Madras Cements Ltd.

Expansion of Govindapuram Cement Plant
(Clinker 1.55 MTPA to 3.25 MTPA & Cement 3.0 MTPA to 5.5 MTPA)
along with

Captive Power Plant (18 MW to 60 MW)

Govindapuram & Aminabad Villages, Ariyalur Taluk & District, Tamil Nadu

Environmental Clearance under EIA Notification 2006
Category ‘A’

Summary Environmental Impact Assessment Report

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1.0 Project Description

1.1 Project Proponent

Ramco Group is one of the leading, highly reputed and Second Largest Industrial Group in South India. The total employees are about 8,500 and the Turnover of the Group is Rs.3,500 crores. Ramco’s main Company M/s. Madras Cements Ltd. (MCL) are one of the reputed and respected Cement Companies in India. The cement production of MCL is about 12 MTPA from its existing cement plants in South India.

MCL is producing Ordinary Portland Cement (OPC), Portland Pozzolana Cement (PPC) and Slag Cement (PSC). The cement produced by MCL is marketed in the brand name of ‘RAMCO’. The brand name RAMCO SUPER GRADE is very popular PPC and RAMCO SUPER STEEL is the slag cement brand. The market centres are mainly in Tamil Nadu, Andhra Pradesh, Kerala and Karnataka States.

MCL has been constantly upgrading the technology and has been the trend setter for the rest of the industry in the country. MCL which has always been striving for Total Quality, possesses International Certificate ISO:9001, ISO:14001 and ISO:18001. The company has achieved various awards for ‘Best Performance’ in the Cement Industry and also Green Rating Project Awards 4 Leaves from Centre for Science and Environment for the Year 2005.

1.2 Need for the Project

MCL has recently commissioned a Cement Plant of 3.0 million tons per annum (MTPA) capacity along with a Township of 300 Quarters in an extent of 81.00 Ha near Ariyalur at Govindapuram village, Ariyalur Taluk & District, Tamil Nadu (Fig. 1.1). It has obtained the Environmental Clearance from the Ministry of Environment and Forests (MoEF) for the Cement Plant and 18 MW CPP vide Letter J-11011/509/2006-IA II (I) dated 24.08.2007. The cement production was commenced from May 2009 after obtaining the Consents to Operate from the Tamil Nadu Pollution Control Board (TNPCB) vide its Orders 17859 (Air Act) & 21820 (Water Act) dated 15.05.2009. Captive Power Plant of 1x18 MW proposed earlier is yet to be established. Township construction is to be completed by this year end.

Railway sidings were earlier proposed from Ottakovil Station. However, the Southern Railway has recommended the sidings along with existing TANCEM Line from Ariyalur Station. Thus, the railway sidings shall be laid from Ariyalur as per the Railway’s guidelines. MCL Govindapuram Cement Plant is being supported by four mine blocks viz. Periyanagulur, Kattupiringium, Reddippalayam and Puduppalaiyam North (Adjacent Tan India Block) in Ariyalur Region with a total limestone production of 3.50 MTPA. The centralised Crusher has been established near Periyanagulur Mines (at a distance of 13 km from Govindapuram Plant in the southeast).
With the recent prospecting and assessment of existing and proposed mine blocks, MCL proposes a Second Cement Line of 2.50 MTPA capacity in Govindapuram Plant. Accordingly, the production of existing mines in Ariyalur Region are also being enhanced. In addition to the existing 8,000 TPD Crusher at Periyanagapuram, an additional 1000 TPH Crusher (4.00 MTPA capacity; for low grades) is also proposed at the Plant.

Existing Line-I requires 23.5 MW and the proposed Line-II would require 25.0 MW. Thus, the total power requirement with auxiliary consumption of 7 MW would be 56 MW. With prevailing power scenario in the State and for smooth operations of Lines I & II, MCL has decided to opt for 60 MW (1x40 MW and 1x20 MW) Captive Power Plant in lieu of 1x18 MW CPP (for which environmental clearance was obtained).

1.3 Expansion Proposal

The details of the expansion proposed now are as follows:

- New Cement Line-II (clinker 1.70 MTPA; cement 2.50 MTPA) for the Plant total production of 3.25 MTPA clinker and 5.50 MTPA cement.
- CPP of 60 MW (1 x 40 MW and 1 x 20 MW) in place of 1 x 18 MW CP.
- New Crusher of 4.0 MTPA capacity at Govindapuram Cement Plant.
- Additional standby DG Power of 6 MW (in addition to existing 14 MW) and
- Railway Siding from Ariyalur.

<table>
<thead>
<tr>
<th>Production of</th>
<th>Source</th>
<th>Production Capacity, MTPA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Existing</td>
<td>Addition on Expansion</td>
</tr>
<tr>
<td>Clinker</td>
<td>Line-I</td>
<td>1.55</td>
</tr>
<tr>
<td></td>
<td>Line-II</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Sister concern</td>
<td>0.45</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>2.00</td>
</tr>
<tr>
<td>Cement</td>
<td>Line-I</td>
<td>3.00</td>
</tr>
<tr>
<td></td>
<td>Line-II</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>3.00</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Power Generation</th>
<th>Capacity, MW</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Existing</td>
</tr>
<tr>
<td>Captive Power Plant</td>
<td>1 x 18</td>
</tr>
<tr>
<td></td>
<td>(in place of 18 MW)</td>
</tr>
<tr>
<td>TNEB Supply</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Standby DG Sets</td>
<td>14</td>
</tr>
</tbody>
</table>

TNEB power supply would be reviewed once the CPPs had commissioned.
1.4 Additional Land

Existing Plant, Captive Diesel Power Plant, Township, etc. are located in an extent of 81 Ha. For Expansion, lands to an extent of 69 Ha falling in Govindapuram and Aminabad villages have been purchased. Now, the total extent is 150 Ha. The available additional land extent will accommodate the Line-II, Raw Material Storage, Railway Sidings, etc. All other infrastructure facilities would be adequate for both lines.

