FINAL ENVIRONMENTAL IMPACT ASSESSMENT REPORT

8

ENVIRONMENTAL MANAGEMENT PLAN

FOR

Proposed Clinker Grinding Unit

with Cement Production Capacity of 5.0 MTPA

(2.5 MTPA- Phase I & 2.5 MTPA- Phase II) and D.G. Set (6.5 MW)



At

Village: Jhanswa, Sub - Tehsil: Sahalwas, Tehsil: Matanhail, District: Jhajjar (Haryana)



September, 2019

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ABBREVIATIONS

| AAQM | : | Ambient Air Quality Monitoring |
|--------|---|--|
| AAQMS | : | Ambient Air Quality Monitoring Stations |
| AERMOD | : | Atmospheric Dispersion Modelling |
| APCE | : | Air Pollution Control Equipments |
| APM | : | Air Particulate Matter |
| BDL | : | Below Detection Limit |
| BIS | : | Bureau of Indian Standards |
| BOD | : | Bio-chemical Oxygen Demand |
| CAGR | : | Compound Annual Growth Rate |
| CCTV | : | Closed Circuit Television |
| CEO | : | Chief Executive Officer |
| CEP | : | Corporate Environment policy |
| CGWA | : | Central Ground Water Authority |
| СРСВ | : | Central Pollution Control Board |
| СРР | : | Captive power Plant |
| CO | : | Carbon Monoxide |
| CREP | : | Corporate Responsibility for Environment Protection |
| CSI | : | Cement Sustainability Initiative |
| CSR | : | Corporate Social Responsibility |
| CTE | : | Consent to Establish |
| СТО | : | Consent to Operate |
| D.G | : | Diesel Generator |
| DL | : | Detection Limit |
| DO | : | Dissolved Oxygen |
| DMP | : | Disaster Management Plan |
| EAC | : | Expert Appraisal Committee |
| EC | : | Environmental Clearance |
| ECC | : | Emergency Control Centre |
| EIA | : | Environmental Impact Assessment |
| EMC | : | Environment Management Cell |
| EMP | : | Environmental Management Plan |
| ENE | : | East of North-East |
| EPA | : | Environmental Protection Authority |
| ERDAS | : | Earth Resources Data Analysis System |
| ERT | : | Emergency Response Team |
| ESE | : | East of South East |
| ESC | : | Enterprise Social Commitment |
| ESP | : | Electrostatic Precipitator |
| ETP | : | Effluent treatment Plant |
| FCC | : | False Color Composite |
| FHZ | : | Flood Hazard Zonation |
| FICCI | : | Federation of Indian Chambers of Commerce and Industry |
| FIMI | : | Federation of Indian Mineral Industries |
| FPM | : | Fine Particulate Matter |

| FPS | : | Fine Particulate Sampler |
|-----------------|----|---|
| FY | : | Financial Year |
| GIS | : | Geographic Information System |
| GCP | : | Ground Control Points |
| GDP | : | Gross Domestic Product |
| GHG | : | Greenhouse Gases |
| GOI | : | Government of India |
| GOVT. | : | Government |
| GPS | : | Global Positioning System |
| GLC | : | Ground Level Concentration |
| На | : | Hectare |
| HAZID | : | Hazard Identification |
| HC | : | Hydrocarbons |
| HSE | : | Health, Safety & Environment |
| IBM | : | Indian Bureau of Mines |
| ISO | : | International Organization for Standardization |
| ISRO | : | Indian Space Research Organization |
| IMD | : | India Meteorological Department |
| IS | : | Indian Standards |
| JMEPL | : | J.M. EnviroNet Private Limited |
| KLD | : | Kilo Litre Per Day |
| Km | : | Kilometer |
| KWH | : | Kilo Watt Hour |
| KVA | : | Kilo Volt Ampere |
| LOS | : | Level of Service |
| LULC | : | Land Use/Land Cover |
| LS | : | Limestone |
| MEMC | : | Mines environment and Mineral Conservation |
| MT | : | Metric Tonne |
| MTPA | : | Million Tonnes Per Annum |
| MoEFCC | : | Ministry of Environment and Forest & Climate Change |
| MW | : | Mega Watt |
| MVA | : | Mega Volt Ampere |
| NAAQS | : | National Ambient Air Quality Standards |
| NABL | : | National Accreditation Board For Testing And Calibration Laboratories |
| NABET | : | National Accreditation Board for Education & Training |
| NGO | : | Non- Governmental Organization |
| NATMO | : | National Atlas Thematic Mapping Organization |
| NDIR | : | Non-dispersive Infrared Detector |
| NE | : | North East |
| NH | : | National Highway |
| NIDM | : | National Institute of Disaster Management |
| NL | : | Nirma Limited |
| NOC | : | No Objection Certificate |
| NNE | : | North of Northeast |
| NO _x | : | Oxides of Nitrogen |
| NRSA | : | National Remote Sensing Agency |
| NIU | : | Nephiometeric Turbidity Unit |
| NW | : | North West |
| OHS | : | Occupational Health & Safety |
| OPC | : | Ordinary Portland Cement |
| PCU | 1: | Passenger Car unit |
| PF | : | Protected Forest |
| рН | : | Potential Hydrogen |

| PHC | : | Public Health Centers |
|--------------|---|--|
| PM | : | Particulate Matter |
| PPE | : | Personal Protective Equipments |
| PPC | : | Pozzolona Portland Cement |
| PPM | : | Parts Per Million |
| PSC | : | Portland Slag Cement |
| QCI | : | Quality Council of India |
| RABH | : | Reverse Air Bag House |
| RDS | : | Respiratory Dust Sampler |
| RI | : | Rainfall Infiltration |
| RINL | : | Rashtriyalspat Nigam Limited |
| RO | : | Regional Office |
| RO | : | Reverse Osmosis |
| RSPM | : | Respirable Suspended Particulate Matter |
| R & R | : | Rehabilitation & Resettlement |
| RSMM | : | Rajasthan State Mines & Minerals Ltd. |
| RSPCB | : | Rajasthan State Pollution Control Board |
| S | : | South |
| SC | : | Scheduled Caste |
| SE | : | South East |
| SEAC | : | State Level Expert Appraisal Committee |
| SEIAA | : | State Environment Impact Assessment Authority |
| SOI | : | Survey of India |
| SPM | : | Suspended Particulate Matter |
| SRTM | : | Shuttle Radar Topographic Mission |
| SSE | : | South of South East |
| SVCPA | : | Siddhi Vinayak Cement Pvt. Ltd. |
| SW | : | South West |
| ST | : | Scheduled Tribes |
| STP | : | Sewage treatment Plant |
| TDS | : | Total Dissolved Solids |
| ToR | : | Terms of Reference |
| TPD | : | Tonnes Per Day |
| TPH | : | Tonnes Per Hour |
| USEPA | : | United States Environmental Protection Agency |
| USDA | : | United States Department of Agriculture |
| UTM | : | Universal Transverse Mercator |
| VAT | : | Value Added Tax |
| VRM | : | Vertical Rolling Mill |
| WBCSD | : | World Business Council for Sustainable Development |
| WHRB | : | Waste Heat Recovery Boller |
| WNW | : | West of North West |
| WSW | : | West of South West |
| WIP | : | Water Treatment Plant |
| µg/m³ | : | Micro gram per metre cube |
| μm | : | Micro metre |
| hs/cm | | |
| | | Cram par subis continente |
| g/cc | : | Gram per cubic centimetre |
| g/KITI Dr | | |
| iid ka/ba | | Rectare |
| kg/na | | Kilomotro |
| KIII m | | Matro |
| III | : | mene |

| mg/kg | : | Milligram per kilogram |
|--------------------|---|----------------------------------|
| mg/l | : | Milligram per litre |
| mg/m³ | : | Milligram per metre cube |
| mg/Nm ³ | : | Milligram per Newton cubic metre |
| mm | : | Millimetre |
| mS/cm | : | MilliSiemens per centimetre |
| sq. | : | Square |

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STATE ENVIRONMENT IMPACT ASSESSMENT AUTHORITY HARYANA Bay No. 55-58, Prayatan Bhawan, Sector-2, PANCHKULA,

Dated: 5.7.19 No. SEIAA/HR 2019/191

To

M/s WONDER CEMENT LIMITED, Wonder Cement Ltd., R.K. Nagar, Nimbahera, Chittorgarh Rajasthan

Subject: Environment Clearance for proposed clinker Grinding Unit with Cement Production Capacity of 5.0 MTPA (2.5 MTPA-Phase I & 2.5 MTPA Phase II) and D.G.Set (6.5 MW) at Village Jhanswa, Tehsil Matenbail, District Jhajjar, Haryana.

This has reference to your application no. Ref. no. WCL/CGU-Jhajjar dated 19.03.2019 addressed to M. S. SEIAA Haryana received on 03.04.2019 to prescribe the TOR(Terms of Reference) for undertaking detailed EIA Study for the purpose of obtaining Environment Clearance in accordance with the provisions of EIA Notification, 2006. For this purpose the proponent had submitted online information in the prescribed format (Form-1) along with Pre-feasibility Report. The details of the proposal are given below:

| ۱. | Name of the project: | M/s Wonder Cement Ltd |
|----|------------------------------|---|
| 2. | Category of the proposal: | 3(b) |
| 3. | Project/Activity applied for | clinker Grinding Unit with Cement Production |
| 4. | Date of submission for TOR | 03.04.2019 |

Project was recommended by SLAC in its 180th meeting and taken up in the 118th meeting of SEIAA held on 12.06.2018. It was decided that the Project Proponent will prepare the EIA by using Model ferms of Reference of MoEF & CC along with specific conditions & public consultation and the following additional Terms of Reference:

- 1 Environment Impact Assessment of particulate matter on the health of local population.
- 2. Ecological effect of particulate matter on the flora and fauna,
- The project proponent shall take the NOC from the CGWA/SGWA as may the case in 3. reference to MoEF & CC, Gol OM F. No. 21-103/2015-1A.III dated 02.11.2018.
- Approval/permission of the CGWA/SGWA shall be obtained before drawing ground 4. water for the project activities. Haryana State Pollution Control Board (HSPCB) concerned shall not issue Consent to Operate (CTO) till the project proponent obtains such permission.
- 5. Public hearing issues to be addressed properly.
- The PP shall submit CER Plan as per OM dated 1.05.2019. 6.
- The PP should enclose all analysis reports of Air, Water, Soil, Noise etc. from MoEF & 7. CC /NABL Laboratory with scope of accreditation along with range of testing. All

original reports should be available during appraisal of project.

8. The PP shall prepare and submit the wildlife conservation plan of the area and get approved from the Chief Wildlife Warden Haryana.

bairman, SEIAA Haryana

STANDARD TERMS OF REFERENCE (TOR) FOR EIA/EMP REPORT FOR PROJECTS/ ACTIVITIES REQUIRING ENVIRONMENT CLEARANCE

3(b):STANDARD TERMS OF REFERENCE FOR CONDUCTING ENVIRONMENT IMPACT ASSESSMENT STUDY FOR CEMENT PLANTS PROJECTS AND INFORMATION TO BE INCLUDED IN EIA/ EMP REPORT

A. STANDARD TERMS OF REFERENCE (TOR)

- 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 Iexisting 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

STANDARD TERMS OF REFERENCE (TOR) FOR EIA/EMP REPORT FOR PROJECTS/ACTIVITIES REQUIRING ENVIRONMENT CLEARANCE

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. Details w.r.t. option analysis for selection of site
- iv. Co-ordinates (lat-long) of all four corners of the site.
- v. Google map-Earth downloaded of the project site.
- vi. 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.
- vii. Photographs of the proposed and existing (if applicable) plant site. If existing, show photographs of plantation/greenbelt, in particular.
- viii. 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)
- ix. A list of major industries with name and type within study area (10km radius) shall be incorporated. Land use details of the study area
- x. Geological features and Geo-hydrological status of the study area shall be included.
- xi. 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)
- xii. Status of acquisition of land. If acquisition is not complete, stage of the acquisition process and expected time of complete possession of the land.
- xiii. 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)

STANDARD TERMS OF REFERENCE (TOR) FOR EIA/EMP REPORT FOR PROJECTS/ ACTIVITIES REQUIRING ENVIRONMENT CLEARANCE

- 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 micrometeorological 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 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.
 - 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.
 - v. Whether the site falls near to polluted stretch of river identified by the CPCB/MoEF&CC, if yes give details.
 - 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.
 - 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 and Environment Management Plan

- i. Assessment of ground level concentration of pollutants from the stack emission based on sitespecific 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 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.
- ii. Water Quality modelling in case of discharge in water body
- 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 conveyorcum-rail transport shall be examined.
- 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 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.
- 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.

STANDARD TERMS OF REFERENCE (TOR) FOR EIA/EMP REPORT FOR PROJECTS/ ACTIVITIES REQUIRING ENVIRONMENT CLEARANCE

- 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. Plan and fund allocation to ensure the occupational health & safety of all contract and casual workers
 - 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.
 - iii. Details of existing Occupational & Safety Hazards. What are the exposure levels of 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,
 - iv. Annual report of heath status of workers with special reference to Occupational Health and Safety.
- 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 (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

STANDARD TERMS OF REFERENCE (TOR) FOR EIA/EMP REPORT FOR PROJECTS/ACTIVITIES REQUIRING ENVIRONMENT CLEARANCE

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 TOR.

B. SPECIFIC TERMS OF REFERENCE FOR EIA STUDIES FOR CEMENT PLANTS

- 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. For large Cement Units, a 3-D view i.e. DEM (Digital Elevation Model) for the area in 10 km radius from the proposal site.
- 4. 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.
- 5. If the raw materials used have trace elements, an environment management plan shall also be included.
- 6. Plan for the implementation of the recommendations made for the cement plants in the CREP guidelines must be prepared.
- 7. Energy consumption per ton of clinker and cement grinding
- 8. Provision of waste heat recovery boiler
- 9. Arrangement for use of hazardous waste

ToR Compliance

Point-wise Compliance of ToRs

Point-wise compliance to the ToR points issued by SEIAA, Haryana *vide* letter no. SEIAA/HR/2019/141 dated 05th July, 2019 for Proposed Clinker Grinding Unit with Cement Production Capacity of 5.0 MTPA (2.5 MTPA: Phase -I & 2.5 MTPA: Phase - II) and D.G. Set (6.5 MW) at Village: Jhanswa, Sub-Tehsil: Salhawas, Tehsil: Matanhail, District: Jhajjar (Haryana) by M/s. Wonder Cement Ltd.

