki to the Boyareddipalli is in the advance stage and the villagers will be provided with water within a month.</p>	<p>providing water to villages through tankers and the supply through pipelines from Yadiki canal is expected in a month or two. The roads will also be developed further.</p> <p>One need not go to Headmaster. They can approach the Personnel Manager for admissions and all approached will be admitted.</p> <p>Management is ready to extend the School facilities more.</p>		
12.	<p>Mr.Chalamareddy, Veerareddypalli:-</p> <p>He informed that there is no proper road connectivity to their village and requested the authorities to provide road connectivity to their village. The Joint Collector has informed him the</p>	<p>It is district administration issue.</p>	-	-

S.NO	SPEAKER	MANAGEMENT RESPONSE	ACTION PLAN	BUDGET
	issues raised by him is not related to the present public hearing and requested him to give separate representation to the District administration for consideration for laying road to their village.			

ANNEXURE – 10A

**STANDARD OPERATING PROCEDURE FOR REPORTING NON
COMPLIANCES TO BOARD OF DIRECTORS**

STANDARD OPERATING PROCEDURE (SOP)

This SOP describes the procedure for reporting Non-Compliances which effect operation of the plant and plant personnel.

This SOP applies to all Plants of Penna Cement Industries Limited (PCIL).

Definitions

- Non-Compliance: Any deviation or departure from the stipulated conditions of statutory bodies that does not have prior approval unless the change is necessary to remove an immediate hazard to plant and working personnel.
- Corrective Action Plan (CAP): A plan developed in response to a violation that outlines the steps to be taken to: (1) reduce the risk to plant affected by the violation and (2) prevent a recurrence of the violation.

Procedures

Reporting protocol on violations

Periodic review of the compliance to the conditions stipulated by statutory bodies will be done once in 6 months. The responsibility of conducting the Audit lies with the Unit Head. Audit shall be carried out by internal or external persons. The summary of violations that occurred during Audit will be recorded in report form. Violations will be reported within 48 hours to the Unit Head.

The violation recorded will be evaluated to study whether protocol change has been initiated to remove violation

The Content of the Violation Report.

Reports of violations will include the following elements:

- Date of report
- Department Name
- Description of the violation, including dates and other details;
- Description of the factors that led to the violation;
- Description of any compromises to workers safety or to the integrity of the plant
- A statement addressing whether the violation is likely to affect plant operations/personnel.

- As applicable, a description of corrective actions already taken, dates of implementation, and whether and how persons involved were informed of the violation and outcomes.
- A Corrective Action Plan (CAP). Corrective action plans shall be prepared to include one or more of the following:
- Drafting new or revised standard operating procedures,
 - Developing new or revised monitoring plan
 - Notifying Departments/workers of risks associated with the violation
 - Training personnel,
 - Hiring additional personnel or modifying roles and responsibilities
 - Signature. The Auditor will sign the violation report.

Review of Findings of Non-Compliance

All reports of non-compliance are initially evaluated by the Incharge (Environment Safety). A report will either be designated as not requiring further action, or will be escalated for review by Unit Head.

Investigation

The Unit Head reviews the report and chooses one of the following courses of action in investigating the allegation:

- a. Conducts the review alone
- b. Conducts the initial review in co-ordination Incharge (Environment Safety)
- c. Requests that legal counsel provide advice and conduct the review

Serious or Continuing Non-Compliance Referred to the Board of Directors (BOD)

Non-compliance that is believed to be serious or continuing is referred for review to the BOD through Incharge (Environment Safety) after endorsement by Unit Head. The report, along with pertinent materials, will be made available to all BOD members of the reviewing prior to the convened meeting.

Upon convened BOD review, the following actions may be taken:

- i. The BOD determines that additional information is needed and requests that such information be obtained before further action is taken.
- ii. The BOD determines that non-compliance did not occur or that non-compliance occurred but was neither serious nor continuing, and either takes no action or requires or recommends an appropriate

- corrective action plan.
- iii. The BOD determines that non-compliance occurred and that it was serious or continuing. The BOD takes appropriate action
- ❖ Follows the required internal reporting procedure concerning determinations of serious or continuing non-compliance.
 - ❖ For concerns not within the BOD purview, the BOD refers the matter to the Unit Head.
 - ❖ BOD determinations and actions are recorded, and communicated to the relevant Incharge (Environment Safety) with Copy marked to Unit Head for necessary actions.

Post-Review Reporting Procedures

In considering actions for serious or continuing non-compliance, the BOD seeks to:

- a. Correct the non-compliance
- b. Discourage it from occurring again (e.g., hold the relevant individuals accountable for their actions and provide education on how to comply), and
- c. Attempt to mitigate any adverse effects on plant/workers.