1.5 Project Cost & EMP Budget

Project Cost of the Cement Plant Line-I is Rs.600.00 crores. Project Cost of the proposed Line-II is Rs.450.00 crores. Project Cost of 60 MW CPP is Rs.200.00 crores. Thus, Project Cost for the expansion proposals is Rs.650.00 crores. EMP Budget for the proposed expansion would be as follows:

<table>
<thead>
<tr>
<th>Description</th>
<th>Rs. Crores</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Existing</td>
</tr>
<tr>
<td>Project Cost - Cement Plant</td>
<td>600.00</td>
</tr>
<tr>
<td>Project Cost - CPP</td>
<td>-</td>
</tr>
<tr>
<td>Capital Cost for EMP Measures</td>
<td>68.00</td>
</tr>
<tr>
<td></td>
<td>(11.33%)</td>
</tr>
<tr>
<td>Recurring Cost per Annum</td>
<td>5.80</td>
</tr>
<tr>
<td>Occupational Health Budget per Annum</td>
<td>0.25</td>
</tr>
<tr>
<td>CSR Budget per Annum (out of total allotment of Rs.42.50 crores)</td>
<td>0.50</td>
</tr>
</tbody>
</table>

There will be an addition of 300 employees to the existing 350 employees. There will be indirect employments to about 600 persons due to the Plant.

1.6 Cement Manufacturing Process

The Plant is producing Ordinary Portland Cement (5-10%) and Portland Pozzolana Cement (90-95%) Layout of the Cement Plant (both Lines I & II) is shown as Fig. 1.2. The general manufacturing process of cement manufacturing (Fig. 1.3) and section-wise process details are explained below:

Cement manufacturing consists of: raw meal grinding, blending, pre-calcining, clinker burning and cement grinding. Crushed Limestone and other materials (additives) containing calcium, silicon, aluminium and iron oxides are crushed, dried and ground in a ball mill (raw meal). This raw meal is blended in blending silos and is then heated in the pre-heating system to dissociate into calcium oxide and carbon dioxide. The meal then proceeds to the kiln for heating and reaction to form calcium silicates and aluminates at about 1450 °C. Clinkerisation takes place partly in the pre-burning zone (380 °C- 860 °C) and partly in the burning zones (1500 °C). The clinker formed will be cooled in a cooler.
The cooled clinker will be grinded in a ball mill along with Gypsum and Fly Ash/Slag. Cement formed is sent to packing section and despatch.
Proposed Line-II shall have a dry process kiln with suspension preheater (5 stage) and precalciner with suitable cooler. Line-II shall have 5000 TPD kiln (4.15 m dia x 64 m long) to manufacture clinker. Vertical roller mills are proposed for raw material grinding, cement grinding, coal/lignite grinding. Provision of Microprocessor based latest process control and instrumentation and automation system with gas analysers shall be provided. All controls, except for limestone crushing, will be handled from the central control room.

1.7 Captive Power Plant

The proposed Captive Thermal Power Plant will have the following configuration:

- **Capacity**: $1 \times 40 \text{ MW} + 1 \times 20 \text{ MW} = 60 \text{ MW}$
- **Steam Generator and ranges**: 3 Nos. of maximum continuous rating 85 TPH & each at 89 atm. & 515 °C
- **Type of Boiler**: Atmospheric Fluidized Bed Combustion Boiler (AFBC)
- **Steam Turbine Generator**: 1 No. 40 MW & 1 No. 20 MW
- **Pollution Control Measure**: ESP (99.98% efficiency);
- **SPM emission**: $<50 \text{ mg/Nm}^3$
- **Stack Height**: 100 m + 82 m.

The proposed Captive Power Plant will be a conventional Rankine Steam Cycle Thermal Power Plant with Fluidised Bed Combustion Boiler. The Plant would consist of a single 40 MW and 20 MW Steam Turbine Units directly coupled Electrical Generator. The boiler is designed to use imported coal. Coal shall be received by rail/trucks and unloaded into a dump hopper in the Cement Plant with the help of truck tippler and wagon tippler. From the dump hopper, a vibrating shall feed the material to the stacker belt conveyor through prescreen and crusher to coal storage yard.

The boiler together with its associated auxiliaries would produce superheated steam at 89 kg/cm² and 515 °C. The super heated steam would be taken to the steam turbine generator, air cooled condensers and associated auxiliaries. The steam will be used for running the turbine generator to produce total 60 MW electricity.

**Crusher at Govindapuram**: In the expansion, a 1000 TPH Crusher (4.0 MTPA) is proposed at the Plant itself.

MCL is utilising the Fly Ash from nearby Thermal Power Plants to an extent of 30-35% and provision is being made for usage of Slag from the Blast Furnaces to an extent of 30-35%.

MCL proposes an efficient Bag House for Kiln/Raw Mill, Bag Filters for Coal Mill, 99.98% efficiency ESPs for Cooler Vent and Bag Filters for Cement Mill and Packing Plants to control the SPM Emissions $<50 \text{ mg/m}^3$. High efficiency reverse air jet type bag filters have been considered for all materials transfer points to control SPM emission $<50 \text{ mg/Nm}^3$. 
1.8 EIA Study

As per the Environmental Impact Assessment Notification 2006 [SO 1533 (E) dated 14.09.2006], all the Cement Plants with \( \geq 1.0 \) MTPA capacity have been kept at Sl. No. 3 (b) under Category ‘A’ for the Environmental Clearance from the Central EIA Authority at MoEF, New Delhi. As the present proposal is the expansion of Cement Plant with \( \geq 1.0 \) MTPA capacity along with Captive Power Plant, application is being submitted to the Industry Committee at Central EIA Authority in MoEF.