| ToR Point No. | ToR Point | Compliance | | Reference in Final EIA / EMP Report |
|------------------|--|--|--|--|
| Standard Te | | | | |
| 1. | Executive Summary | Executive Summincorporated in th | nary of the project has been nis EIA/EMP Report. | Chapter - 11, Page no. 205 - 213 |
| 2. | Introduction | | | |
| i. | Details of the EIA Consultant including NABET accreditation. | The consultant e EnviroNet Pvt. L environmental co in Gurugram (Hary Details of the accreditation has Report. | Chapter - 12, Page no. 214 - 215 | |
| ii. | Information about the project proponent. | M/s. Wonder Cement Limited is a unit of M/s R.K. Marble Group. The company is ISO 9001-2008, ISO 14001 and OHSAS 18001 certified unit. Details reg. the same has been incorporated in this FIA/FMP Report. | | Chapter - 1, Section 1.2.2, Page no. 27- |
| iii. | Importance and benefits of the project. | Importance of this project has been given in this EIA/EMP Report. A separate chapter on Project benefits has also been prepared and incorporated in this EIA/EMP Report | | Chapter - 1, Section 1.3.2, Page no. 28 Chapter-8, |
| 3. | Project Description | | | |
| i. | Cost of project and time of completion. | Total Cost of Project Time of Completion | Rs. 830 Crores (Phase - I: Rs. 480 Crores & Phase - II: Rs. 350 Crores) The proposed schedule for Phase-I implementation will be 18 months and Phase-II project will be implemented after successful commissioning and operation of Phase-I. Details of activities along with time required have been incorporated in this EIA/EMP Report. | Chapter - 2, Table 2.4, Page no. 37 Chapter - 2, Section 2.6, Page no. 43 |
| ii. | Products with capacities for the proposed project. | Details of product project is below - | ts with capacities for the proposed | Chapter - 1, Table 1.1, Page no. 26 |

| ToR Point No. | ToR Point | | Reference in Final EIA / EMP Report | |
|------------------|--|--|--|--|
| | | S. No. Pa | rticular Proposed Capacity | |
| | | 1. Ceme | nt (MTPA) 5.0 MTPA (2.5: Phase-I & 2.5: Phase-II) | |
| | | 2. D.G.S | Sets (MW) 6.5 | |
| iii. | If expansion project, details of existing products with capacities and whether adequate land is available for expansion, reference of earlier EC if any. | Not applicable, | , as this is a proposed project. | - |
| iv. | List of raw materials required and their source along with mode of transportation. | List of raw m with their m incorporated ir | aterials required, their source along node of transportation has been n this EIA/EMP Report. | Chapter - 2, Section 2.5.1, Table 2.6, Page no. 38 |
| ν. | Other chemicals and materials required with quantities and storage capacities. | No other chen the proposed p | nical and material will be required for project. | - |
| vi. | Details of Emission, effluents, | Emission | | |
| | hazardous waste generation and their management. | Туре | PM & Fugitive Emission | Chapter - 4, Section 4.13. Page no. 129 |
| | | Source | Cement Mill Stack and Plant activities | |
| | | Management | Installation of Efficient Air Pollution Control Equipment (APCE), like Bag House/Bag Filter Covered Conveyor belts Covered Silos & Sheds | |
| | | Effluent | i | |
| | | Туре | Waste Water | |
| | | Source | Domestic activities | |
| | | Management | Domestic waste water (12 KLD) generated from the plant offices will be treated in the STP (25 KLD capacity) and treated water (10 KLD) will be used for Greenbelt development/Plantation. | Chapter - 2, Section 2.5.3, Page no. 39-41 |
| | | Hazardous Wa | ste | |
| | | Туре | Used oil & grease (5.0 KL per year) | Chapter - 10 Section |
| | | Source | Industrial activities | 10.6.2, Page no. 191 |
| | | Management | Sold to the CPCB authorized recycler. | |
| vii. | Requirement of water, power, with source of supply, status of | Particular | Requirement Phase - I Phase - II Total | Chapter - 2, Section 2.5.3, Page no. 39 |

| ToR Point No. | ToR Point | Compliance | | | Reference in Final EIA / EMP Report | |
|------------------|---|--|---|---|---|--|
| | approval, water balance diagram, | Water (KLD) | 300 | 250 | 550 | 1 |
| | man-power requirement (regular | Source: Ground V | Vater* | | | |
| | and contract) | Power (MW) | 13 | 12 | 25 | |
| | | Source: Haryana back-up). | State Grid and | D.G. Set (For | emergency | |
| | | Manpower Requirement (Nos.) | 178 | 52 | 230 | |
| | | Source: Unskille outside/local *Status of app withdrawal has copy of the | ed / Semi-skille proval: Applica s been submi submission r | ed - local area ation for grou tted to CGW/ eceipt is en | a, skilled - und water A and the closed as | Annexure - 1 Page no. 222 Figure 2.5 (a) and (b) |
| | | Annexure - 1 wi Water Balance in this EIA/EMP | th this EIA/EM Diagram has Report. | P Report. also been inc | orporated | Page no. 40 - 41 |
| viii. | Process description along with major equipment and machineries, process flow sheet (quantitative) from raw material to products to be provided | Process des and machin EIA/EMP Re Process flo | cription along eries has bee port. ow sheet (qu | ; with major e en incorporat uantitative) f | equipment ed in this from raw | Chapter - 2, Section 2.7 & 2.8, Page no. 44 - 47 |
| | be provided. | incorporate | d in this EIA/EA | MP Report. | also been | 2.4, Page no. 38 |
| ix. | Hazard identification and details of proposed safety systems. | Hazard identifi systems has I Report. | cation and det been incorpo | tails of propo rated in this | sed safety EIA/EMP | Chapter - 7, Section 7.5.2, Page no. 152 - 163 |
| х. | 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 30 th 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 | Not applicable, | as this is a pro | oposed projec | t. | - |

| ToR | Compliance | |
|-----|------------|--|

| ToR Point No. | ToR Point | Compliance | Reference in Final 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. | Not applicable, as this is a proposed project. | - |
| 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. | Project site is located at Village: Jhanswa, Sub-Tehsil: Salhawas, Tehsil: Matanhail, District: Jhajjar (Haryana). Location map has been incorporated in the EIA/EMP report. Justification for selecting the site has been incorporated in the EIA/EMP Report. | Chapter - 2, Figure - 2.1, Page no. 31 Chapter - 5, Section - 5.1.1, Page no. 131 |
| ii. | A toposheet of the study area of radius of 10 km 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). | Map showing project site and 10 km radius study area on Toposheet of 1:50,000 scale on an A3 sheet has been incorporated in this EIA/EMP Report. | Chapter - 3, Figure 3.1, Page no. 53 |
| iii. | Details w.r.t option analysis for selection of site | Details w.r.t option analysis for selection of the site has been incorporated in the EIA/EMP Report. | Chapter-5, Section 5.1, Page no. 131 |
| iv. | Co-ordinates (lat-long) of all four corners of the site. | Map showing Corner Co-ordinates of the project site are given in this EIA/EMP Report. | Chapter - 2, Figure no. 2.2, Page no. 33 |
| ٧. | Google map-Earth downloaded of the project site. | Google Earth downloaded map of the project site is given in this EIA/EMP Report. | Chapter - 2, Figure no. 2.2, Page no. 33 |
| vi. | 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 | Plant Layout showing the proposed unit, storage area, greenbelt area, other utilities etc. is incorporated in this EIA/EMP Report. Proposed project site is not located in an industrial area / Estate / Complex. | Chapter - 2, Figure - 2.3, Page no. 35 |

| ToR Point No. | ToR Point | Compliance | Reference in Final EIA / EMP Report |
|------------------|---|---|--|
| | area/Estate. | | |
| vii. | Photographs of the proposed and existing (if applicable) plant site. If existing, show photographs of plantation/greenbelt, in particular. | Photographs of the proposed project site have been incorporated in this EIA/EMP Report. | Chapter - 2, Section 2.3.3, Page no. 36 |
| viii. | Land use break-up of total land of the project site (identified and acquired), government / private - agriculture, forest, wasteland, water bodies, settlements, etc. shall be included (not required for industrial area). | Total proposed project area is 21.78 ha; which is under the possession of the company. Present land use of the project site is private land. Land area break-up of total land of the plant site has been incorporated in this EIA/EMP Report. | - Chapter - 2, Section 2.3.3, Page no. 34 |
| ix. | A list of major industries with name and type within study area (10 km radius) shall be incorporated. Land use details of the study area. | List of major industries with name and type within the study area (10 km radius) has been incorporated in this EIA/EMP Report. Land use details of the study area have also been incorporated in this EIA/EMP Report. | Chapter - 3, Table 3.2, Page no. 54 Chapter - 3, Figure 3.2, Page no. 57-60 |
| х. | Geological features and Geo- hydrological status of the study area shall be included. | Details regarding Geological features and Geo- hydrological status of the study area have been given in Hydro-geological Study Report incorporated in this EIA/EMP Report. | Chapter - 7, Section 7.3.3 -7.3.6 Page no. 137-139 |
| xi. | Details of Drainage of the project up to 5 km 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). | Drainage patttern of the project site and 10 km radius study area has been incorporated in Hydro-geological Study Report along with this EIA / EMP Report. Project Site does not fall within 1 km radius of any major River. | Chapter - 7, Section 7.3.3, <i>Page</i> no. 137 |
| xii. | Status of acquisition of land. If acquisition is not complete, stage of the acquisition process and expected time of complete possession of the land. | Total proposed project area is 21.78 ha; which is under the possession of the company. | Chapter - 2, Section 2.3.3, Page no. 34 |
| xiii. | R & R details in respect of land in line with state Government policy. | Land acquisition was done through mutual understanding with individual land holders. | - |
| 5. | Forest and Wildlife related issues (if | applicable) | |

| ToR | Compliance |
|-----|------------|

| ToR Point No. | ToR Point | Compliance | Reference in Final EIA / EMP Report |
|------------------|---|---|--|
| 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 land is involved in the proposed project; thus, no such permission / approval is required. | - |
| ii. | Land use 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) | No forest land is involved in the proposed project. | - |
| iii. | Status of Application submitted for obtaining the stage I forestry clearance along with latest status shall be submitted. | Not applicable. | - |
| iv. | The projects to be located within 10 km of the National Parks, Sanctuaries, Biosphere Reserves, Migratory Corridors of Wild Animal; the project proponent shall submit the map duly authenticated by Chief Wildlife Warden showing these features vis-a- vis the project location and the recommendations or comments of the Chief Wildlife Warden - thereon. | Nahar Wildlife Sanctuary is situated at a distance of 6.0 km in South direction. Map showing 10 km radius study area has been incorporated in this EIA/EMP Report. | Chapter - 3, Figure 3.1, Page no. 53 |
| 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. | Five Schedule-I Species were found within 10 km radius of the study area viz., Antilope cervicapra (Blackbuck), Gazella bennettii (Indian Gazelle), Melanoperdix niger (Black Partridge), Pavo cristatus (Peafowl), Varanus bengalensis (Common Indian monitor). Conservation Plan along with receipt of submission to PCCF (WL) is enclosed as Annexure - 2 along with this EIA/EMP Report. | Annexure - 2 Page no. 223 - 280 |
| vi. | Copy of application submitted for clearance under the Wildlife (Protection) Act, 1972, to the Standing Committee of the National Board for Wildlife. | Nahar Wildlife Sanctuary is located in South Direction at a distance of around 6.0 km in south direction from the project site. Application for Wildlife Clearance under the Wildlife (Protection) Act, 1972 from the National Board for Wildlife (NBWL) has been submitted on o6 th July, 2019. The copy of the same is attached as Annexure - 3 along with EIA/EMP report. | - Annexure - 3, Page no. 281 - 282 |
| 6. | Environmental Status | | |
| i. | Determination of atmospheric inversion level at the project site | Details of atmospheric inversion level at the project | Chapter - 3, Section 3.5.5.1, |

| ToR Point No. | ToR Point | Compliance | Reference in Final EIA / EMP Report |
|------------------|--|---|---|
| | and site-specific micro- meteorological data using temperature, relative humidity, hourly wind speed and direction and rainfall. | site have been incorporated in this EIA/EMP Report. Site-specific micro-meteorological data (temperature, relative humidity, wind speed and direction) were collected during Summer Season (March to May, 2019). Details of the same have been incorporated in this EIA/EMP Report. Hourly meteorological data has been enclosed as Annexure - 4 along with this EIA/EMP Report. Rainfall data has also been incorporated in this EIA/EMP Report. | Page no. 67 - 68 Chapter - 3, Section 3.5.5, Page no. 67 <i>Annexure - 4</i> Page no. 283 - 294 Chapter - 3, Table 3.6, Page no. 65 |
| 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 forests. | AAQ monitoring was carried out at 8 locations for PM ₁₀ , PM _{2.5} , SO ₂ , NO _x and CO during Summer Season (March to May, 2019) within 10 km radius study area. The monitoring stations were selected taking into account the dominant wind direction, population zone and sensitive receptors etc. Detail of the same has been incorporated in this EIA/EMP Report. | Chapter - 3, Section 3.5.6, Page no. 68 - 72 |
| 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. | Raw data of all AAQ measurement / detailed AAQM Tables of all AAQ stations along with min., max., average and 98% values for each of the AAQ parameters have been enclosed as Annexure - 5 along with this EIA/EMP Report. | Annexure - 5, Page no. 295 - 302 |
| iv. | Surface water quality of nearby River (6om upstream and downstream) and other surface drains at eight locations as per CPCB/MoEFCC guidelines. | There will be no discharge of waste water, as Proposed Clinker Grinding Unit will be based on Zero Liquid Discharge (ZLD) technology. Jawahar Lal Nehru Feeder (Canal) is present within 10 km radius of the project site. Details regarding surface water quality of the same is incorporated in this EIA/EMP report. | Chapter - 3, Section 3.5.8.1, Page no. 75 - 78 |
| V. | Whether the site falls near to polluted stretch of river identified by the CPCB / MoEFCC. | Project site does not fall near to polluted stretch of river identified by the CPCB / MoEFCC. Note on the same has been enclosed as Annexure - 6 along with this EIA/EMP Report. | Annexure - 6, Page no. 303 - 304 |

| ToR Point No. | ToR Point | Compliance | Reference in Final EIA / EMP Report |
|------------------|--|---|---|
| vi. | Ground water monitoring minimum at 8 locations shall be included. | Ground water sampling was carried out at 8 locations in the study area during Summer Season (March to May, 2019). Details of the same have been incorporated in this EIA/EMP Report. | Chapter - 3, Section 3.5.8.2, Page no. 78 - 84 |
| vii. | Noise levels monitoring at 8 locations within the study area. | Noise level monitoring was carried at 8 locations within the study area during Summer Season (March to May, 2019). Details of the same have been incorporated in this EIA/EMP Report. | Chapter - 3, Section 3.5.7, Page no. 72 - 74 |
| viii. | Soil Characteristics as per CPCB guidelines. | Soil sampling was carried out at 8 locations within the study area during Summer Season (March to May, 2019). Details of the same have been incorporated in this EIA/EMP Report. | Chapter - 3, Section 3.5.9, Page no. 84 - 87 |
| 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. | Traffic study of the area w.r.t. existing traffic, type of vehicles, frequency of vehicles for transportation of materials, additional traffic due to proposed project was conducted and details for the same have been incorporated in this EIA/EMP Report. | Chapter - 4, Section 4.11, Page no. 124 - 129 |
| х. | Detailed description on 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. | Details of the flora and fauna found within the study area have been given in this EIA/EMP Report. Five Schedule-I Species were found within 10 km radius of the study area viz., Antilope cervicapra (Blackbuck), Gazella bennettii (Indian Gazelle), Melanoperdix niger (Black Partridge), Pavo cristatus (Peafowl), Varanus bengalensis (Common Indian monitor). Conservation Plan along with receipt of submission to PCCF (WL) is enclosed as Annexure - 2 along with this EIA/EMP Report. | Chapter - 3, Section - 3.5.10, Page no. 88 - 96 Annexure - 2 Page no. 223 - 280 |
| xi. | Socio-economic status of the study area. | Details reg. socio-economic status of the study area has been incorporated in this EIA/EMP Report. | Chapter - 3, Section - 3.5.11, Page no. 96 - 109 |
| 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 hilly terrain characteristics for | The incremental ground level concentration of pollutants from the stack emissions based on site- specific meteorological features has been predicted via computation done through mathematical modeling and incorporated in this EIA/EMP Report. The project site is not located on a hilly terrain. | Chapter - 4, Section 4.4.1, Page no. 112 - 116 |