National Accreditation Board for Education and Training

(Member - International Accreditation Forum & Pacific Accreditation Cooperation)



Reference No. - QCI/NABET/ENV/ACO/17/0415

September 21, 2017

To,
M/s B S Envi-Tech Pvt Limited
12-13-1270/71/73, Amity Ville, 4th Floor
St Anne Road, Tarnaka, Secundrabad- 5000017
(Kind Attention :Mr Y B S Moorthy)

SUB: Letter regarding Extension of Validity with Accredited Sector

Ref.: NABET letter dated September 18, 2017 and your mail dated September 20, 2017

Dear Sir,

This has reference to the accreditation of your organization under QCI-NABET EIA Scheme, the validity of **B. S. Envi – Tech (P) Ltd.** is extended up to **June 22, 2018** subject to continued compliance. The scope of Accreditation for your organization is as per below table:

Scope of Accreditation

Sl. No.	NABET Scheme Sectors	Sector Description	Cat.	Sector No (MoEFCC Notification dated Sep. 14, 2006 and Amendments)
1	1	Mining of minerals including Open cast/ Underground mining	A	1 (a) (i)
2	4	Thermal power plants	A	1 (d)
3	7	Mineral beneficiation including palletization	A	2 (b)
4	8	Metallurgical industries (ferrous & non-ferrous) - both primary and secondary	A	3 (a)
5	9	Cement plants	A	3 (b)
6	11	Coke oven plants	B	4 (b)
7	12	Asbestos milling and asbestos based products	A	4 (c)
8	22	Distilleries	A	5 (g)
9	25	Sugar Industry	B	5 (j)
10	38	Building and large construction projects including shopping malls, multiplexes, commercial complexes, housing estates, hospitals, institutions	B	8 (a)
11.	39	Townships and Area development Projects	B	8 (b)

The above extension is subject to the submission of required information/documents related to assessment on time to the NABET.

With best regards,

(Signature)
A K Jha 21/09/2017
Sr. Director



National Accreditation Board for Education and Training

(Member - International Accreditation Forum & Pacific Accreditation Cooperation)



QCI/NABET/EIA/ACO/17/00400

September 18, 2017

B. S. Envi – Tech (P) Ltd.

12-13-1270/71/73, 'Amity Ville', 4th Floor,
St. Ann's Road, Tarnaka, Secunderabad – 500017
(Kind Attention: Mr. Y B S Moorthy)

Sub: Validity of Accreditation as EIA Consultant organization- B. S. Envi – Tech (P) Ltd.

Dear Sir,

This has reference to the accreditation of your organization under QCI-NABET EIA Scheme, the validity of **B. S. Envi – Tech (P) Ltd.** is hereby extended till June 22, 2018 or completion of assessment process, whichever is earlier.

The above extension is subject to the submission of required information/documents related to assessment on time to NABET.

You are requested not to use this letter after expiry of the above stated date.

With best regards,

A.K. Jha


Senior Director | NABET

DECLARATION BY EXPERTS CONTRIBUTING TO THE EIA

**M/s. Penna Cement Industries Ltd – Expansion of Cement Plant by
Increasing of Clinker Production from 1.5 to 4.0 MTPA, Cement from 2.0
to 4.6 MTPA & Increase of Waste Heat Recovery Power Plant from 10 MW
to 20 MW near at Boyareddypalli Village, Yadiki Mandal,
Anantapur District, Andhra Pradesh.**

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

EIA Coordinator :

Name	:	Ch. V. Tulasi
Signature & Date	:	
Period of involvement	:	June 2016 to till date
Contact information	:	M/s. B. S. Envi-Tech Pvt. Ltd. #12-13-1270/71/73, Amity Ville, 4th Floor, Beside Spencer Super Market, St. Ann's Road, Tarnaka, Secunderabad-500017
Email id	:	info@bsenvitech.com
Ph No	:	+91-40-49783062.
Team member For EC	:	Vijay Kumar .V (TM)

Functional Area Experts:

S. No	Functional Areas	Name of the expert/s	Involvement (Period & Task)	Signature & Date
1	LU (Land Use)	G. Chandra Sekhar	June 2016 to till date	G. Chandra Sekhar
2	AQ (Meteorology, Air Quality Modeling & Prediction)	Ch. V. Tulasi		Tulasi
3	AP (Air Pollution Prevention, Monitoring & Control)	B.S. Chandra Murthy		B.S. Chandra Murthy
		V. Vijay Kumar (TM)		V. Vijay Kumar (TM)
4	WP (Water Pollution Prevention, Control & Prediction of Impacts)	Ch. V. Tulasi		Tulasi
		V. Vijay Kumar (TM)		V. Vijay Kumar (TM)
5	EB (Ecology and Biodiversity)	G. Raja Reddy		G. Raja Reddy
6	SE (Socio-Economics)	D.V.L.N.V. Prasad Rao		D.V.L.N.V. Prasad Rao
7	NV (Noise/Vibration)	B.S. Chandra Murthy		B.S. Chandra Murthy
8	RH (Risk Assessment & Hazard Management)	D.H. Patel		D.H. Patel
9	SHW (Solid Waste and Hazardous Waste Management)	Ch. V. Tulasi		Tulasi
10	HG (Hydrology, Ground Water & Water Conservation)	M. Veeranna		M. Veeranna
11	GEO (Geology)	G. Chandra Sekhar		G. Chandra Sekhar
12	SC (Soil Conservation)	B. Hari Babu		B. Hari Babu

Declaration by the Head of the Accredited Consultant Organization

I, Y.B.S. Moorthy, hereby, confirm that the above mentioned experts prepared the EIA M/s. Penna Cement Industries Ltd - Expansion of Cement Plant by Increasing of Clinker Production from 1.5 to 4.0 MTPA, Cement from 2.0 to 4.6 MTPA & Increase of Waste Heat Recovery Power Plant From 10 MW to 20 MW near at Boyareddypalli Village, Yadiki Mandal, Anantapur District, Andhra Pradesh. I also confirm that I shall be fully accountable for any mis-leading information mentioned in this statement.

Signature

: 

Name

: Y B S Moorthy

Designation

: Managing Director

Name of the EIA Consultant Organization

: B.S. Envi Tech (P) Ltd

NABET Certificate No.

: NABET/EIA/1316/RA0002

Valid Date

: June 2018