MCL has engaged the services of M/s. Environmental System Consultants & Ensyscon Environmental Laboratory, Chennai as the Consultant for the EIA-EMP Study. List of Experts pooled for the study is:

- Ensyscon Environmental Laboratory which has the competency and infrastructure in carrying out monitoring studies (TNPCB Letter to the Effect Ref. P&D1/22214/99 dated 29.06.1999). The Laboratory is having a Permanent Account with the National Remote Sensing Agency (NRSA), Hyderabad for acquiring the IRS Satellite Imagery.
- The services and expertise of Dr. S. Aruchamy, Sr. Lecturer, Bharathidasan University, Trichy for Land Use and Demographic studies.
- Dr. D. Srinivasan, Reader, Department of Geology, National College (under Bharathidasan University), Trichy will be engaged for the Hydrogeological Studies.
- Dr. Alagappa Moses, Sr. Lecturer, Bishop Heber College, Trichy and his team will be engaged for the Flora-Fauna studies including Avian Fauna.

MCL has applied to MoEF with Form-1, Project Feasibility Reports and Draft Terms of Reference (Draft TORs) on 18.12.2009. Based on the communication received from MoEF, MCL has also presented the Project to the Expert Appraisal Committee (EAC) - Industry (1) during its 10th Meeting held on 17-18th May 2010. Final TORs were finalised and awarded vide MoEF Letter J-11011/82/2010-IA.II (I) dated 18th June 2010.

MCL is carrying out the periodical environmental quality monitoring for the Cement Plant in compliance with conditions stipulated in MoEF Clearance and TNPCB Consents and submitting the status reports to the concerned Authorities. MCL has requested the Hon’ble Committee for using the recent season data for EIA Report and the Hon’ble Committee permitted for the same. Accordingly, the environmental data pertaining to the Winter 2009-10 Season are used for the EIA Study.

The Environmental Impact Assessment (EIA) Report and the Summary Environmental Impact Assessment Report have been prepared as per the generic structure proposed in EIA Notification 2006 and as per the Model TORs for Cement Plant along with Captive Power Plant Projects that devised by MoEF Experts Appraisal Committee for Industry Projects.

The Additional TORs are also incorporated in the EIA Report and submitted along with Summary EIA Report (both in English & Tamil) for Public Consultation/Public Hearing.
2.0 Description of the Environment

The Plant area falls in Survey of India Topo Sheet No. 58/M4 (Fig. 2.1). The Latitude and Longitude details of the Plant area is:

\[
\begin{align*}
\text{Latitude} & : 11^\circ10'30"-11^\circ10'45" \text{ North} \\
\text{Longitude} & : 79^\circ05'19"-79^\circ05'45" \text{ East.}
\end{align*}
\]

There is no environmental issues about the site. No forest land is involved. No Rehabilitation/Resettlement is envisaged. There is no National Park/Wild Life Sanctuary/Biosphere Reserve/Reserved Forest/Hot Spot/Historical Monuments exist within 10 km radius area.

The Plant is accessible from the nearby State Highway SH-139 connecting Ariyalur-Sendurai-Jayamkondam (1 km). The Southern Railway BG Line runs parallel to the site at a distance of 0.5 km in the west. The nearest Airport is Trichy at a distance of 55 km in the south. The nearest Ports are at Chennai (300 km) and Cuddalore (115 km).

Study area of 10-km radius exhibits plain terrain with a gentle slope towards north as well as south. The minimum and maximum elevations are 30 m and 120 m above mean sea level (aMSL) respectively. There is no hillock noticed in the study area.

Seasonal nallah Marudaiyar River drains the area which flows in south at 7 km distance from Plant. Vanchiyam odai drains the Plant area. Another seasonal nallah Kallar River drains the areas in the east. Small seasonal streams/ nallahs flow towards north as well as south. Overall drainage pattern of the region appears to be dendritic.

The area falls under semi-arid zone and is free from seismic effects (Seismic Zone II). Sub-tropical climate prevails over the study area. The nearest IMD Centre is Trichy Airport at a distance of 55 km in the south. The temperature is maximum during March to May and it drops from June onwards. The maximum temperature ranges from 40 °C to 44 °C and the minimum temperature from 26 °C to 30 °C. The nearest raingauge station is Ariyalur and the 70 years normal annual rainfall is 1096 mm.

The nearest Town is Ariyalur at a distance of 3.5 km in the south. Ariyalur Town is a Class III Town with a population of 27822 persons in 6305 Households as per 2001 Census. Govindapuram (1.5 km; west), Nallambathai (1.0 km; northwest) and Aminabad hamlet (0.5 km; southeast) are the nearest settlements.