| ToR Point No. | ToR Point | Compliance | Reference in Final EIA / EMP Report |
|------------------|--|---|--|
| | 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 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. | Impact of all the sources of emissions (including transportation) on the AAQ of the area was assessed. Details of the same along with details of the model used and the input data used for modeling have been incorporated in this EIA/EMP Report. Isopleths showing air quality contours plotted on location map have also been incorporated in this EIA/EMP Report. | Chapter - 4, Figure 4.1, Page no. 116 |
| ii. | Water Quality modelling- in case of discharge in water body. | No wastewater will be discharged from the Proposed Clinker Grinding Unit. Same has been shown in water balance diagram given in this EIA/EMP Report. Therefore, water quality modelling study is not required. | Chapter - 2, Figure 2.5 (a) & (b), Page no. 40 - 41 |
| 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. | There will be no major impact of the transport of the raw materials and end products on the surrounding environment due to proposed project; as proper mitigation measures will be adopted. Major raw material i.e. Clinker will be transported by rail/road. The impact of the transport of the raw materials and end products on the surrounding environment has been assessed and details reg. the same has been incorporated in this EIA / EMP Report. | Chapter - 4, Section 4.11, Page no. 124 - 128 |
| 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. | No wastewater will be discharged from the Grinding Unit. Domestic waste water (12 KLD) generated from the plant offices will be treated in the STP (25 KLD capacity) and treated water (10 KLD) will be used for Greenbelt development/ Plantation. Details of STP (along with expected characteristics of untreated and treated sewage, design, capacity etc) are included in this EIA/EMP Report. | Chapter - 2, Section 2.5.3, Page no. 39 - 41 Chapter - 2, Section 2.8, Page no. 48 |
| v. | Details of stack emission and action plan for control of emissions to | Proposed Stack emission details have been incorporated in this EIA/EMP Report. | Chapter - 4, Section 4.4.1.3, Page no. 103 |

| ToR Point No. | ToR Point | Compliance | Reference in Final EIA / EMP Report |
|------------------|--|---|--|
| | meet standards. | Efficient Air Pollution Control Equipment (APCE) will be installed for the control of emissions from all the sources within the prescribed limit. Details of the same have been incorporated in this EIA/EMP Report. | Chapter - 10, Table 10.1, Page no. 184 |
| vi. | Measures for fugitive emission control. | Measures for control of fugitive emission have been incorporated in this EIA/EMP Report. | Chapter - 10, Section 10.3.2, Page no. 184 - 189 |
| 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. | Used oil & grease (5 KL/annum) will be generated, which will be sold to the CPCB authorized recycler. Concept of waste - minimization, recycle/ reuse / recover techniques, Energy conservation and natural resource conservation has been included in the EMP and details reg. the same have been incorporated in this EIA/EMP Report. | Chapter - 10, Table 10.6, Page no. 191 |
| viii. | Proper utilization of fly ash shall be ensured as per Fly Ash Notification, 2009. A detailed plan of action shall be provided. | There is no generation of fly ash from the Grinding Unit. Fly ash will be utilized as a raw material in manufacturing of PPC. It will be transported by road from Thermal Power Plants, IGSTPP and CLP, Jharli, Jhajjar. Transportation of Fly ash will be done by closed bulkers and loading & unloading will be done through pneumatic system. | - |
| ix. | Action plan for the greenbelt 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 greenbelt shall be around the project boundary and a scheme for greening of the roads used for the project shall also be incorporated. | Out of the total proposed project area of 21.78 ha, 33% (i.e. 7.18 ha) will be developed under greenbelt development / plantation. Action Plan for greenbelt development along with details of species, width of plantation, etc. has been incorporated in this EIA/EMP Report. | Chapter - 10, Section 10.9, Page no. 192 - 195 |
| x. | Action plan for rainwater harvesting measures at plant site shall be submitted to harvest rainwater from the roof tops and | Action plan for rainwater harvesting measures at project site has been prepared to harvest rainwater from the roof tops and storm water drains to recharge the ground water and also to use for | Chapter - 7, Section 7.4, Page no. 146 - 151 |

| ToR Point No. | ToR Point | Compliance | Reference in Final EIA / EMP Report |
|------------------|---|--|--|
| | 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. | various activities at the plant site to conserve fresh water and reduce the water requirement from other sources. The same given in Hydro-geological Study Report incorporated in this EIA/EMP Report. | |
| xi. | Total capital cost and recurring cost/annum for environmental pollution control measures shall be included. | Cost for Environmental Protection Measures: Capital Cost: Rs. 28.0 Crores (14.0 Crores for each Phase) Recurring Cost: Rs. 4.0 Crores / Annum (2 Crores for each Phase) Detailed breakup of cost has been given in this EIA/EMP report. | Chapter - 10, Section 10.12, Page no. 204 |
| xii. | Action plan for post-project environmental monitoring shall be submitted. | Action plan for post-project environmental monitoring has been incorporated in this EIA/EMP report. | Chapter - 6, Section 6.2.5, Page no. 134 - 135 |
| 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. | Onsite and Offsite Disaster (natural and Man-made) Preparedness and Emergency Management Plan including Risk Assessment and damage control have been incorporated in this EIA/EMP Report. | Chapter - 7, Section 7.5.4.1, Page no. 163 - 172 |
| 8. | Occupational health: | | |
| i. | Plan and fund allocation to ensure the occupational health & safety of all contract and casual workers | Rs. 20 Lacs / annum has been allotted to ensure the occupational health and safety of all contract and casual workers. Details have been incorporated in this EIA/EMP Report. | Chapter - 10, Section 10.10.9, Page no. 200 |
| 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 | Exposure specific health status evaluation of workers will be done after commencement of the project. However, details regarding Occupational Health to be undertaken by Unit after plant commissioning are given in this EIA/EMP Report. | Chapter - 10, Section 10.10, Page no. 193 - 200 |

| ToR Point No. | ToR Point | Compliance | Reference in Final EIA / EMP Report |
|------------------|--|---|---|
| | of abovementioned parameters as per age, sex, duration of exposure and department wise. | | |
| iii. | 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. | Pre-placement and periodical examinations of the employees will be done as per company's health & safety policy. Details of proposed activities are incorporated in this EIA/ EMP Report. | Chapter - 10, Section 10.10, Page no. 193 - 200 |
| iv. | Annual report of health status of workers with special reference to Occupational Health and Safety. | Annual sample report of health status of worker with special reference to Occupational Health and Safety will be maintained. | - |
| 9. | Corporate Environment Policy: | | |
| i. ii. | 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. Does the Environment Policy prescribe for standard operating process / procedures to bring into focus any infringement / deviation / violation of the environmental or forest norms / conditions? If so, it may be detailed in the EIA. | Yes, the company has a laid down Environment Policy approved by its Board of Directors. Corporate Environment Policy of the company has been enclosed as Annexure - 7 along with this EIA / EMP Report. Yes, the Environment Policy prescribes for standard operating process to implement the environmental standards. | Annexure - 7, Page no. 305 - 309 |
| iii. iv. | What is the hierarchical system or Administrative order of the company to deal with the environmental issues and for ensuring compliance with the environmental clearance conditions? Details of this system may be given. Does the company have system of | The hierarchical system or Administrative order of the company to deal with the environmental issues and for ensuring compliance with the environmental clearance conditions is given in the Corporate Environment Policy. Yes, the company has system of reporting of non- | |
| | reporting of non-compliances / violations of environmental norms to the Board of Directors of the company and / or shareholders or | compliances / violations of environmental norms to the Board of Directors of the company. The same has been incorporated under roles & responsibilities of Corporate Environment Policy. | |

| ToR Point No. | ToR Point | Compliance | Reference in Final EIA / EMP Report |
|------------------|--|--|--|
| | 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. | Details regarding infrastructure facilities to be provided to the labour force during construction as well as to the casual workers including truck drivers during operation phase have been incorporated in this EIA/EMP Report. | Chapter - 2, Section 2.11, Page no. 49-50 |
| 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 | As per OM dated o1 st May, 2018, company has proposed to spend a total of Rs. 13.45 Cr (Phase-I: Rs. 7.7 Crores, Phase – II: Rs. 5.75 Crores) towards CER activities based on the proposed project cost of Rs. 830 Cr [Phase-1: Rs. 480 Crores and Phase-II: Rs. 350 Crores] | Chapter - 8, Section 8.3, Page no. 174 - 177 |
| | action plan shall be included. Socio- economic development activities need to be elaborated upon. | The action plan has been prepared based on the conclusion of public hearing issues. Detailed action plan for the activities along with the budgetary allocation incorporated in this EIA/EMP Report. | Chapter - 7, Section 7.2.4, Page no. 136 - 140 |
| 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 is pending against the project and/or any direction/order passed by any Court of Law against the project. The unit has not received any notice under the Section 5 of Environment (Protection) Act, 1986 or relevant Sections of Air and Water Acts. | - |
| 13. | A tabular chart with index for point wise compliance of above TORs. | Point-wise compliance of the ToRs has been given in the tabular form. | - |
| Specific Ter | ms of Reference for EIA Studies for Cem | nent Plants | |
| 1. | Limestone and coal linkage documents along with status of environmental clearance of limestone and coal mines. | No limestone or coal will be used in the proposed project as the proposal is for Clinker Grinding Unit. | - |

| ToR | Compliance | |
|-----|------------|--|

| ToR Point No. | ToR Point | Compliance | Reference in Final EIA / EMP Report |
|------------------|--|---|--|
| 2. | Quantum of production of coal and limestone from coal & limestone mines and the projects they cater to; | No limestone or coal will be used in the proposed project as the proposal is for Clinker Grinding Unit. | - |
| з. | For large Cement Units, a 3-D view i.e. DEM (Digital Elevation Model) for the area in 10 km radius from the proposed site. | Not applicable; as project is only a Clinker Grinding Unit, not a large Cement Plant project. | - |
| 4. | Present land use shall be prepared based on satellite imagery. High- resolution satellite imagery data having 1m-5m spatial resolution like quick bird, Ikonos, IRS P-6 pan sharpened etc. for the 10 km radius area from the proposed site. The same shall be used for land used/land-cover mapping of the area. | Present land use / land cover map has been prepared, based on satellite imagery, using RESOURCESAT-2 digital data which was procured from National Remote Sensing Centre, Hyderabad and the same have been incorporated in this EIA/EMP Report. | Chapter - 3, Section 3.5.1.1, Page no. 56 - 59 |
| 5. | If the raw materials used have trace elements, an environmental management plan shall also be included. | Raw materials will be analyzed for trace elements after commencement of the project. | - |
| 6. | Plan for the implementation of the recommendations made for cement plants in the CREP guidelines must be prepared. | Plan for the implementation of the recommendations made for the cement plants in the CREP guidelines have been prepared and incorporated in this EIA / EMP Report. | Chapter-10, Section- 10.12, Page no. 203 - 204 |
| 7. | Energy consumption per ton of clinker and cement grinding | Energy consumption per ton of cement grinding will be 32.5 Kwh. Since, this is a Clinker Grinding unit; thus, energy consumption per ton of clinker is not applicable. The same has been shown in the Energy Balance incorporated in this EIA/EMP Report | Chapter-2, Table- 2.10 (a) & (b), Page no. 42 |
| 8. | Provision of waste heat recovery boiler | Not applicable; as the proposal is for Clinker Grinding Unit. | - |
| 9. | Arrangement for use of hazardous waste | Not applicable; as the proposal is for Clinker Grinding Unit. | - |
| Project Spe | cific ToR | | |
| 1. | Environment Impact Assessment of particulate matter on the health of local population. | The concentration of PM in ambient air has been observed to be within prescribed standards. The calculated GLC of PM for proposed clinker grinding unit is 0.10 μ g/m ³ , causing resultant Maximum | Chapter-4, Section- 4.10, Page no. 122 - 123 |

| ToR Point No. | ToR Point | Compliance | Reference in Final EIA / EMP Report |
|------------------|--|--|--|
| | | concentration to be 88.5 µg/m3 which is also within prescribed limits. Further, the major source of pollution from a Clinker Grinding Unit is particulate matter and its impact will be contained within the plant boundary by utilizing various proposed air pollution control equipments. Details of the anticipated impact on occupational health and their mitigation measures have been incorporated in the EIA/EMP report. | |
| 2. | Ecological effect of particulate matter on flora and fauna | Details of anticipated impacts on the biological environment and their mitigation measures has been incorporated in the EIA/EMP report. | Chapter - 4, Section- 4.10, Page no. 127 |
| з. | The project proponent shall take the NOC from CGWA/SGWA as may the case in reference to MoEF&CC, Gol OM F.No. 21-103/2015-IA.III dated 02.11.2018. | Application for ground water withdrawal has been submitted to CGWA and the copy of the submission receipt is enclosed as Annexure - 1 with this EIA/EMP Report. | Annexure - 1 Page no. 222 |
| 4. | Approval/permission of the CGWA/SGWA shall be obtained before drawing ground water for the project activities. Haryana State Pollution Control Board (HSPCB) concerned shall not issue Consent to Operate CTO) till the project proponent obtains such permission. | Application for ground water withdrawal has been submitted to CGWA and the copy of the submission receipt is enclosed as Annexure - 1 with this EIA/EMP Report. | Annexure - 1 Page no. 222 |
| 5. | Public hearing issues to be addressed properly. | The time bound action plan for points raised and commitments made during the Public Hearing has been prepared along with budgetary provisions and the same has been incorporated in this EIA / EMP Report. | - |
| 6. | The PP shall submit CER Plan as per OM dated 1.05.2019 | As per OM dated o1 st May, 2018, company has proposed to spend a total of Rs. 13.45 Cr (Phase-I: Rs. 7.7 Crores, Phase – II: Rs. 5.75 Crores) towards CER activities based on the proposed project cost of Rs. 830 Cr [Phase-1: Rs. 480 Crores and Phase-II: Rs. 350 Crores]. The action plan has been prepared based on the conclusion of public hearing issues. Detailed action plan for the activities along with the budgetary allocation incorporated in this EIA/EMP Report. | Chapter - 8, Section 8.4, Page no. 175 - 177 |

ToR Compliance

| ToR Point No. | ToR Point | Compliance | Reference in Final EIA / EMP Report |
|------------------|---|---|--|
| 7. | The PP should enclose all analysis reports of Air, Water, Soil, Noise etc. from MoEF&CC/NABL Laboratory with scope of accreditation along with range of testing. All original reports should be available during appraisal of project. | Analysis reports of Air, Water, Soil, Noise from MoEFCC / NABL Laboratory with scope of accreditation along with range of testing are enclosed as Annexure - 8 with this EIA/EMP Report. All original reports will be available during appraisal of project. | Annexure - 8, Page no. 310 - 316 |
| 8. | The PP shall prepare and submit the wildlife conservation plan of the area and get approved from the Chief Wildlife Walden Haryana. | Details of the flora and fauna found within the study area have been given in this EIA/EMP Report. Five Schedule-I Species were found within 10 km radius of the study area viz., Antilope cervicapra (Blackbuck), Gazella bennettii (Indian Gazelle), Melanoperdix niger (Black Partridge), Pavo cristatus (Peafowl), Varanus bengalensis (Common Indian monitor). Conservation Plan along with receipt of submission to PCCF (WL) is enclosed as Annexure - 2 along with this EIA/EMP Report. | Annexure - 2 Page no. 223 - 280 |

CHAPTER- 1 INTRODUCTION

1.1 PURPOSE OF THE REPORT

This report has been prepared in reference to the ToR issued by SEIAA, Haryana *vide* letter no. SEIAA/HR/2019/141 dated 05th July, 2019 for carrying out the Environmental Impact Assessment (EIA) study for the Proposed Clinker Grinding Unit with Cement Production Capacity of 5.0 MTPA (2.5 MTPA: Phase-I & 2.5 MTPA: Phase-II) and D.G. Set (6.5 MW) at Village: Jhanswa, Sub-Tehsil: Salhawas, Tehsil: Matanhail, District: Jhajjar (Haryana).