Other than MCL Govindapuram Plant, there are five major Cement Plants in the Region viz. Dalmia Cement Tamaikulam Plant (3.0 MTPA; 0.9 km in NE), TN State Govt. owned TANCEM near Kallankurichi (0.6 MTPA; 3 km in south-southeast), Aditya Birla Group's Grasim Plant at Reddippalaiyam (1.2 MTPA; 12 km in the southeast), Chettinad Cement Kilapaluvur Plant (5.5 MTPA; 13 km in the southwest) and Dalmia Cement Kallakkudi Plant (4.0 MTPA capacity; 25 km in the southwest). Jeppiar Cement is operating a mini Cement Plant (0.3 MTPA) in Kilamattur at 7 km distance in the west. These Cement Plants and others have their Limestone Mines in the Region. Kothari Sugar Plant at Thirumanur is at 20 km distance in the south. MCL Alathiyur Plant is at a distance of 40 km in the north.
Madras Cements Ltd. Govindapuram Cement Plant Expansion (3.0 to 5.5 MTPA) along with CPP (18 to 60 MW), Ariyalur, TN

Fig. 2.1 Topo Map (3, 5, 10 & 15 km Radius)

Legend

Survey of India Topo Sheet Nos.: 58 U/15 & 58 W/4
58 H/18 & 58 H/4

Plant Coordinates:

Latitudes: 11°10'30"-11°10'45" N
Longitudes: 78°06'10"-78°06'45" E

Elevation: 90-160 m (AMSL)

Note: Some of the Reserved Forests (with Cauvery) demarcated in 1891 have been brought under Developmental activities (merged into Revenue Village Limits) in Census-2001.

Enyscon, Chennai-78.
2.2 Environmental Components

Considering the environmental setting of project, project activities and their interaction, environmental Regulations and Standards, following Environmental Attributes have been included for the EIA study. Study Area will be covering 10 km Radius from Plant Boundary (Fig. 2.2).

The Project site and its environs fall in Industrial, Residential, Rural and Other Areas Category as per National Ambient Air Quality (NAAQ) Standards revised as per GSR 826(E) dated 16.11.2009.

- Site specific Micrometeorological Data for the parameters Wind Speed & direction, Temperature, Humidity, Cloud Cover and Rainfall.
- Ambient Air Quality (at 14 locations) for the parameters : PM2.5, PM10, SPM, SO₂, NOx, CO, HC & Particulate Lead.
- Noise Level Measurements at 14 Locations for both Leq-Day and Leq-Night values.
- Water Quality-both Surface Waters (8 Locations) and Ground Waters (10 Locations) for IS:10500 Norms.
- Soil Quality (5 Locations) for Textural & Physical Parameters, Nutrients, etc.
- Present & Post-project Land Use Pattern based on Satellite Imagery.
- Biotic Attributes : Flora & Fauna -Core zone & Buffer zone-Diversity Index.
- Socio-Economic Profile (2001 Census) : Total Population, Household Size, Age, Gender Composition, SC/ST, Literacy Level, Occupational Structure, etc.

TNPCB has conducted the environmental quality survey at MCL Govindapuram Plant during 08-09.09.2009 and the results are given in the following Table.

Table: 3.1 Existing Environmental Status in the vicinity of MCL Govindapuram Cement Plant

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Environmental Component</th>
<th>Date of Sampling</th>
<th>Report Reference</th>
<th>Pollutants Concentration Range &amp; Mean, ug/m³</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SPM</td>
<td>SO₂</td>
</tr>
<tr>
<td>1</td>
<td>Ambient Air Quality at 3 locations</td>
<td>09.09.09</td>
<td>Report No. 43 dt. 18.09.2009</td>
<td>127-143 Mean : 134.7</td>
<td>8-13 Mean : 9.9</td>
</tr>
<tr>
<td></td>
<td>AAQM at 8 locations by Ensyscon</td>
<td>15.09.09</td>
<td>Lab/Mon 43.10 dt. 05.10.2009</td>
<td>SPM 78-156 Mean : 118.9 PM10 : 35-72 Mean 55.6</td>
<td>7-10 Mean : 8.0</td>
</tr>
<tr>
<td></td>
<td>NAAQ Norms (8-hourly), ug/m³ - Revised as per GSR 826(E) dt. 16.11.09</td>
<td></td>
<td></td>
<td>PM10 : 100 80 80</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Fugitive Emissions</td>
<td>09.09.09</td>
<td>43/18.09.09</td>
<td>98-173 Mean : 124</td>
<td>6-14 Mean : 8.6</td>
</tr>
<tr>
<td></td>
<td>Coal Yard</td>
<td></td>
<td></td>
<td>98</td>
<td>5.68</td>
</tr>
</tbody>
</table>
Madras Cements Ltd.                         Govindapuram Cement Plant Expansion (3.0 to 5.5 MTPA) along with CPP (18 to 60 MW), Ariyalur, TN

Ensyscon, Chennai-78.
Madras Cements Ltd.  
Govindapuram Cement Plant Expansion (3.0 to 5.5 MTPA) along with CPP (18 to 60 MW), Ariyalur, TN

<table>
<thead>
<tr>
<th>Stack Emissions</th>
<th>Cement Plant 4 main stacks</th>
<th>08-09.09.09</th>
<th>31-38 Mean: 35.0</th>
<th>2.1-2.6 Mean: 2.4</th>
<th>0.81-3.20 Mean: 2.0</th>
<th>SPM Limit is &lt;50 ug/m³</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Noise Levels, dB(A)</th>
<th>09.09.09</th>
<th>43/18.09.09</th>
<th>Min. Range: 37.2 – 47.5</th>
<th>Max. Range: 50.4-58.7</th>
<th>Leq Range: 45.6-50.1</th>
</tr>
</thead>
</table>

MoEF Norms for day & night times, dB(A) - <55 & <45

**Load Based Emission**: As per TNPCB Survey during 08-09.09.2009, the installed APC measures and the stack emissions were as given below:

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Parameter</th>
<th>RM/Kiln RABH</th>
<th>Coal Mill BFs</th>
<th>Cooler ESP</th>
<th>Cement Mill BFs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Stack Height, m</td>
<td>115</td>
<td>55</td>
<td>50</td>
<td>55</td>
</tr>
<tr>
<td>2</td>
<td>Stack Diameter, m</td>
<td>4.85</td>
<td>1.9</td>
<td>3.2</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>Stack Temperature, °C</td>
<td>106</td>
<td>81</td>
<td>217</td>
<td>93</td>
</tr>
<tr>
<td>4</td>
<td>Stack Velocity, m/s</td>
<td>13.3</td>
<td>8.4</td>
<td>12.8</td>
<td>16.11</td>
</tr>
<tr>
<td>5</td>
<td>Discharge, Nm³/hr.</td>
<td>702453</td>
<td>74903</td>
<td>225607</td>
<td>335750</td>
</tr>
<tr>
<td>6</td>
<td>SPM, mg/Nm³</td>
<td>37</td>
<td>34</td>
<td>31</td>
<td>38</td>
</tr>
</tbody>
</table>

The Plant produced clinker of 4500 TPD is ground along with 1500 TPD clinker from MCL sister concern to produce 3.0 MTPA cement. The average clinker production of the Unit on the monitoring days was 4400 TPD. The Load based Emission computed as per TNPCB Survey was 193 g/Ton of Kiln Feed. As per MoEF Norm, the Load based Emission would be <227 g/Ton of Kiln Feed.

Thus, the environmental quality at MCL Govindapuram Plant was found to be in compliance with the norms stipulated by MoEF/TNPCB. The periodical status reports are being submitted to the statutory authorities regularly.

The findings of baseline environmental status of the study area are summarized below:

- The collected meteorological data during this season represented the local weather phenomena. Neutral and unstable atmospheric conditions were prevailing most of times.
- The monitored ambient air quality in the study area was found to be in compliance with the National Ambient Air Quality (NAAQ) Norms of 100 ug PM10/m³, 60 ug PM2.5/m³, 80 ug SO²/m³ and 80 ug NOX/m³ for Residential, Rural and other areas.
- Ambient equivalent noise levels (Leq) during day and night times were found to be well within the MoEF Norms.
- The water quality of surface waters were found to be in compliance with IS/CPCB norms except for Total Coliforms due to sewage contamination. The ground water quality was found to be in compliance with the IS:10500 Norms.
- The soil in the study area would very well support vegetation after amending it suitably.
Presence of number of phanerophytes (shrubs and trees) and therophytes (annuals) indicates semiarid vegetation structure in the study area.

There is no Wild Life Sanctuary or National Park or Biosphere or Hotspots in the study area of 10 km.

Domesticated animals and common fauna only exist in the study area.

The area is thinly populated except in the only Town Ariyalur. The basic amenities are there almost at all villages.

Thus, adequate buffer exists for the proposed Expansion activity in the physical, biological and edaphic environments of the study area.

3.0 Anticipated Environmental Impact and Mitigation Measures

3.1 Construction Phase

The proposed construction requires/involves: PCC 15000 m³, RCC 75000 m³, Brick Works 2000 m³, RR Wall 2000 m³, Steel 40 mm 13500 m³, Steel 20 mm 65000 m³, RF Steel 7500 Tons, Bricks 10,00,000 Nos., RR structures 1,70,000 m, Sand: 50000 m³, Cement 30000 Tons and Water for Curing & others: 100 KLD. In an average, 10 Truck loads/day (for transporting all construction materials) will be visiting the site in a day during the construction period. Construction labourers (100-125 persons/day) will be pooled from the local public for construction.

Ambient air quality: The monitored mean ambient air pollutants values at the sites were found to be very well within the National Ambient Air Quality Norms for Residential and Rural Areas. The main sources of emission during the construction period are the movement of construction materials and equipments at site and dust emitted during the construction related activities. The impacts of construction activities on air quality will be for short duration, confined locally and is expected to be negligible outside the plant boundaries. Also, there is enough buffer level in the ambient levels in the plant vicinity.

Noise levels: The proposed construction activities would increase the equivalent noise levels by another 2-3 dB(A). There will be very less impact on the existing noise levels due to construction, traffic, fabrication and handling of equipments and machineries, etc. which will be confined locally.

Water quality: The construction water requirement of about 100 KLD will be met from existing borewells. As local labourers to be engaged for the construction activities, no sewage generation is anticipated. Thus, impact on water environment is insignificant.

Terrestrial ecology: Being proposed in existing industrial premises, there is no tree cutting or removal of plantations, etc. involved. No solid/hazardous wastes generation. There is no significant impact is anticipated on the land environment due to the construction activities.

Socioeconomics: There are significant numbers of non-workers in the area and the project would provide direct or indirect job opportunities to them.

Thus, the overall impact on environment during construction phase due to the proposed Project would be short term and insignificant.
3.2 Operation Phase

**Land Use Pattern**: The expansion activities are proposed within and around the Cement Plant. Thus, the proposed Project will not alter the existing land use pattern significantly.

**Air Environment - Prediction Modelling**: Industrial Source Complex Short Term (ISCST3) model by USEPA was used for carrying out the prediction of maximum concentration, the direction and the distance of its occurrence from the project site. On the Cement Plant Expansion (Addition of Line-II of 2.5 MTPA), the predicted (cumulative of Cement Plant Lines I & II and CPP of 60 MW) GLCs were:

- **PM10**: 0.52 ug/m^3 (occurs at a distance of 2 km near the Plant)
- **SO2**: 7.64 ug/m^3 (at 3 km)
- **NOx**: 10.44 ug/m^3 (at 3 km).