The main purpose of this report is to provide a coherent statement after analysing all significant impact of the proposed project and measures that should be taken to eliminate and mitigate them. It contains essential information for:

- The proponent to implement the proposal in an environmentally and socially responsible way;
- ∞ The responsible authority to make an informed decision on the proposal, including the terms and conditions that must be attached to an approval or authorization; and
- >>>> The public to understand the proposal and its likely impacts on people and the environment.

1.2 IDENTIFICATION OF PROJECT AND PROJECT PROPONENT

1.2.1 Identification of the Project

A. Project Proposal

M/s. Wonder Cement Ltd. is proposing Stand-alone Clinker Grinding Unit with Cement Production Capacity of 5.0 MTPA (2.5 MTPA: Phase-I & 2.5 MTPA: Phase-II) and D.G. Set (6.5 MW) at village: Jhanswa, Sub-Tehsil: Salhawas, Tehsil: Matanhail, District: Jhajjar (Haryana). Details of the production capacities are given in **Table - 1.1**:

Table - 1.1

Production Capacities of the Proposed Project

| S. No. | Particular | Proposed Capacity |
|--------|-----------------|------------------------------------|
| 1. | Cement (MTPA) | 5.0 (Phase-I: 2.5 & Phase-II: 2.5) |
| 2. | D. G. Sets (MW) | 6.5 |

Source: Pre-Feasibility Report

B. Screening Category

As per EIA Notification dated 14th Sept., 2006, as amended from time to time; the project falls under Category "B", Project or Activity '3(b)' Cement Plants.
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C. Status of the Proposed Project with respect to Environment Clearance

The chronology of the project activities undertaken so far with respect to the process of getting Environment Clearance are as given in **Table - 1.2**:

Table - 1.2

Status of the Proposed Project with respect to Environment Clearance

| S. No. | Project Activity | Details |
|--------|---|---------------------------------------|
| 1. | Application (Form - 1/ToR and Pre-Feasibility Report) uploaded on SEIAA, Haryana portal | 28 th March, 2019 |
| 2. | First Technical Presentation (For ToR approval) held before SEAC, Haryana | 30 rd April, 2019 |
| 3. | Reconsideration Presentation (For ToR approval) held before SEAC, Haryana | 16 th May, 2019 |
| 4. | Baseline Monitoring & Data Collection | Summer Season (March to May, 2019) |
| 5. | First Technical Presentation (for ToR approval) held before SEIAA, Haryana | 12 th June, 2019 |
| 6. | ToR Letter issued by SEIAA, Haryana | 05 th July, 2019 |
| 7. | Public hearing conducted on | 28 th Aug., 2019 |

1.2.2 Introduction of the Project Proponent

Project Proponent

About Wonder Cement Limited

M/s. Wonder Cement Limited is a unit of M/s. RK Marble Group. Wonder Cement Limited is a cutting edge cement manufacturing company having a total cement production capacity of 12.0 MTPA (Line 1, Line 2 & Line 3). The state of the art manufacturing plant was established in technical collaboration with ThyssenKrupp and Pfeiffer Ltd. of Germany, the world leaders in cement technology, and it produces cement at par with international standards. Special effort was taken to ensure that the plant upholds the latest environmental norms and with the help of an air bag house, ESP and a number of nuisance bag filters, the plant remains clean & dust free. Wonder Cement Limited has two Grinding Units- one in Dhule district, Maharashtra having a capacity of 2 MTPA and another grinding unit at Badnawar, Madhya Pradesh having a cement production capacity of 2 MTPA is under construction. The company aspires to establish itself as a leading player in the industry. Its Registered & Corporate Office is at Madanganj - Kishangarh, District Ajmer (Rajasthan). This company is ISO 9001-2015, ISO 14001-2015 and OHSAS 18001-2007 certified unit.

Proposed Clinker Grinding Unit with Cement Production Capacity of 5.0 MTPA (2.5 MTPA: Phase - I & 2.5 MTPA: Phase - II) and D.G. Set (6.5 MW) At Village: Jhanswa, Sub-Tehsil: Salhawas, Tehsil: Matanhail, District: Jhajjar (Haryana)

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1.3 BRIEF DESCRIPTION OF NATURE, SIZE, LOCATION OF THE PROJECT AND ITS IMPORTANCE TO THE COUNTRY, REGION

1.3.1 Brief Description of Nature, Size and Location of the Project

Brief Description of Nature, Size and Location of the Project is given in Table - 1.3.

Table - 1.3

| Brief Descript | ion of Nature | Size and | Location (| of Project |
|-----------------------|---------------|----------|------------|------------|
| | | | | |

| S. No. | PARTICULARS | DETAILS | | | | | |
|--------|-------------------------|---|--|--|--|--|--|
| А. | Nature of the Project | Proposed Project | | | | | |
| в. | Size of the Project | ✓ Cement - 5.0 MTPA (Phase-I: 2.5 & Phase-II: 2.5) ✓ D. G. Set - 6.5 MW | | | | | |
| C. | Category of the Project | As per EIA Notification dated 14 th Sept, 2006, as amended fro time to time; the project falls under Category "B", Project Activity '3 (b)'- Cement Plants | | | | | |
| | Location Details | | | | | | |
| | Village | Jhanswa | | | | | |
| | Sub-Tehsil | Salhawas | | | | | |
| D | Tehsil | Matanhail | | | | | |
| D. | District | Jhajjar | | | | | |
| | State | Haryana | | | | | |
| | Latitude | 28° 28' 16.15" N to 28° 28' 58.16" N | | | | | |
| | Longitude | 76° 24' 18.12" E to 76° 24' 40.75" E | | | | | |

Source: Pre-Feasibility Report

1.3.2 Importance to the Country and Region

National Importance

With nearly 502 Million Tonnes (MTPA) of cement production capacity in 2018, India is the second largest cement market in the world, both in production & consumption. India's cement production capacity is expected to reach 550-600 million tonnes by 2025.

No wonder, India's cement industry is a vital part of its economy, providing employment to more than a million people, directly or indirectly. Ever since it was deregulated in 1982, the Indian cement industry has attracted huge investments, both from Indian as well as foreign investors.

India has a lot of potential for development in the infrastructure and construction sector and the cement sector is expected to largely benefit from it. Some of the recent major government initiatives such as development of 98 smart cities are expected to provide a major boost to the sector.

Also, a significant factor which aids the growth of this sector is the ready availability of the raw materials for making cement, such as limestone and coal.

The eastern states of India are likely to be the newer and virgin markets for cement companies and could contribute to their bottom line in future. In the next 10 years, India could become the

main exporter of clinker and grey cement to the Middle East, Africa, and other developing nations of the world.

The housing sector is the biggest demand driver of cement, accounting for about 67% of the total consumption in India. The other major consumers of cement include infrastructure at 13%, commercial construction at 11% and industrial construction at 9%.

There is a capacity addition of 109 MTPA between 2013-16. Cement Industry is expected to grow at 5-6 percent CAGR between FY17 - FY20. The industry is currently producing 280 MT for meetings its domestic demand and 5 MT for exports requirement. The country's per capita consumption stands at around 225 kg.

Due to the increasing demand in various sectors such as housing, commercial construction and industrial construction, cement industry is expected to reach 550-600 Million Tonnes Per Annum (MTPA) by the year 2025.

Driven by a booming housing sector, global demand and increased activity in infrastructure development such as state and national highways; the cement industry has outpaced itself, ramping up the production capacity. Going forward, these demand drivers will take the cement demand to new heights in the next five years. Thus, this proposed project is of prime importance to country and local region.

Regional Importance

Haryana's 14th placed 12.96% 2012-17 CAGR estimated 2017-18 GSDP of US\$95 billion is split in to 52% services, 30% industries and 18% agriculture.

Services sector is split across 45% in real estate and financial & professional services, 26% trade and hospitality, 15% state and central govt employees, and 14% transport and logistics & warehousing. In IT services, Gurugram ranks number 1 in India in growth rate and existing technology infrastructure, and number 2 in start-up ecosystem, innovation and livability (Nov 2016).

Industries sector is split across 69% manufacturing, 28% construction, 2% utilities and 1% mining. Installed capacity in North Region (Rajasthan, Punjab & Haryana) are 85.6 MTPA. By installing the proposed grinding unit, M/s wonder cements will try to provide for increasing demands form Delhi/NCR region, Uttar Pradesh, Haryana and other border states.

1.4 SCOPE OF EIA STUDY

Scope of this study covers all the points given in the Terms of Reference (ToR) prescribed by SEIAA, Haryana *vide* letter no. SEIAA/HR/2019/141 dated 05th July, 2019. This EIA/EMP report includes total twelve chapters as per Appendix-III of the EIA Notification, 2006.

| Chapter | Description | | | |
|-------------|--------------------------------|--|--|--|
| Chapter - 1 | Introduction | | | |
| Chapter - 2 | Project Description | | | |
| Chapter - 3 | Description of the Environment | | | |

Proposed Clinker Grinding Unit with Cement Production Capacity of 5.0 MTPA (2.5 MTPA: Phase - I & 2.5 MTPA: Phase - II) and D.G. Set (6.5 MW) At Village: Jhanswa, Sub-Tehsil: Salhawas, Tehsil: Matanhail, District: Jhajjar (Haryana)

Chapter - 1 of Final EIA / EMP Report

| Chapter | Description |
|--------------|---|
| Chapter - 4 | Anticipated Environmental Impacts and Mitigation Measures |
| Chapter - 5 | Analysis of Alternatives (Technology & Site) |
| Chapter - 6 | Environmental Monitoring Plan |
| Chapter - 7 | Additional Studies |
| Chapter - 8 | Project Benefits |
| Chapter - 9 | Environment Cost Benefit Analysis |
| Chapter - 10 | Environment Management Plan |
| Chapter - 11 | Summary & Conclusion |
| Chapter - 12 | Disclosure of Consultants Engaged |

1.4.1 Regulatory Scoping

The study covers the requirements of various acts and rules applicable for Cement industry related to air pollution, water pollution, solid waste management,CREP guidelines and fugitive emissions guidlines etc.

CHAPTER - 2 PROJECT DESCRIPTION

2.1 TYPE OF THE PROJECT

As mentioned in the previous chapter, the proposed project is a new project - which falls under Category 'B' projects as per the EIA Notification, 2006 & as amended from time to time; Project or Activity '3(b)' Cement Plants- in which installation of Clinker Grinding Unit with cement production capacity of 5.0 MTPA (2.5 MTPA: Phase - I & 2.5 MTPA: Phase - II) and D.G. Set (6.5 MW) at village: Jhanswa, Sub-Tehsil: Salhawas, Tehsil: Matanhail, District: Jhajjar (Haryana) will be carried out.

2.2 NEED FOR THE PROJECT

Cement manufacturing Industries are one of the important sectors of Indian Economy. The sector has experienced phenomenal growth, especially after the decontrol regime from 1999, and greater thrust by Government on Infrastructure development and spurt in housing construction sector has led to increased demand for cement.

India has a lot of potential for development in the infrastructure and construction sector and the cement sector is expected to largely benefit from it. Some of the recent major government initiatives such as development of 98 smart cities are expected to provide a major boost to the sector.

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% of the total consumption in India. The other major consumers of cement include infrastructure at 13%, commercial construction at 11% and industrial construction at 9%.

In order to meet the increasing demand, most cement plants are making efforts to achieve higher production levels, at times by stretching the existing production facilities and by adding additional capacities.

Looking into the increasing demand of Cement, M/s. Wonder Cement Ltd. is proposing installation of Clinker Grinding Unit at Village: Jhanswa, Sub-Tehsil: Salhawas, Tehsil: Matanhail, District - Jhajjar (Haryana).

2.3 LOCATION OF THE PROJECT

The project site is located at Village: Jhanswa, Sub - Tehsil: Salhawas, Tehsil: Matanhail, Jhajjar District in the state of Haryana.

2.3.1 General Location Map

The map showing general location of the project site is as given below:



Figure 2.1: Location Map

2.3.2 Specific Location Map

The map showing specific location of the project site along with geographical coordinates on Google Earth downloaded image of the project is given in Figure - 2.2.



Figure 2.2: Google Earth Downloaded Map of the Project Site along with Corner Co-ordinates of the site

S. No. **Co-ordinates** S. No. **Co-ordinates** 28°28'58.23" N & 76°24'35.49"E Κ 28°28'16.16" N & 76°24'33.57"E Α 28°28'48.36" N & 76°24'34.18"E 28°28'31.28" N & 76°24'18.94"E В L С 28°28'46.10" N & 76°24'33.59"E Μ 28°28'32.88" N & 76°24'19.74"E D 28°28'44.27" N & 76°24'33.53"E Ν 28°28'34.92" N & 76°24'18.08"E Ε 28°28'38.16" N & 76°24'30.72"E ο 28°28'39.66" N & 76°24'18.80"E F 28°28'29.54" N & 76°24'30.04"E Ρ 28°28'44.15" N & 76°24'22.00"E G 28°28'28.91" N & 76°24'40.75"E 28°28'46.22" N & 76°24'25.13"E Q Н R 28°28'26.62" N & 76°24'39.74"E 28°28'50.30" N & 76°24'32.73"E L 28°28'20.08" N & 76°24'32.20"E S 28°28'57.55" N & 76°24'32.73"E J 28°28'20.36" N & 76°24'36.0"E

Table 2.1: Corner Co-ordinates of the Project site

2.3.3 Project Site Layout

Total area required for the proposed Clinker Grinding Unit is 21.78 ha; which is a private agricultural land. 100% land has been purchased by mutual agreement and conversion of the total land for installation of Grinding Unit is under process. Out of the total project area (21.78 ha), 33% (i.e. 7.18 ha) will be developed under greenbelt / plantation.

Project area break-up is given in Table - 2.2.

Table - 2.2 Project Area Break-up

| Unit | Proposed area (ha) |
|----------------------|--------------------|
| Plant area | 3.6 |
| Greenbelt/Plantation | 7.21 |
| Roads | 1.75 |
| Railway Siding | 4.3 |
| Parking Area | 1.5 |
| Others | 3.42 |
| Total Project Area | 21.78 |

Source: Pre-feasibility Report

The plant layout showing proposed units indicating machinery, storage facilities, greenbelt/plantation etc. is shown in **Figure - 2.3**.

Figure 2.3: Plant Layout

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2.3.4 Project Site Photographs



2.4 SIZE OR MAGNITUDE OF OPERATION

In the proposed project, there will be installation of clinker grinding unit for the production of

cement. Size of the project is given in Table - 2.3 and magnitude of operation in Table2.4.

| Table - 2.3 |
|---------------------|
| Size of the Project |

| S. No. | Units | Proposed Capacity |
|--------|---------------|------------------------------------|
| 1. | Cement (MTPA) | 5.0 (Phase-I: 2.5 & Phase-II: 2.5) |
| 2. | D.G. Set (MW) | 6.5 |

Source: Pre-Feasibility Report

Table - 2.4

Magnitude of Operation in terms of Cost

| S. No. | Particular | Details |
|--------|-----------------------------------|--|
| 1. | Total Cost for the Project | Rs. 830 Crores (Phase – I: Rs.480 Crores & Phase- II: Rs.350 Crores) |
| 2. | Cost for Environmental Protection | ✓ Capital Cost: Rs. 28 Crores (Rs. 14 Crores for each Phase) |
| | Measures | ✓ Recurring Cost: Rs. 4.0 Crores/annum (Rs. 2.0 Crores for each Phase) |

Facilities / Activities Proposed

The major facilities and associated activities proposed as a part of proposed project are as given below:

Table - 2.5 Scope of Proposed Project

| S. No. | Unit | Major facilities and associated activities proposed |
|--------|--------------------------------|--|
| 1. | Grinding Unit | Gypsum Crusher Cement Mill (VRM) Storage Facilities for Raw Materials and Products (Covered Sheds, Silos) Packing Plant Packers and Truck Loaders Truck Tipplers (for gypsum, clinker) Wagon Tippler |
| 2. | Other Associated Facilities | Diesel Generator with storage of fuelSewage Treatment Plant |

2.5 REQUIREMENTS FOR THE PROJECT

The project requirements such as raw materials, water, power, manpower with source of supply are described in the sections below.

2.5.1 Raw Material Requirement

Major raw material required for cement production in Clinker Grinding Unit is Clinker, Fly ash, Gypsum (Mineral and Chemical). Details regarding quantity of raw materials required, their source along with distance and mode of transportation are given in Table - 2.6.

Table - 2.6 Raw Material Requirement

| | | Quantity (MTPA) | | | Distance / Mada of | | |
|--------|--------------------|-----------------|---------|-------|--------------------|---|----------------------|
| S. No. | Material | Pha | ise - I | Pha | se - II | Source | Transportation |
| | | PPC | OPC | PPC | OPC | | Transportation |
| 1. | Clinker | 0.75 | 1.187 | 0.75 | 1.187 | Existing Cement Plant in Nimbahera, Dist. Chittorgarh, Rajasthan / Outsourced | 550 km ; Road / Rail |
| 2. | Fly ash | 0.437 | 0 | 0.437 | 0 | Thermal Power Plants, IGSTPP and CLP, Jharli, Jhajjar | 20 km ;Road |
| 3(a). | Mineral Gypsum | 0.067 | 0.062 | 0.067 | 0.062 | RSMML, Nagaur/ Bikaner (Raj.) | 365 km; Road & Rail |
| 3(b). | Chemical Gypsum | 0.003 | 0.003 | 0.003 | 0.003 | Dye & dye Intermediate plants in Surat Vapi Gujarat | 750 km ;Road & Rail |

Source: Pre-feasibility Report

Mass Balance Diagram

Mass Balance Diagram for manufacturing of OPC & PPC is shown in Figure - 2.4.



Figure 2.4: Mass Balance Diagram

2.5.2 Fuel Requirement for Grinding Unit

Details regarding quantity of fuel required, their source along with distance & mode of transportation for proposed project are given in Table - 2.7

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Table - 2.7

Fuel Requirement

| S. No. | Name | Quantity | Source | Distance & Mode of Transportation | Calorific value (Kcal./kg) | % Ash | % Sulphur |
|-----------|-----------------|-----------------|----------------------|---|----------------------------------|-------|-----------|
| 1. | Diesel (HSD) | 300 Litre/Hr | IOC depot Jhajjar | 10 km | 10000 | - | 0.05% |

Source: Pre-feasibility Report

2.5.3 Water Requirement

Total water requirement for the proposed project will be 550 KLD (300 KLD for phase I and 250 KLD for phase II) and the same will be sourced from Ground Water.

Status of Approval: Application for ground water withdrawal has been submitted to CGWA and the copy of the submission receipt is enclosed as **Annexure - 1** with this EIA/EMP Report.

Break-up of the water requirement is given in Table - 2.8 and Water Balance Diagram is given in Figure - 2.5 (a) & 2.5 (b).

Table - 2.8 Break- up of Water Requirement

| Durnasa | Requireme | Source | | |
|-----------------------|-----------|----------|-----------------|--|
| Purpose | Phase-I | Phase-II | Source | |
| Cooling Water | 100 | 100 | | |
| Mill Water Spray | 130 | 130 | | |
| D. G. Set | 10 | - | | |
| Drinking/Domestic | 30 | 20 | Ground Water | |
| Greenbelt/ Plantation | 20 | - | Water | |
| Dust Suppression | 10 | | | |
| Total | 300 | 250 | | |

Source: Pre-feasibility Report

Proposed Clinker Grinding Unit with Cement Production Capacity of (2.5 MTPA: Phase - I & 2.5 MTPA: Phase - II) and D.G. Set (6.5 MW) At Village: Jhanswa, Sub-Tehsil: Salhawas, Tehsil: Matanhail, District: Jhajjar (Haryana)

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Water Balance Diagram for total water requirement (Phase-I)

Figure. 2.5 (a): Water Balance Diagram (Phase-I)

Proposed Clinker Grinding Unit with Cement Production Capacity of (2.5 MTPA: Phase - I & 2.5 MTPA: Phase - II) and D.G. Set (6.5 MW) At Village: Jhanswa, Sub-Tehsil: Salhawas, Tehsil: Matanhail, District: Jhajjar (Haryana)

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Water Balance Diagram for total water requirement (Phase-II)

Figure 2.5 (b): Water Balance Diagram (Phase-II)

2.5.4 Power Requirement

Total power requirement for the proposed project will be 25 MW (Phase - I: 13 MW & Phase-II: 12 MW). Source: Haryana State Grid and D.G. Set (For Emergency back-up)

Energy Balance

Energy balance for the Phase - I and Phase - II power requirement is given in Table - 2.9 (a) & Table - 2.9 (b).

| Table - 2.9 (a) |
|----------------------------|
| Energy Balance (Phase - I) |

| S. No. | Description | Capacity / annum (TPA) | Working Day | TPD | Running Hrs | ТРН | Kwh / Tonne | KWh/ annum | kw/hr | MW/hr |
|--------|----------------|---------------------------|----------------|------|----------------|-----|----------------|---------------|-------|-------|
| 1. | Gypsum Crusher | 1035000 | 345 | 3000 | 20 | 150 | 0.5 | 517500 | 62.5 | 0.62 |
| 2. | Cement Mill | 2777250 | 345 | 8050 | 23 | 350 | 32.5 | 90260625 | 10901 | 10.9 |
| 3. | Packing Plant | 3312000 | 345 | 9600 | 20 | 480 | 1.75 | 5796000 | 700 | 0.7 |
| 4. | Other | - | - | - | - | - | _ | - | 780 | 0.78 |
| | Total Power | | | | | | | | 13000 | 13.0 |

Table - 2.9 (b)

Energy Balance (Phase-II)

| S. No. | Description | Capacity / annum (TPA) | Working Day | TPD | Running Hrs | ТРН | Kwh / Tonne | KW/annum | kw/hr | MW/hr |
|--------|----------------|------------------------------|----------------|------|----------------|-----|----------------|----------|-------|-------|
| 1. | Gypsum Crusher | 1035000 | 345 | 3000 | 20 | 150 | 0.5 | 517500 | 62.5 | 0.62 |
| 2. | Cement Mill | 2777250 | 345 | 8050 | 23 | 350 | 32.5 | 90260625 | 10901 | 10.9 |
| 3. | Packing Plant | 3312000 | 345 | 9600 | 20 | 480 | 1.75 | 5796000 | 700 | 0.7 |
| | Total Power | | | | | | | | 12000 | 12.0 |

2.5.5 Manpower Requirement

Total manpower required for the proposed project is 230 (Phase-I: 178, Phase-II: 52). Source: Regular- Nearby Villages/Area/Outside and Contractual- Nearby Villages/Area.

Details regarding manpower requirement is given in Table - 2.10.

Table - 2.10 Manpower Requirement

| Particular | Regular | Contractual | Total |
|------------|---------|-------------|-------|
| Phase-I | 58 | 120 | 178 |
| Phase-II | 22 | 30 | 52 |
| Total | 80 | 150 | 230 |

Source: Pre-feasibility Report

2.6 PROPOSED SCHEDULE FOR APPROVAL AND IMPLEMENTATION

The construction work will be started after getting Environmental Clearance from the SEIAA, Haryana.

A. Proposed Schedule for Approval:

- 80 Environment Clearance from SEIAA, Haryana: By October, 2019
- 80 Consent to Establish from HSPCB: Approx. 3 months after getting EC.

B. Proposed Schedule for Implementation:

The proposed schedule for Phase-I implementation will be 18 months and Phase-II project will be implemented after successful commissioning and operation of Phase-I. Implementation chart for Phase-I is given below:

| S No Broject Activity | | | | | | | | | | | | |
|-----------------------|---|-----|-------|----|---|---|---|----|----|----|----|----|
| 3. 10. | Project Activity | | 4 | 5 | 6 | 8 | 9 | 12 | 14 | 16 | 17 | 18 |
| 1. | Land Acquisition | Cor | nplet | ed | | | | | | | | |
| 2. | Detail Engineering | | | | | | | | | | | |
| 3. | Plant machine and Auxiliary order placement | | | | | | | | | | | |
| 4. | Civil Construction | | | | | | | | | | | |
| 5. | Equipment Delivery | | | | | | | | | | | |
| 6. | Fabrication | | | | | | | | | | | |
| 7 | Erection | | | | | | | | | | | |
| 8. | Final Commissioning | | | | | | | | | | | |

2.7 TECHNOLOGY AND PROCESS DESCRIPTION

2.7.1 Technology Description of Grinding Unit

Latest VRM technology will be adopted for Clinker Grinding.

The type of cement manufactured will be Portland Pozzolona Cement (PPC) and Ordinary Portland Cement (OPC).

2.7.2 Process Description of Grinding Unit

The manufacturing process comprises of:

- Clinker storage and handling
- Fly Ash storage and handling
- Gypsum storage and handling
- Clinker grinding, Cement production and storage
- Cement packing and dispatch

The manufacturing process details are given below:

✓ Clinker Storage & Handling

Clinker will be received at plant site by railway. Clinker will be unloaded and transported by a belt conveyor to the clinker silo. From the silo, clinker will be conveyed to the mill hopper by a combination of extraction equipment and belt conveyors. Clinker will be sourced from Integrated Cement Plant at Chittorgarh (Rajasthan).

✓ Fly Ash Storage & Handling

Fly ash will be sourced from Thermal Power Plants, IGSTPP and CLP, Jharli, Jhajjar and will received through closed bulkers & fed into silo through pneumatic conveying system.

✓ Gypsum Storage & Handling

Gypsum will be received by road / railway and will be unloaded and transported to storage by a belt conveyor. Gypsum will be reclaimed by reclaimer for further conveying to Mill hoppers by conveyors.

✓ Clinker grinding & Cement production and storage

Vertical Roller Mill

In this circuit Clinker, Gypsum and Fly ash will fed to the table of Roller Mill. Fines will air swept to Dynamic separator. Product cement from Dynamic separator will collected in product Bag house or product cyclones for further transport to Cement Silos. Coarse clinker from separator and coarse-ground material from mill table will re-circulated and fed to mill table again along with fresh clinker.

✓ Cement Packing and Dispatch

Rotary electronic packing machines will be used for packing of cement. Loading of packed bags onto the trucks will be done by truck loading machines. Bags are of 50 kgs each. Loose cement will be dispatched through closed bulkers to bulk consumers. Cement will be dispatched by road and railway.



Typical flow diagram cement manufacture by dry process is shown below in Figure.

Figure -2.6: Process Flow Chart

| Product Mix for Portland | Pozzolana Cement (| PPC) |
|--------------------------|--------------------|------|
|--------------------------|--------------------|------|

| S. No. | Component | Proportion by Weight (%) |
|--------|-----------|--------------------------|
| 1. | Clinker | 60 |
| 2. | Fly Ash | 35 |
| 3. | Gypsum | 5 |

Product Mix for Ordinary Portland Cement (OPC)

| S. No. | Component | Proportion by Weight (%) |
|--------|-----------|--------------------------|
| 1. | Clinker | 95 |
| 2. | Gypsum | 5 |

2.8

D. G. Set

WCL have proposed 6.5 MW DG sets within Grinding Unit as standby arrangement for power supply will be operated in case of power failure. This report includes findings of environmental impacts during operation of these set. Pertinent specifications with regard to emissions are given below.

| Fuel | HSD |
|---|------------------------------------|
| Fuel consumption | 300 L/hr/unit |
| Stack height, m | 30 m |
| Power factor | 0.8 Lag |
| Set height | 30 m acoustic enclosure & silencer |
| No of fuel tanks | 991 L |
| Stack height, m | 30 m |
| HSD characteristics | |
| Flash point, °C | 38 |
| Pour point, °C | 3-18 |
| Kinematic viscosity, centi stokes at 38, °C | 2-7.5 |
| Sp. gravity, at 15.6, °C | 0.822-0.812 |
| Water content, wt, % | 0.05 |
| Ash, % | Traces |
| Sulphur, % | 0.05 |
| Sediment, wt % | 0.05 |
| GCv, kcal/kg | 11,000-11,100 |

2.9 Sewage Treatment Plant

Sewage Treatment Plant (STP) of capacity 25 KLD will be installed for the treatment of domestic waste water in Plant.

Process description of the STP

Proposed Description of Sewage Treatment Plant

- Screen Chamber: The effluent flowing through drain is screened. All collection drains up to Collection Sump is covered & fitted with proper screens to prevent entry of coarse floating material like polythene bags, pieces of wood, glass and ropes etc.
- Collection Sump: Effluent is collected into a sump for pumping in to FAB Reactor. The flow of Sewage, wash water from Bath Room and Kitchen is highly in-consistent in terms of quality and quantity. In order to control gush of water and provide consistent out flow, aeration shall be provided.
- FAB Reactor: The effluent is pumped at a controlled rate from Collection Sump to FAB REACTOR for degradation of organic matter with the help of Microorganisms, present in Sewage itself. A special type of bacteria is developed in FAB REACTOR in conjunction with dissolved oxygen, transferred through Diffused Aeration System which converts sewage and other contaminants into new cells. The developed Bio Sludge forms coating around the media provided in the FAB REACTOR. The proposed Activated Sludge Process is one of the most widely used process. This process is carried out in two steps. The raw effluent is first aerated and agitated continuously with the help of Twin Lobe Blower and Diffusers. During this period, a mass of biological active flocs called "Activated Sludge" is formed. The mixture of activated sludge and suspended solids is called "Mixed Liquor Suspended Solids".
- Clarifier: In the 2nd Step of the above process, the mixed liquor passes through a Clarifier where separation of the activated sludge from aerated water takes place. Settled sludge is removed from the Clarifier through sludge transfer pump and divided into two streams. One stream called return sludge is sent back to FAB Reactor near to the inlet, where it mixes with the incoming effluent and acts as seed for the formation of more activated sludge & simultaneously maintains, the MLSS up to desired level. The other stream is excess activated sludge from Clarifier sent for compaction and drying through Sludge Filter Press. The percolated water from the sludge press is sent back to Collection Sump for retreatment. The treated effluent from the clarifier is passed through chlorine Contact Tank.
- © Ozonisation cum Collection Tank: The treated water passes through Ozonator for removal of left over bacteria.
- 80 Pressure Sand Filter: The Chlorinated treated effluent is passed through Pressure Sand Filter for driving away chlorine; minimize suspended Solids and colour etc.
- Activated Carbon Filter: After passing through Pressure Sand Filter, the effluent is passed through Activated Carbon Filter for further polishing by reducing Colour and odour etc.
- Sludge Filter Press: Sludge needs to be dewatered and dried for easy disposal. This is done through sludge bag filter press, which allow excess water to filter through and separated sludge cake is used as manure / land fill.

The schematic diagram for sewage treatment plant has been shown in Figure - 2.7.