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Pollutant</th>
<th>Background Concentration (24-hly.), ug/m^3</th>
<th>Maximum Predicted Ground Level Concentration, ug/m3</th>
<th>Distance from the Plant, km</th>
<th>Total Concentration, ug/m^3</th>
<th>Revised NAAQ Norms, ug/m^3</th>
<th>Buffer Available in Atmosphere, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PM10</td>
<td>39.6</td>
<td>0.52</td>
<td>2.0</td>
<td>40.12</td>
<td>100</td>
<td>59.88</td>
</tr>
<tr>
<td>2</td>
<td>SO2</td>
<td>8.3</td>
<td>7.64</td>
<td>3.0</td>
<td>15.94</td>
<td>80</td>
<td>80.08</td>
</tr>
<tr>
<td>3</td>
<td>NOx</td>
<td>9.6</td>
<td>10.44</td>
<td>3.0</td>
<td>20.04</td>
<td>80</td>
<td>74.95</td>
</tr>
</tbody>
</table>

Note: 1. Background concentration is the existing levels in the study area includes operations of Industrial Plants and Mines. 2. NAAQ Norms-National Ambient Air Quality Norm (24/8 hly.) stipulated by CPCB for Industrial, Residential and Rural Areas.

Thus, there is no significant increase in the ambient air pollutants levels is anticipated due to the Project and adequate buffer exists in the study area for the operation of the Plants.

**Noise**: Noise levels from turbine, fans, centrifugal pumps, electric motors etc, shall be kept below the permissible level of 85 dB (A) at 1m away from the source by proper design. Noise from safety valves, start up vents, steam jet ejectors of condensers etc, are reduced by providing silencers at the outlet of down steam piping. The specifications for procuring major noise generating machines/ equipment shall include built in design requirements to have minimum noise levels meeting Occupational Safety and Health Association (OSHA) requirement. Appropriate noise barriers/shields, silencers, etc. will be provided in the equipment, wherever feasible. As far as possible noise emanating from noisy equipment should be adequately attenuated by enclosure, insulation etc. Ear plugs will be provided to workmen working near high noise generating sources.

**Traffic Intensity**: During Operation Phase, transportation of raw materials and finished products would be by both road and rail net works as existing now. The proposed Expansion would increase the no. of
vehicles to 1144 trucks/day from existing 678 trucks/day for transporting correctives, additives/fly ash, finished product cement, etc.

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Material</th>
<th>Source</th>
<th>For Existing Production, MTPA</th>
<th>Mode of Transport</th>
<th>No. of Tps/d</th>
<th>Addition on Expansion, MTPA</th>
<th>Cumulative, MTPA</th>
<th>Expn. No. of Tps/d</th>
</tr>
</thead>
<tbody>
<tr>
<td>i</td>
<td>Limestone</td>
<td>Own Mines</td>
<td>2.91 @ 7,977 TPD</td>
<td>20 T Taurus</td>
<td>399</td>
<td>2.35 @ 6,433 TPD</td>
<td>5.26 @ 14,420 TPD</td>
<td>721</td>
</tr>
<tr>
<td>ii</td>
<td>Bauxite</td>
<td>TN &amp; Karnataka</td>
<td>0.09 @ 252 TPD</td>
<td>20 T Trucks</td>
<td>13</td>
<td>0.07 @ 203 TPD</td>
<td>0.17 @ 455 TPD</td>
<td>23</td>
</tr>
<tr>
<td>iii</td>
<td>Iron Ore</td>
<td>Karnataka</td>
<td>0.06 @ 168 TPD</td>
<td>20 T Trucks</td>
<td>9</td>
<td>0.05 @ 135 TPD</td>
<td>0.11 @ 303 TPD</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>Clinker Prodn.</td>
<td>-</td>
<td>1.55</td>
<td>-</td>
<td>-</td>
<td>1.70</td>
<td>3.25</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Oth Plant Clinker</td>
<td>Alathiyur</td>
<td>0.45</td>
<td>Rail</td>
<td>-</td>
<td>-</td>
<td>0.45</td>
<td>-</td>
</tr>
<tr>
<td>v</td>
<td>Gypsum</td>
<td>SPIC, EID Parry</td>
<td>0.15 @ 415 TPD</td>
<td>20 T Trucks</td>
<td>21</td>
<td>0.13 @ 335 TPD</td>
<td>0.27 @ 750 TPD</td>
<td>38</td>
</tr>
<tr>
<td>vi</td>
<td>Fly Ash</td>
<td>Mettur &amp; Neyveli</td>
<td>0.76 @ 2092 TPD</td>
<td>40 T Bowsers</td>
<td>53</td>
<td>0.59 @ 1,608 TPD</td>
<td>1.35 @ 3,700 TPD</td>
<td>93</td>
</tr>
<tr>
<td>viii</td>
<td>Coal</td>
<td>Imported</td>
<td>0.24 @ 654 TPD</td>
<td>15 T Trks/Rail</td>
<td>44</td>
<td>0.26 @ 718 TPD</td>
<td>0.50 @ 1,372 TPD</td>
<td>-</td>
</tr>
<tr>
<td>ix</td>
<td>CPP Coal</td>
<td>Imported</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.28 @ 765 TPD</td>
<td>0.28 @ 765 TPD</td>
<td>-</td>
</tr>
<tr>
<td>x</td>
<td>Cement</td>
<td>-</td>
<td>3.00 @ 8,300 TPD</td>
<td>50% - Rail 50% -30 T tk</td>
<td>139</td>
<td>2.50 @ 6,700</td>
<td>5.50 @ 15,000 TPD</td>
<td>250</td>
</tr>
</tbody>
</table>

[466 trips/day (19.4 tks/hr) increase on Expn.] Total 678 1144

Existing roads, Bypass, and State Highways are adequate for handling increase in traffic volume. There will not be any impact on the village roads and nearby agricultural fields nearby due to the expansion.