Figure 2.7: Schematic Diagram for Sewage Treatment Plant

| e: 2.11 |
|---------|
| 2: 2.11 |

Quality of STP Treated water

| Parameters | Quality of Raw Sewage | Quality of Treated Sewage |
|---|--------------------------|------------------------------|
| рН | 6-8.5 | 6.5-7.5 |
| BOD | 100-350mg/l | ≤20mg/l |
| COD | 200-550 mg/l | ≤100mg/l |
| TSS | 200 mg/l | 20 mg/l |
| Fecal Coliform (FC) (Most Probable Number per 100 millilitres, MPN/100ml | 200 mg/l | 20 mg/l |

2.10 MAJOR EQUIPMENTS AND MACHINERIES

2.10.1 Equipment Selection

A list of equipment and storage capacities are given below. In selecting a particular type of equipment or storage for the project, among others, the following issues have been considered:

- ✓ Equipment costs
- ✓ Energy consumption
- ✓ Raw materials characteristics
- ✓ Sizes in which the equipment is available
- ✓ Lead times for particular types of equipment
- ✓ Operating experience with various types of equipment
- ✓ Ease of operation of equipment
- ✓ Product to be manufactured
- ✓ Site conditions
- ✓ Local skills available
- ✓ Environmental issues.

2.10.2 **Plant and Equipment Sizing**

Details regarding plant and equipment sizing are given in Table - 2.12.

| Table - | 2.12 |
|---------|------|
|---------|------|

Equipment Details of Grinding Unit

| S. No. | Description | Unit | Capacity (Phase - I) | Capacity (Phase - II) |
|-------------|--|------|-------------------------|--------------------------|
| 1. | Gypsum crusher | TPH | 1 X 150 | - |
| 2. | Clinker Grinding Circuit | TPH | 1 x 350 | 1 x 350 |
| 3. | Packing plant | | | |
| 4 (a). | Packer | TPH | 3 x 240 | 1 X 240 |
| 4 (b). | Truck Loaders | Nos. | 9 | 4 |
| 5. | Truck Tipplers for Gypsum (1), Clinker unloading (2) and fly ash (1 nos.) | TPH | 2 X 100 | - |
| 6. | Sector Gates under Truck Tipplers | Nos | 4 | - |
| 7. | Belt Conveyors, Elevators, system for material transport | Lot | 1 | 1 |
| Source: Pre | -feasibility Report | | | • |

2.10.3 **Storage Facilities**

Details regarding storage facilities of raw material & product are given in Table 2.13:

| Storage Facilities | | | | | |
|--------------------|-----------------|-----------|------------|--|--|
| Turne of Material | Type of Storage | Capacity | (Tonnes) | | |
| Type of Material | | Phase - I | Phase - II | | |
| Cement | RCC Silo | 3 x 7500 | - | | |
| Clinker | RCC Silo | 40000 | - | | |
| Fly ash | RCC Silo | 3000 | 3000 | | |
| Gypsum | Covered Yard | 4500 | - | | |

Table - 2.13

Source: Pre-feasibility Report

Infrastructure facilities 2.11

Labour is one of the key factor of production; the operational workers will be employed form nearby area, who may commute daily from their residence for work and hence no long term housing will be needed. It will be ensured that labourers are provided with infrastructure facilities during construction as well as operation phase. Following facilities will be provided:

Construction Phase

- ✓ Minimum space will be allocated per person or per family in terms of floor area.
- ✓ Supply of safe water in such quantities as to provide for all personal and household uses will be ensured.
- ✓ Adequate sewage and garbage disposal systems will be ensured.
- Appropriate protection against heat, cold, damp, noise and fire. √

- Adequate sanitary and laundry facilities, ventilation, cooking, storage facilities and natural and artificial lighting.
- ✓ Medical Facilities.

Operation Phase

- ✓ Workplace facility such as; Canteens, Rest rooms, rest areas
- ✓ Occupational Health & safety with first aid facilities
- ✓ Security of the workers
- ✓ Medical Facilities.

2.12 DESCRIPTION OF MITIGATION MEASURES

The mitigation measures given in this section are for management of the emissions, effluents, solid and hazardous waste generation from the plant to meet the environmental standards and environmental operating conditions.

2.12.1 Details of Emissions from the Plant and their mitigation

| Emissions | Mitigation measures to be adopted |
|-------------|--|
| PM | Bag House at Cement Mill Bag filters at all the material transfer points |
| | o Bag filters at all the material transfer points. |
| | Covered Conveyor belts for transfer of raw materials / finished products |
| | Clinker, Fly ash and Cement stored in the silos |
| Fugitivo | Gypsum stored in the covered sheds |
| Emission | Water sprinkling to control dust |
| EIIIISSIOII | Proper maintenance of vehicles to reduce gaseous emissions |
| | $\circ~$ Greenbelt / plantation done along the plant boundary to attenuate air pollution |
| | $\circ~$ Fly ash received through closed bulkers and fed into silo through pneumatic system |

2.12.2 Details of Effluent and their mitigation

| Effluents | Plant Unit | Mitigation measures to be adopted | | |
|---------------------|--------------|---|--|--|
| Process Waste Water | Cooling blow | Blow down will be used for greenbelt development/ | | |
| FIDLESS Waste Water | down | Plantation. | | |
| Sowago | Plant | Treated water used for greenbelt development/ | | |
| Sewage | Fidilt | plantation and dust suppression. | | |

2.12.3 Details of Noise Generated and their mitigation

| Source | Mitigation measures to be adopted | | |
|------------------|---|--|--|
| | DG Set provided with acoustic enclosures. | | |
| Noise Generating | Greenbelt /plantation will be developed. | | |
| Machines | PPE such as earplugs/muffs will be provided to employees working near | | |
| | high noise generating areas. | | |

2.12.4 Details of Solid and Hazardous Waste Generation and their mitigation

| Plant Unit | Waste | Mitigation measures to be adopted |
|-------------------|----------|--|
| Plant Maintenance | Used Oil | Sold to CPCB/SPCB registered recycler. |

2.13 ASSESSMENT OF NEW & TESTED TECHNOLOGY FOR THE RISK OF TECHNOLOGICAL FAILURE

Latest modern technology i.e. VRM will be used for the Clinker Grinding Unit. For OPC production, clinker with gypsum will be ground in Vertical Roller Mill (VRM). In case of PPC production, the fly ash feeding will be considered at Vertical Roller Mill inlet.

- <u>O</u>O--

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CHAPTER - 3 DESCRIPTION OF THE ENVIRONMENT

To predict and evaluate the impacts of proposed project on the surrounding area, it is vital to assess the baseline status of the environmental quality in the vicinity of the plant site. To assess the baseline environmental quality of the area, field assessment has been conducted considering following components of the environment, viz. land, air, meteorology, noise, water, soil, biological and socio-economic.

3.1 STUDY AREA

An area of 10 Km radius (aerial distance) from the project site is marked as a study area. The study area for the proposed project is rural and falls in Sub-Tehsil: Salhawas, Tehsil: Matanhail, District: Jhajjar (Haryana).

The baseline information is collected for the identified study area, where plant site is considered as the core zone and area within 10 km radius of the plant site is considered as buffer zone. Environmental Settings within 10 km radius of the project site (i.e. study area) is given in Table - 3.1 and shown in Figure - 3.1.

| | | Details |
|--------|--|---|
| S. No. | Particulars | (with approximate aerial distance & direction from the nearest project boundary) |
| 1. | Nearest Village | Jhanswa (0.5 km in NE direction) |
| 2. | Nearest Town | Matanhail (12.0 km in NNE direction) |
| 3. | Nearest National / State Highway | SH - 22 (8.0 km in South direction) |
| 4. | Nearest Railway Station | Jharli Railway Station (4.0 km in NNW direction) |
| 5. | Nearest Airport | Indira Gandhi International Airport, New Delhi (65.0 km in ENE direction) |
| 6. | National Parks, Wildlife Sanctuaries, Biosphere Reserves, etc. within 10 km radius | Nahar Wildlife Sanctuary (6.0 km in South direction) |
| 7. | Reserve Forests (RF) / Protected Forests (PF) within 10 km radius | Bir Sarkar RF (6.5 km in SSE direction) Nahar RF (6.5 km in South direction) |
| 8. | Water Bodies (within 10 km radius) | Jawahar Lal Nehru Feeder (Canal) (8.0 km in East direction) |
| 9. | Seismic Zone | Zone - IV as per IS: 1893 (Part-I): 2002 |

Table - 3.1 Environmental Setting Details

Proposed Clinker Grinding Unit with Cement Production Capacity of 5.0 MTPA (2.5 MTPA: Phase - I & 2.5 MTPA: Phase - II) and D.G. Set (6.5 MW) At Village: Jhanswa, Sub-Tehsil: Salhawas, Tehsil: Matanhail, District: Jhajjar (Haryana)



Source: SOI Toposheet



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List of major operational industries within 10 km radius of the project site (i.e. study area) is given below:

Table - 3.2

List of Industries in the Study area

| S. No. | Name of Industry | Distance and direction from the project site |
|--------|--|--|
| 1. | JK Lakshmi Cement Ltd. | ~ 5.5 km in NE direction |
| 2. | UltraTech Cement Ltd. | ~ 5.0 Km in NE direction |
| 3. | Jhajjar Power Station by CLP | ~ 5.5 km in WNW direction |
| 4. | Indira Ghandhi Super Thermal Power Plant (IGSTPP) | ~ 4.0 Km in West direction |

Source: Field Survey

3.2 STUDY PERIOD

The relevant information and data (both primary and secondary) were collected in core as well as buffer zone (10 km distance from the project boundary) during *Summer Season (March to May, 2019)* in accordance with the guidelines for preparation of EIA studies in order to assess the impacts of proposed project on existing physical, biological and social environment.

3.3 ENVIRONMENTAL COMPONENTS

Information on the following components / parameters were collected to study the present scenario of the area:

- 1. Land Use & Land Cover
- 2. Meteorology
- 3. Air Environment
- 4. Noise Environment
- 5. Water Environment
- 6. Soil Environment
- 7. Biological Environment
- 8. Socio-economic Environment

3.4 ESTABLISHMENT OF BASELINE FOR VALUED ENVIRONMENTAL COMPONENTS

Baseline data was collected by monitoring and surveying of various environmental components / parameters in the core as well as buffer zone during the study period i.e. *Summer Season (March, to May, 2019)*; details of which are given in **Table - 3.3.**

Sampling, preservation, transportation & storage of samples were carried out by J.M. EnviroLab Pvt. Ltd. under supervision of EC/FAE concerned. Analysis of samples has been carried out by JM EnviroLab Pvt. Ltd.

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| S. No. | Environmental Component | Primary data | | | Secondary data | |
|--------|--------------------------------|---|--|---------------------------------------|---|---|
| | | Parameters | Frequency | Monitoring / Sampling Locations | Methodology | |
| 1. | Land | Land use and land cover | Once in a season | Project Site & Study Area | Field survey | Satellite image from NRSC, Hyderabad |
| 2. | Meteorology | Temperature, Relative Humidity, Wind Speed, Wind Direction | Hourly | 1 (Project site) | | IMD book (Climatological Normals 1981-2010) |
| 3. | Air | PM_{10} , $PM_{2.5}$, SO_2 , NO_2 and CO | (24 hourly), twice a week | 8 | Sampling: CPCB Guidelines/NAAQS/IS 5182 and Instrument Manual Analysis: CPCB Guidelines/IS 5182 | Monitoring reports of the nearby project |
| 4. | Noise | Equivalent noise levels in dB (A) | Once in a season (day & night time) | 8 | Sampling: IS 9989 Analysis: CPCB Guidelines/IS 9989 | |
| 5. | Surface Water | Parameters as per IS 10500- 2012 Parameters as per IS 10500- | Once in a season | 1 | Sampling: CPCB Guideline & APHA 22nd edition 2012 Analysis: IS 10500-2012/ IS 3025/APHA 22 nd edition 2012 | |
| 6. | Ground Water | 2012 | Once in a season | 8 | | |
| 7. | Soil | | Once in a season | 8 | Sampling: USDA Analysis: As per IS 2720/USDA | |
| 8. | Biological Environment | Flora and fauna | Once in a season | Study area | Quadrate method/ random sampling | Forest working plan |
| 9. | Socio- Economic Environment | Socio- Economic status | Once in a season | Study area | Field survey through questionnaire, group discussion and random sampling | Census data, 2011 List of prevailing diseases from Public Health Centre List of villages where public health centre are set up List of schools Map of taluka Details on socio-economic developmental activities undertaken |

Table - 3.3 Baseline Data Collection

Proposed Clinker Grinding Unit with Cement Production Capacity of 5.0 MTPA (2.5 MTPA: Phase - I & 2.5 MTPA: Phase - II) and D.G. Set (6.5 MW) At Village: Jhanswa, Sub-Tehsil: Salhawas, Tehsil: Matanhail, District: Jhajjar (Haryana)

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3.4.1 Instruments Used for Environmental Baseline Data Collection

The following instruments were used at the site for environmental baseline data collection work.

- 1. Respirable Dust Sampler with attachment for gaseous Pollutants, Envirotech APM 460
- 2. Fine Particulate Sampler (FPS), APM 550
- 3. Sound Level Meter, Model Envirotech SLM 100
- 4. Digital D.O. Meter Model, 831 E (CPCB Kit)
- 5. Weather Monitoring Station, Model Enviro WM 271
- 6. Global Positioning System (GPS).

3.5 BASELINE STATUS OF THE VARIOUS ENVIRONMENTAL COMPONENTS

3.5.1 Land

3.5.1.1 Land Use Pattern

To study the land use pattern of the core as well buffer zone, land use / land cover maps have been prepared in accordance to *ToR Point no. 3* (*Additional ToR for Cement Industry*) "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 should be used for land used / land-cover mapping of the area" opting the following process:

- >>> Development of land use & land cover map using land coordinates of the plant area.
- Identification and marking of important basic features according to primary and secondary data.
- & Evaluation of the impact on existing land use of the project area.
- » Suggestive measures for conservation and sustainable use of land.

Technical details of Data used

- 80 Satellite Image RESOURCESAT-2
- 🔊 Satellite Data Source NRSC, Hyderabad
- 🔊 Satellite Vintage- March, 2019
- 80 SOI Toposheets No 53 D/6, 53 D/7 and 53 D/10
- Software Used Earth Resources Data Analysis System (ERDAS) Imagine
 9.2

Methodology

- 🔊 Preliminary / primary data collection of the study area
 - Satellite data procurement from NRSC, Hyderabad
- 80 Secondary data collection from authorized bodies
 - Survey of India Toposheet (SOI), Plant Layout, Cadastral / Khasra map and GPS Coordinates of Project Boundary

- Processing of satellite data using ERDAS Imagine 9.2 and to prepare the Land use & Land cover maps (e.g. Forest, agriculture, settlements, wasteland, water bodies etc.) by Digital Image Processing (DIP) technique.
 - Geo-Referencing of the Survey of India Toposheet
 - o Geo-Referencing of satellite Imagery with the help of Geo-Referenced Toposheets
 - o Enhancement of the Satellite Imagery
 - Base Map layer creation (Roads, Railway, Village Names and others Secondary data etc.)
 - o Data analysis and Classification using Digital interpretation techniques.
 - o Ground truth studies or field Verification.
 - o Error fixing / Reclassification
 - Final Map Generation.

Land Use / Land Cover Details of Buffer Zone (Study Area)

The study area mainly comprises of **71.73** % Crop land, **11.14** % as fallow Land and **6.44** % as Human Settlement. Thus, other classes occupy only **10.59** % of the total area constitutes Indistrial area, Open area, Forest area, Plantation / Vegetation, Water Bodies and Open Scrub etc. Details of the same are given in **Table - 3.4** and map is shown in **Figure - 3.2**.

Table-3.4

Land Use / Land Cover Details of Study Area

| S. No. | Legend | Area (in ha) | Area (in %) |
|--------|-------------------------|--------------|-------------|
| 1. | Crop Land | 25026.48 | 71.73 |
| 2. | Falllow Land | 3886.06 | 11.14 |
| 3. | Human Sattlement | 2245.20 | 6.44 |
| 4. | Industrial area | 1445.77 | 4.14 |
| 5. | Open Land | 534.92 | 1.53 |
| 6. | Forest area | 822.92 | 2.36 |
| 7. | Plantation / Vegetation | 398.87 | 1.14 |
| 8. | Open Scrub | 370.25 | 1.06 |
| 9. | Water Boadies | 158.58 | 0.45 |
| | Total | 34889.05 | 100 |

Source: LU/LC Map for Buffer Zone

Proposed Clinker Grinding Unit with Cement Production Capacity of 5.0 MTPA (2.5 MTPA: Phase - I & 2.5 MTPA: Phase - II) and D.G. Set (6.5 MW) At Village: Jhanswa, Sub-Tehsil: Salhawas, Tehsil: Matanhail, District: Jhajjar (Haryana)

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Source: Satellite Imagery



Observation of the Land Use / Land Cover Study

- The study area mainly comprises of 71.73 % Crop land, 11.14 % as fallow Land and 6.44 % as Human Settlement. Thus, other classes occupy only 10.59 % of the total area constitutes Indistrial area, Open area, Forest area, Plantation / Vegetation, Water Bodies and Open Scrub etc.
- There is one major water body i.e. Jawahar Lal Nehru Feeder (Canal) (8.0 km in East direction from the plant site) within 10 Km radius of study area.
- 🔊 Jhanswa (~ 0.5 km in NE direction)) is the nearest village from the project site.
- There is only one Nahar Wildlife Sanctuary (6.0 km in South direction from the project site) within 10 km radius of the study area.
- ∞ Bir Sarkar RF (6.5 km in SSE direction) & Nahar RF (6.5 km in South direction) are located within the 10 km radius of the study area.

Interpretation and Conclusion

- M/s. Wonder cement Ltd. has proposed Clinker Grinding unit with the cement production capacity of 5.0 MTPA (2.5 MTPA: Phase - I & 2.5 MTPA: Phase - II) and D.G. Set (6.5 MW) at Village: Jhanswa, Sub-Tehsil: Salhawas, Tehsil: Matanhail, District: Jhajjar (Haryana)
- Eand use of the existing land area is agricultural Land which will be converted in to industrial land; out of the total proposed project area i.e. 21.78 ha, & 7.18 ha (~33 % of the total project area) ha will be developed as greenbelt / plantation.
- 🔊 Main impact will be on the agricultal land of surrounding villages viz. Jhanswa and Mohanbadi.

3.5.2 SEISMICITY AND FLOOD HAZARD ZONATION OF THE AREA

Seismicity of the Area

Many parts of the Indian subcontinent have historically high seismicity. Seven catastrophic earthquakes of magnitude greater than 8 (Richter scale) have occurred in the western, northern and eastern parts of India and adjacent countries in the past 100 years.

Bureau of Indian Standards [IS - 1893 (Part-1): 2002], has grouped the country into four seismic zones viz. Zone - II, III, IV and V. Of these, Zone - V is the most seismically active region, while Zone - II is the least. The Modified Mercalli Intensity (MMI) scale, which measures the impact of the earthquakes on the surface of the earth, broadly associated with various zones is as follows:

| Table - 3.5 | | | | |
|------------------|-------|--|--|--|
| Seismic Zones in | India | | | |

| S. No. | Seismic Zone | Risk | Intensity on MMI Scale |
|--------|--------------|---------------------|------------------------|
| 1. | Zone - II | Low Risk Zone | VI & below |
| 2. | Zone - III | Moderate Risk Zone | VII |
| 3. | Zone - IV | High Risk Zone | VIII |
| 4. | Zone - V | Very High-Risk Zone | IX & above |

Source: IMD & NIDM

Haryana is a landlocked state in North India with its capital at Chandigarh. It is a moderate sized state having an areaof 44,212 km², which is 40 times the area of state of Delhi. The state Haryana falls in the Seismic Zone IV, III & II and therefore vulnerable to earthquake. No major earthquake has occurred in Haryana in the recent past but certainly major tremors have been felt frequently.Unfortunately, District Jhajjar falls in Seismic Zone IV , which is considered as a High Damage Risk Zone and may trigger into a technological disaster, including collapse of old structures &buildings leading to further fire and explosions. The potential seismic hazard in Haryana and adjoining areas is attributed to fault system ofDelhi Fold Belt. The Delhi Fold Belt is bounded by twostrike slip faults, Mahendragarh–Dehradun SubsurfaceFault and Great Boundary Fault.

In 2004 Seismic Hazard Map of India was updated by the Bureau of Indian Standards (BIS) in which Haryana state falls under Zones II,III and IV [shown in Figure - 3.3] However, district Jhajjar falls in Zone IV along with Gurgaon, Rewari, Palwal, Faridabad and districts adjoined to Himalayan foothills viz., Ambala, Pachkula & Yamunanagar.

According to BMTPC, Vulnerability Atlas data, as an epi centre, Jhajjar district has experienced seismic activity of magnitude 5.1 in 2012.

Proposed Clinker Grinding Unit with Cement Production Capacity of 5.0 MTPA (2.5 MTPA: Phase - I & 2.5 MTPA: Phase - II) and D.G. Set (6.5 MW) At Village: Jhanswa, Sub-Tehsil: Salhawas, Tehsil: Matanhail, District: Jhajjar (Haryana)

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BMTPC : Vulnerability Atlas - 3rd Edition : Peer Group, MoHUA, GOI; Map is Based on digitised data of SOI; Seismic Zones of India Map IS:1893 (Part I): 2002, BIS; Earthquake Epicentre from IMD; Seismotectonic Atlas of India and its Environs, GSI; Houses/Population as per Census 2011; *Houses including vacant & locked houses. Disclaimer: The maps are solely for thematic presentation.

Figure 3.3: Earthquake Hazard map for Haryana

The plant site as well as study area of this project lies in Zone - IV of Seismic Zoning Map of India, Bureau of Indian Standards and thus, can be said to be located in an area of High damage risk zone by national standards.

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Flood Hazard Zonation of the Area

As per the "Vulnerability Atlas -3rd Addition; Peer Group, MoHand UPA; based on digitized data of SOI, GOI; Flood Atlas, Task Force Report, C.W.C., GOI" the plant site doesnot falls under "area liable to flood". As per, Haryana flood manual there are 102 vulnerable points in which Jhajjar district is also one of all the points but the proposed site doesnot fall in the area liable to flood. A Flood Hazard Zonation Map showing the plant site is given in **Figure - 3.5(a) & 3.5(b)**



Figure 3.5(a): Flood Hazard Zonation Map of the Area
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Vulnerability Atlas - 3rd Edition; Peer Group, MoHUA; Map is B as (1987), Task Force Report (2004), C.W.C., G.O.I. Houses/Pop as per Ce maps are solely for thematic representation

Figure 3.5(b): Flood Hazard Zonation Map of the Area (Haryana)

Climate and Rainfall 3.5.3

The climate of the state can be classified as tropical steppe, semi-arid and hot which is mainly characterized by the extreme dryness of the air except during monsoon months, intensely hot summers and cold winters. During three months of south west to monsoon from last week of June to September, the moist air of oceanic origin penetrate into the district and causes high humidity, cloudiness and monsoon rainfall. The period from October to December constitutes post monsoon season. The cold weather season prevails from January to the beginning of March and followed by the hot weather or summer season which prevails up to the last week of June. The maximum average temperature reaches up to 45° C while in winter season minimum average temperate falls up to 4 ° C in the month of January. Sandy dust cyclones are common in summer season.

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The normal annual rainfall in Jhajjar district is about 532 mm and rainy days spread over 23 days. The south west monsoon sets in the last week of June and withdrawstowards the end of September and contributes about 85% of the annual rainfall. July and August are the wettest months. 15% of the annual rainfall occurs during the non-monsoon months in the wake of thunder storms and western disturbances.

The normal rainfall of the area is about 481 mm spread over 23 days, out of which 85% of the rainfall received during the monsoon period and 15% during non-monsoon period. Rainfall data of the area for past 36 years is shown in below **Table - 3.6**.

| Year | Rainfall | Year | Rainfall |
|------|----------|------|----------|
| 1982 | 693.526 | 1998 | 612.565 |
| 1983 | 705.967 | 1999 | 300.626 |
| 1984 | 506.933 | 2000 | 528.171 |
| 1985 | 669.581 | 2001 | 499.539 |
| 1986 | 395.357 | 2002 | 278.702 |
| 1987 | 259.197 | 2008 | 612.3 |
| 1988 | 713.481 | 2009 | 380.9 |
| 1989 | 343.342 | 2010 | 485.7 |
| 1990 | 619.31 | 2011 | 331.3 |
| 1991 | 489.736 | 2012 | 232.8 |
| 1992 | 398.913 | 2013 | 285.5 |
| 1993 | 633.982 | 2014 | 340.8 |
| 1994 | 648.92 | 2015 | 455.6 |
| 1995 | 695.905 | 2016 | 472.5 |
| 1996 | 639.268 | 2017 | 428.6 |
| 1997 | 524.515 | 2018 | 477.1 |

Table - 3.6 Rainfall Data for last 36 Years

3.5.4 Meteorology

Meteorology plays a vital role in determining the transport and diffusion pattern of air pollutants released into atmosphere.

The principal variables include horizontal convective transport (average wind speed and direction), vertical convective transport (atmospheric stability) and topography of the area.

Meteorological characteristics of an area are very much important in assessing possible environmental impacts and in preparing environmental management plan.

Since meteorological factors show wide fluctuations with time, meaningful interpretation can be drawn only from long-term reliable data. Such source of data is India Meteorological Department (IMD), which maintains a network of meteorological stations at several important locations.

The nearest IMD station to the plant site is located in Rohtak. The Meteorological data i.e. temperature, relative humidity, rainfall, wind speed, and wind direction, recorded during *Summer*

Season (March to May, 2019) was obtained from this station to study meteorology of the study area and for selection of location for ambient air quality monitoring during study period. Windrose diagram of IMD data used is given in Figure - 3.6.



Figure 3.6: Windrose Diagram

3.5.5 Micro-Meteorology at Site

Meteorological station was set-up at site to record surface meteorological parameter during Summer Season (March to May, 2019).

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Wind speed and wind direction data recorded during the study period was collected from secondary sources like IMD, which has enabled identifying the influence of meteorology on the air quality of the area. Based on the collected meteorological data, relative percentage frequencies of different wind directions were calculated and plotted as wind rose diagram. Maximum and minimum temperatures including percentage relative humidity were also recorded simultaneously.

Summary of the micro-meteorology at site is given in **Table- 3.7.** Detailed Hourly Meteorological Data has been enclosed as **Annexure - 4** with this EIA / EMP Report.

Table - 3.7

Micro-Meteorology at Site

| Month | Temperature (°C) | | Relative H | umidity (%) | Wind Speed (m / sec) | |
|-------------|------------------|------|------------|-------------|----------------------|-----|
| Month | Max | Min | Max | Min | Max | Min |
| March, 2019 | 35.8 | 9.8 | 70 | 39 | 5.6 | 0.2 |
| April, 2019 | 38.0 | 18.5 | 53 | 25.8 | 5.5 | 0.2 |
| May, 2019 | 39.9 | 19.0 | 58 | 28 | 5.6 | 0.1 |

Study Period: Summer Season (March to May, 2019)

Source: Meteorological Station at Site

3.5.5.1 Mixing Height

Mixing Height (MH) is the vertical extent through which the contaminant plume can be mixed. Forecasting of mixing height is done with the aid of the vertical temperature profile. The MH is a function of stability. In unstable air the MH is higher and in stable air the MH is lower. With a lower MH, there is a smaller volume of air in which the pollutant can be dispersed, resulting in higher concentrations in the ambient environment. There is a seasonal variation of MH. During summer daylight hours, MH can be few thousand feet whereas for winter it can be a few hundred feet. It varies also in the course of a day. It is lowest at night and increases during the day.

As site specific mixing heights were not available, mixing heights based on IMD publication, "Atlas of Hourly Mixing Height and Assimilative Capacity of Atmosphere in India", has been considered to establish the worst-case scenario. Secondary information has been used to determine the mixing height over the study region for the study period i.e. *Summer Season (March to May, 2019)* and it varies from 285 - 18,250 meters (IMD).

| Mixing Height for the Project Site (Summer Season) | | | | |
|--|-------------------|--|--|--|
| Time (Hours) | Mixing Height (m) | | | |
| 06:00 | 285 | | | |
| | 280 | | | |

Table - 3.8

| 06:00 | 285 |
|-------|------|
| 07:00 | 280 |
| 08:00 | 570 |
| 09:00 | 1700 |
| 10:00 | 3500 |
| 11:00 | 7750 |

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| Time (Hours) | Mixing Height (m) |
|--------------|-------------------|
| 12:00 | 11000 |
| 13:00 | 13500 |
| 14:00 | 14600 |
| 15:00 | 18250 |
| 16:00 | 17000 |
| 17:00 | 17300 |
| 18:00 | 14000 |
| 19:00 | 9000 |
| 20:00 | 4600 |

Source: IMD publication, "Atlas of Hourly Mixing Height and Assimilative Capacity of Atmosphere in India"

3.5.6 Ambient Air Environment

Ambient air quality monitoring is done to determine the general background concentration levels. Samples were collected within 10 km study area to observe pollution trends throughout the region. It helps in providing a data base for evaluating the effects of a project activity in that region. It will be also useful in ascertaining the quality of air environment in conformity to standards of the ambient air quality during operation phase of project.

Methodology

The air quality monitoring was done during *Summer Season (March, to May, 2019)* within 10 km radius study area as per the Terms of Reference (ToR) issued by SEIAA, Haryana *vide* letter no. SEIAA/HR/2019/141 dated 05th July, 2019.

The samples were collected for the following air quality determinants:

- Sulphur Dioxide (SO_2)
- Nitrogen Dioxide (NO₂)
- Particulate Matter (PM₁₀ and PM_{2.5})
- Carbon Monoxide (CO)

The sources of air pollution in the region are dust rising from unpaved roads, domestic fuel burning, vehicular traffic, agricultural activities, emission from other industries, etc.

Analytical methods prescribed by CPCB & approved Indian Standard methods were used for carrying out air quality monitoring.

Sampling Schedule

The sampling was done continuously for 24 hours for SO_2 , NO_x , PM_{10} , $PM_{2.5}$, and CO with a frequency of twice a week for three months (26 observations for one location) at 8 locations.

Sampling Locations

Sampling locations were selected for AAQ Monitoring keeping in view the pre-dominant wind direction prevailing in the area during the study period.

It can be observed from the wind rose diagram (**Figure-3.6**) that the dominant wind direction prevailing in the area during the study period was in West Direction.

Villages / locations have been selected in the downwind direction as well as in the upwind direction for AAQ monitoring from the project site.