**Water Balance**: Earlier, the water demand for the cement plant, CPP and township had been projected as 1500 KLD. Permission for tapping 1500 KLD ground water has been obtained from the State Ground Water Board as detailed below:

1. Lr. No. G9/13599/Spl./Cons./TNJ/07 dated 08.11.2007 for 630 KLD.

The proposed expansion activities (Line-II & CPPs) require an additional 1000 KLD for which necessary permission would be obtained from SGWB/CGWB.
The water requirement in existing and proposed scenarios are given in the following Table:

<table>
<thead>
<tr>
<th>Parameters/Components</th>
<th>Raw Water Quantity, KLD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Existing Line-I</td>
</tr>
<tr>
<td>Cement Plant Line-I : Cooling Domestic Use</td>
<td>875</td>
</tr>
<tr>
<td>Township</td>
<td>230</td>
</tr>
<tr>
<td>RO Plant</td>
<td>100</td>
</tr>
<tr>
<td>Captive DG Plant</td>
<td>200*</td>
</tr>
<tr>
<td>Cement Plant Line-II : Cooling Domestic Use</td>
<td></td>
</tr>
<tr>
<td>RO Plant</td>
<td>200</td>
</tr>
<tr>
<td>Captive Power Plants</td>
<td>200</td>
</tr>
<tr>
<td>Green Belt</td>
<td>70</td>
</tr>
<tr>
<td>Total</td>
<td>1500</td>
</tr>
</tbody>
</table>

* - Captive DG Power will be standby on Expn.; Blowdowns of 160 KLD will not be there on Expn.; 30 KLD RO Water will be used for CPP Boilers; 30 KLD out of 200 KLD for DG Plants will be used for Township Expn. and 150 KLD to CPP Cooling Towers and balance 20 KLD for standby DG sets cooling.

There is no effluent generation from the Cement Plant. However, the CPP will generate effluents to a tune of 225 KLD as RO Plants rejects (120 KLD), Boiler blowdowns (25 KLD) and Cooling Tower blowdowns (80 KLD) which will be treated in a 250 KLD ETP and the treated effluent will be sent to the Cement Plant for equipment cooling and evaporated fully there.

A STP of 250 KLD has been proposed earlier for treating 245 KLD sewage from the Plants and townships. The sewage generation will be increased by 50 KLD on expansion and thus a 350 KLD STP is established to treat the total sewage of 295 KLD. The treated sewage would be used for Green Belt proposed in about 50 Ha (33.33%). Thus, the Govindapuram Plant would be a ‘Zero Effluent Discharge’ plant.

The water conservation measures (like air cooled blowers & compressors) and rain water harvesting measures are also being undertaken in the existing Plant.

Solid Wastes: The dust collected from the various Air Pollution Control Measures like Bag House/Filters, ESPs, etc. will be totally recycled in the process for cement manufacturing. In the power plant, imported coal will be used as fuel and the fly ash generation will be 78 TPD which will be pneumatically transported to the Cement Plant for PPC manufacturing. The bed ash (14 TPD) shall be used as bed material in the Cement Plant. Thus, entire quantity of Fly Ash generated by the Power Plant will be fully utilized in the Cement Manufacturing Process.
Solid wastes from STP Plant (12 Tons/year) shall be vermi composted and used as manure for Green Belt. Waste Oil (250 lits./day) from the Plants shall be collected and sold to the MoEF/TNPCB authorised Agency for further treatment & disposal. Organic wastes from Plants & Township @ 0.5 tons/day will be subjected to vermi-composting and used as manure for Green Belt. Inorganic wastes (papers and other wastes) are sold to rag pickers/scrap dealers.

4.0 Environmental Monitoring Programme

For effective implementations of Environmental Management Plan, MCL has the Environment Monitoring Cell comprising of Plant Engineers, Lab chemists, Mine Personnel and Horticulturists under the overall supervision of the Vice-President. Also, the quality of air, water, soil and noise levels are already being monitored at MCL as per specified norms and the reports are being submitted to MoEF and TNPCB on regular basis. The same practice will be continued during the Expansion period also.

5.0 Additional Studies

Risk Assessment and DMP: Fire, electrical shock, natural calamities, etc. are the risks associated with the activities. Detailed assessment and mitigative measures are delineated and an effective Disaster Management Plan is also envisaged in the EIA Report.

6.0 Project Benefits

There will be a huge positive impact by way of employment, better socioeconomic conditions, improved local and regional economy, etc.

7.0 Environmental Management Plan

EMP is formulated for mitigation of adverse impacts and is based on present environmental status and impact appraisal. EMP includes formulation, implementation and monitoring of environmental protection measures.

It is mandatory to comply with the various regulatory Norms for Prevention and Control of Pollution. Alongside, it is also imperative to go beyond compliance through adoption of cleaner technologies and improvement in Management practices. A series of industry specific interaction meetings had been organized to formulate the Charter on Corporate Responsibility for Environmental Protection (CREP) and action points were enlisted for the Cement Industry. MCL shall comply to the Action Points of CREP Guidelines for Cement Sector.

7.1 Air Environment

- All sources of dust generation in the Cement and Power Plants shall be well designed for producing minimum dust and shall be provided with high efficiency Bag Filters.
- SPM emission level in exhaust air shall be <50 mg/Nm³.
For collecting the ground material from AFBC boiler and dedusting of vent air, a suitably sized ESP shall be considered.
SO₂ concentration shall be negligible and the stack height will be 100 m & 82 m.
The periodical evaluation for the efficiency performance of ESPs and Bag Filters shall be carried out.

For controlling fugitive dust, in dump hopper, reclaimers, belt conveyor discharge, silos etc., bag filters shall be installed.

Fugitive emissions due to storage, transportation, etc. and the leakages and spillages shall be continuously monitored and controlled.

Water conservation measures shall be undertaken for effective implementation. Cooling water is put into closed circuit to minimize the evaporation losses.

Thermal insulation is provided wherever necessary to minimize heat radiation from the equipment, piping etc., to ensure protection of personnel.

Insulation thickness is so selected that the covering jacket surface temperature does not exceed the surrounding ambient temperature by more than 15 °C. The effect of thermal pollution of air is negligible considering the atmosphere as the ultimate heat link and no other industry being located in the vicinity.

As far as gaseous pollution is concerned, the impact of carbon monoxide (CO) emission is negligible in view of the firing technique of keeping a positive oxygen balance.

Generation of NOₓ gases depends to a great extent on the combustion temperature. A well designed burner system is installed and limiting the temperature to a reasonably low value of NOₓ generation.

### 7.2 Noise Levels

- The design features of machineries shall be provided to ensure low noise levels in the working areas.
- All rotating items are well lubricated and provided with enclosures as far as possible to reduce noise.
- Extensive vibration monitoring system are provided to check and reduce vibrations. For all fans, compressors etc. vibration isolators are provided to reduce vibration and noise.
- Noise generating items such as fans, blowers, compressors, pumps, motors etc. shall be running with speed less than 1500 rpm and reduce noise levels. Static and dynamic balancing of equipment are being done regularly.
- Provision of silencers are made wherever possible.
- Green Belt proposed in the Plants and Township are also act as noise reducers.
- Layouts, equipment foundations and structures are designed keeping the requirement of noise abatement in view.
- Necessary enclosures are also provided on the working platform/areas to provide local protection in high noise level areas.
- All heavy earthmoving equipment is kept in a well maintained condition.
- Proper lubrication and house keeping are maintained to avoid excessive noise generation.
- In case where the operation of the equipment warranted the presence of operators in close proximity to equipment, the operator provided with the necessary safety and protection equipment like ear plugs, ear mufffs etc.
7.3 Water Environment

- Water control measures shall be undertaken.
- No trade effluent shall be discharged from the Plants.
- Cooling water is put into closed circuit to minimize the evaporation losses.
- The domestic sewages from the Cement Plant, Power Plant and Township shall be treated in the proposed 350 KLD Sewage Treatment Plant to meet the Statutory Discharge Norms and the treated sewage shall be used for Green Belt.
- No percolation of treated water to the deep ground water table is done.
- Periodical monitoring for specific parameters shall be done regularly.
- MCL shall also develop rain water harvesting structures as proposed from the roof tops of Plants as well as Township areas to supplement the water supply from the borewells.

7.4 Land Environment

- It should be ensured that there is no industrial solid waste from the Plants.
- The fly ash and bottom ash from the Thermal Power Plant will be consumed in the Cement Plant fully.
- Solid wastes from STP Plant shall be used as manure for Green Belt.
- Waste Oil shall be collected and sold to the MoEF/TNPCB authorised Agency for further treatment & disposal.
- The municipal wastes from Township shall be collected, transported, treated in a landfill (composting) within the Plant vicinity to make use of it as manure for Green Belt.
- The land fill sites are clearly demarcated indicating the period during which they have been filled.

7.5 Green Belt

An effective Green Belt will be carried out in an area of 50 Ha (33.33% coverage of total area) and maintained with the guidance of DFO. A mixture of fruit, fuel, fodder and quick growing timber tree saplings, predominantly local flora/vegetations, are proposed to be planted keeping in view the agro-ecological and edaphic conditions of the areas.

About 10,000 trees will be planted in a year in the earmarked areas. The maintenance contract shall be awarded to the Women Self Help Groups and Local Panchayats of the nearby villages.

7.6 Occupational Health Measures

MCL is committed to provide a safety & healthy working conditions and continually improve the occupational health and safety performance. MCL's SHE Policy objectives are: to achieve zero accident and safe work environment, to improve moral and health of all employees and to maintain the emission
levels below the norms. Also, MCL will provide ergonomic support in work comfortness with periodical review.

A qualified Doctor having the required qualification is employed in the Occupational Health Centre at the Plant. It is having a full fledged dispensary equipped with X-ray unit, Computerised ECG, Laboratory, Computerised blood chemistry analyzer, Ultra Short Wave Therapy, Physiotherapy Unit, Audiometer & Spirometer, Ambulance, etc.

An Environmental Cell has been created as a department consisting of officers from various disciplines to coordinate the activities concerned with the management and implementation of the environmental control measures, SHE and Occupational Health Policies of the Company.

7.7 Social Measures

MCL is presently carrying out various Socio Measures for the local as well as regional populations in the Cement Plant and Mines locations which shall be continued for the new Project area also.

- Welfare measures for upliftment of economically weaker sections
- Free Medical Camps
- Construction of houses for economically weaker sections
- Construction and renovation of school & hospital buildings
- Construction of approach roads to the villages, cause ways, bridges, etc.
- Construction and renovation of temples
- Drinking water supply to the villages
- Extending Educational Facilities.
- Self employment programmes for Self Help Women Groups of nearby villages
- Adoption of PHCs and Hospitals.

7.8 Rain Water Harvesting

Rainwater collection from the rooftop area of about 78000 sq. m is made. Quantum of rainfall available for recharge as per normal annual rainfall conditions (78,000 X 0.8 X 0.8 RF) is 49,920 m³. Nett Water available for recharge through structures is 29952 m³/annum i.e. 82 m³/day. The maximum quantity of rainwater binge impounded is 381 m³/day. All these measures shall be continued and maximum quantity of rain water shall be utilized.

7.9 Conclusion

Predicted/Anticipated impacts would be negligible and Load based Emissions would be very well within the MoEF Norm of <227 g/Ton of Kiln Feed on expansion also. MCL activities are in full compliance with Corporate Responsibility for Environmental Protection (CREP) and Corporate Social Responsibility (CSR) Guidelines.