Monitoring stations selected for Ambient Air Quality Monitoring during the studyperiod are given in **Table - 3.9** and shown in **Figure - 3.7**.

| S. No. | Sampling Location | Coordinates | Approx. Aerial Distance & Direction | Selection Criterion |
|--------|--------------------------------|----------------------------------|--|--|
| SAN 1 | Project Site | 28° 28' 52.3"N 76° 24' 20.0"E | - | o Core zone |
| SAN 2 | Village - Mohan Bari | 28° 28' 46.3"N 76° 23' 45.9"E | 0.5 km in West direction | Upwind of the dominant wind direction |
| SAN 3 | Sampling Location at 1.0 km | 28° 28' 35.4"N 76° 25' 19.1"E | 1.0 km in East direction | Downwind of dominant wind direction Location in Study Area |
| SAN 4 | Village - Jamalpur | 28° 28' 32.7"N 76° 28' 23.2"E | 6.0 km in East direction | Downwind of dominant wind direction Location in Study Area |
| SAN 5 | Village - Jharli | 28° 29' 50.1"N 76° 23' 16.3"E | 3.0 km in NW direction | o Near to Railway Station |
| SAN 6 | Village -Nahar | 28° 24' 37.4"N 76° 24' 10.1"E | 7.0 km in SSW direction | Nearest to the Sensitive Receptor (RF) Location in Study Area |
| SAN 7 | Village - Bhali | 28° 25' 04.8"N 76° 28' 25.7"E | 8.0 km in WSW direction | Near to MDR 130 Location in Study Area |
| SAN 8 | Village - Akheri Madanpur | 28° 30' 54.7"N 76° 28' 06.1"E | 7.0 km in NE direction | Populated AreaLocation in Study Area |

 Table - 3.9

 Locations of Ambient Air Quality Monitoring Stations

Source: SOI Toposheets

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Source: SOI Toposheet



Ambient Air Quality Monitoring

Table - 3.10 shows the maximum & minimum concentration of air pollutants monitored at different locations (as mentioned in **Table - 3.9**) during the study period. All 26 observations of pollutants for each location are detailed in Ambient Air Quality Monitoring Tables enclosed as **Annexure- 5** along with this report.

Table - 3.10

Ambient Air Quality Monitoring Results

Study Period: Summer Season (March to May, 2019)

| | | | | - | | - | | - | | <u>(Unit in µ</u> | ιg/m³) | |
|---------|--------------------|------------------|------|-------------------|------|------|------|------|------|-------------------|----------------------|--|
| | | PM ₁₀ | | PM ₂ s | | 50, | | NO | | C | 0 | |
| S. No. | Sampling Location | | | | | | | | | | (mg/m ³) | |
| | | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | Max. | Min. | |
| SAN 1 | Project Site | 76.5 | 66.9 | 37.5 | 31.8 | 10.6 | 6.5 | 20.9 | 14.2 | BDL | BDL | |
| SAN 2 | Village-Mohan Bari | 86.7 | 69.2 | 42.7 | 34.5 | 12.4 | 7.3 | 24.6 | 16.8 | 0.84 | 0.61 | |
| ς α Ν ο | 1.0 km in East | 82.4 | 71.6 | 39.9 | 30.3 | 13.6 | 6.8 | 21.3 | 15.4 | 0.65 | 0.53 | |
| 5411 5 | Direction | | | | | | | | | | | |
| SAN 4 | Village- Jamalpur | 80.9 | 66.3 | 41.6 | 32.4 | 11.9 | 6.1 | 22.8 | 14.5 | 0.59 | 0.52 | |
| SAN 5 | Village- Jharli | 88.4 | 73.2 | 46.5 | 37.8 | 14.2 | 9.37 | 25.1 | 17.7 | 0.96 | 0.68 | |
| SAN 6 | Village- Nahar | 70.9 | 63.4 | 34.1 | 28.2 | 9.7 | 5.8 | 19.3 | 13.6 | BDL | BDL | |
| SAN 7 | Village- Bhakli | 74.8 | 62.7 | 36.7 | 29.9 | 11.5 | 6.8 | 20.1 | 14.2 | 0.75 | BDL | |
| SAN 8 | Village- | 83.1 | 64.5 | 40.2 | 33.7 | 11.1 | 7.1 | 23.5 | 16.8 | 0.80 | 0.62 | |
| JANO | AkheriMadanpur | | | | | | | | | | | |
| | NAAQS* | 10 | 00 | 6 | 0 | 8 | 0 | 8 | 0 | 0 | 4 | |

Source: Ambient Air Quality Monitoring

*NAAQS - National Ambient Air Quality Standards; Schedule-VII, [Rule 3 (3B)], [Part-II-sec.-3(i)] 16.11.2009

BDL - Below Detectable Limit, Detection Limit of $CO = 0.5 \text{ mg/m}^3$

Interpretation & Conclusion

Ambient Air Quality Monitoring reveals that the concentrations of PM_{10} and $PM_{2.5}$ for all the 8 AAQM stations were found between 62.7 to 88.4 µg/m³ and 28.2 to 46.5 µg/m³, respectively.

The gaseous pollutants SO_2 and NO_x are concerned, the prescribed CPCB limit of $80 \ \mu g/m^3$ has never surpassed at any station. The concentrations of SO_2 and NO_2 were found to be in range of 5.8 to 14.2 $\mu g/m^3$ and 13.6 to 25.1 $\mu g/m^3$ respectively. CO concentration was observed between 0.52 to 0.96. PAH concentration was observed as BDL.

Contributors of the pollutants in the study area is mainly due to the presence of power and cement Industries such as Indra Ghandhi Super thermal power project, Jhajjar powert station and JK Lakshmi cement Ltd. and UltraTech Cement Ltd. The secondary reason for the pollutant concentration is the presence of high density habitation near to the project site leading to high vehicular movement.

Maximum concentration of AAQ parameters among the nearby habitant area is found max at the neareast village Jharli due to its proximity to the industries, its dense population, commercial & human activities and vehicular movement. Whereas, the minimum values of parameters were found at village Bhakli. The plant activities will increase the pollutant concentrations in the nearby villages and villages falling in the downwind direction will be primarily affected. But the concentrations of AAQ at all monitoring locations are found well within the prescribed limits of NAAQS.

3.5.7 NOISE ENVIRONMENT

Noise often defined as unwanted sound, interferes with speech communication, causes annoyance, distracts from work, and disturbs sleep, thus deteriorating quality of human environment.

Source of Noise

There are several sources of noise in the 10 km radius of study area, which contribute to the local noise level of the area. Ambient noise sources in the vicinity of the plant and mine site include the noise from traffic on road, human activities in villages and agricultural fields.

Ambient Noise Level

In order to know the baseline noise levels, in and around the project site, noise levels were measured at site and villages in the study area.

Sampling Schedule

The sampling was done during day time and night time once in the study period.

Sampling Locations

Locations / stations selected for noise level monitoring are given in **Table - 3.11** and shown in **Figure - 3.7.**

| S. No. | Sampling Location | Coordinates | Approx. Aerial Distance | Direction | |
|--------------|-----------------------|----------------|-------------------------|----------------|--|
| CAN 4 | Draigst Site | 28° 28' 52.3"N | | | |
| SANT | Project Site | 76° 24' 20.0"E | - | - | |
| SAND | Villago - Mohan Bari | 28° 28' 40.7"N | o r km | West direction | |
| SAN 2 | Village - Morian Barr | 76° 23' 27.3"E | 0.5 KIII | west direction | |
| SAN 2 | Sampling Location at | 28° 28' 35.6"N | 1.0 km | East direction | |
| 5411 5 | 1.0 km | 76° 25' 19.0"E | 1.0 Kill | Last direction | |
| SAN 4 | Village - Jamalpur | 28° 28' 33.8"N | 6 o km | East direction | |
| 54114 | village - Jamaipul | 76° 28' 16.5"E | 0.0 Km | East un ection | |
| SAN Ε | Village - Ibarli | 28° 29' 55.1"N | 2 0 km | NW direction | |
| 5411.5 | Village - Jridi II | 76° 23' 13.0"E | 2.0 KIII | | |
| SAN 6 | Village -Nahar | 28° 24′ 36.2″N | 7.0 km | SSW direction | |

Table - 3.11

Locations of Noise Monitoring Stations

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| S. No. | Sampling Location | Sampling Location Coordinates Approx. Ae | | Direction |
|--------|------------------------------|--|--------|---------------|
| | | 76° 24' 03.9"E | | |
| SAN 7 | Village - Bhali | 28° 24' 52.1"N 76° 28' 27.4"E | 8.0 km | WSW direction |
| SAN 8 | Village - Akheri Madanpur | 28° 30' 54.7"N 76° 28' 06.1"E | 7.0 km | NE direction |

Source: SOI Toposheet

Ambient Noise Level Monitoring

Ambient noise levels monitoring results monitored at different locations (as mentioned in **Table - 3.11**) during the study period are given in **Table - 3.12**.

Table - 3.12

| | | Noise Levels dB Leq (A) | | | | | |
|--------|-----------------------------|-------------------------|-----------------------------|-------------------------------------|------------------|--|--|
| S. No. | Sampling Locations | (6:00 | Day Time am to 10:00 pm) | Night Time (10:00 pm to 6:00 am) | | | |
| | | Result | Prescribed limit | Result | Prescribed limit | | |
| SAN 1 | Project Site | 51.4 | 75 | 41.8 | 70 | | |
| SAN 2 | Village - Mohan Bari | 53.6 | 75 | 42.9 | 70 | | |
| SAN 3 | Sampling Location at 1.0 km | 51.9 | 55 | 42.7 | 45 | | |
| SAN 4 | Village - Jamalpur | 52.7 | 55 | 42.3 | 45 | | |
| SAN 5 | Village - Jharli | 54.0 | 55 | 43.8 | 45 | | |
| SAN 6 | Village -Nahar | 51.3 | 55 | 40.7 | 45 | | |
| SAN 7 | Village - Bhakli | 53.6 | 55 | 44.2 | 45 | | |
| SAN 8 | Village - AkheriMadanpur | 53.9 | 55 | 43.8 | 45 | | |

Ambient Noise Level Monitoring Results Study Period: Summer Season (March to May, 2019)

Source: Ambient Noise Quality Monitoring

Interpretation & Conclusion

Ambient noise levels were measured at 8 locations around the plant site. Noise levels vary from 51.3 to 54.0 Leq dB (A) during day time and from 40.7 to 44.2 Leq dB (A) during night time.

Maximum noise levels during day time were observed near to the village Jharli and during night time were observed near to village Bhakli. Higher noise levels results from Industrials operational environment and inward - outward movement of trucks, other heavy duty vehicles from the industries and small vehicular movement from the high density population. The minimum noise levels during day time & during night time were found at village Nahar.

During construction activities, a minor increase in noise levels near plant site will be seen which will be temporary. The noise level after proposed project will remain almost same and confined within plant boundary.

From the above study and discussions, it can be concluded the overall noise levels in the study area are below the prescribed limits as prescribed by the Noise Pollution (Regulation and Control) Rules, 2000.

3.5.8 Water Environment

Most water resources are being influenced by human activities. Among these, industrial activities are the major pressure on water environment. The growing population and industrial demands for development and welfare or improvement further increases the pressure on these resources. As a result, water resources are getting contaminated and making the adverse impact on aquatic life. Ensuring a sustained use and avoiding closure of development options requires in depth knowledge of physical, chemical and biological responses to human interference and robust prediction tools for the evaluation and optimization of proposed development and abatement schemes.

Physical, chemical and biological factors influencing water quality are so interrelated that a change in any water quality parameter may trigger other changes in a complete network of interrelated variables. Selected water quality parameters for surface and ground water resources within study region have been used for water environment and assessing the impact on it by proposed project.

As a significant part of predefined framework of the present study, water samples were collected from selected locations. The reconnaissance survey was undertaken and monitoring locations were finalized based on:

- > Presence, location and uses of major water bodies in the region
- > Type and location of industrial/residential areas
- > Likely area that can represent baseline conditions

The water resources in the study area were divided into two categories for getting ideal upshot of baseline status of water quality of the region. These two major categories as determined are:

- Surface water resources including streams, nalas, ponds, river, canals, estuary
- > Ground water resources (tube well, open well, springs etc.

3.5.8.1 Surface Water Quality

Jawahar Lal Nehru Feeder (Canal) at the distance of 8.0 km in East direction is the only one surface water bodies present within the 10 km study area. Surface water samples were collected from 1 locations to know the surface water quality of the area.

Surface water sampling location details are given in **Table - 3.13** & shown in **Figure - 3.8**. Analysis results of the same are given in **Table - 3.14**.

Table- 3.13

Locations of Surface Water Sampling Location

| S. No. | Sampling Location | Approx. Aerial Distance | Direction |
|---------|---------------------------------|-------------------------|----------------|
| S\\\/ 1 | Jawahar Lal Nehru Feeder {Canal | ~ 8.0 km | East direction |
| 5001 | (Upstream) | ~ 0.0 KIII | Last direction |

Source: SOI Toposheet

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Source: SOI Toposheet



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Table - 3.14

Surface Water Analysis Results -Summer Season (March to May, 2019)

| S. No. | Parameters | Unit | Jawahar Lal Nehru Feeder (Canal) |
|--------|----------------------------|------------|----------------------------------|
| 1. | pH (at 25°C) | | 7.14 |
| 2. | Colour | Hazen Unit | BDL (DL 5) |
| 3. | Turbidity | NTU | BDL (DL 1) |
| 4. | Odour | | Agreeable |
| 5. | Total Hardness as CaCO3 | mg/l | 109.00 |
| 6. | Calcium as Ca | mg/l | 25.79 |
| 7. | Alkalinity as CaCO3 | mg/l | 18.21 |
| 8. | Chloride as Cl | mg/l | 17.37 |
| 9. | Residual free Chlorine | mg/l | BDL (DL 0.20) |
| 10. | Cyanide as CN | mg/l | BDL (DL 0.02) |
| 11. | Magnesium as Mg | mg/l | 10.85 |
| 12. | Total Dissolved Solids | mg/l | 132.00 |
| 13. | Sulphate as SO4 | mg/l | 34.95 |
| 14. | Fluoride as F | mg/l | 0.23 |
| 15. | Nitrate as NO3 | mg/l | 0.85 |
| 16. | Iron as Fe | mg/l | 0.08 |
| 17. | Aluminium as Al | mg/l | BDL (DL 0.03) |
| 18. | Boron | mg/l | BDL (DL 0.20) |
| 19. | Phenolic Compounds | mg/l | BDL (DL 0.001) |
| 20. | Anionic Detergents as MBAS | mg/l | BDL (DL 0.02) |
| 21. | Hexa Chromium as Cr+6 | mg/l | BDL (DL 0.03) |
| 22. | Zinc as Zn | mg/l | BDL (DL 0.10) |
| 23. | Copper as Cu | mg/l | BDL (DL 0.02) |
| 24. | Manganese as Mn | mg/l | BDL (DL 0.10) |
| 25. | Lead as Pb | mg/l | BDL (DL 0.008) |
| 26. | Selenium as Se | mg/l | BDL (DL 0.005) |
| 27. | Arsenic as As | mg/l | BDL (DL 0.002) |
| 28. | Mercury as Hg | mg/l | BDL (DL 0.001) |
| 29. | Phosphate as Po4 | mg/l | 0.03 |
| 30. | Total Suspended Solid | mg/l | 4.2 |
| 31. | Biochemical oxygen demand | mg/l | 3.4 |
| 32. | Chemical oxygen demand | mg/l | 11.1 |
| 33. | Sodium as Na | mg/l | 5.2 |
| 34. | Potassium as K | mg/l | 1.4 |
| 35. | Conductivity | μs/cm | 193.00 |
| 36. | Nickel | mg/l | BDL (DL 0.005) |
| 37. | Dissolve Oxygen | mg/l | 6.2 |

Source: Surface Water Analysis

Interpretation & Conclusion

Within 10 km radius of project area, one sample was collected from the Jawahar Lal Nehru Feeder (Canal) for collection & analysis of surface water quality. A review of the above mentioned chemical analysis of surface water sample reveals that the pH of the canal is 7.14 indicating neutral. The colour and turbidity were of permissible range and odour was found to be BDL (5) Hazen Unit and BDL (1) NTU respectively.

Total hardness is from 109 mg/l, Total dissolved solids 132 mg/l; total alkalinity (18.21 mg/l) and conductivity (193 μ s/cm) were low indicating low mineral enrichment of the water sample. The COD (11.1 mg/l) and BOD (3.4 mg/l) are found less than the permissible limits of value more which indicate that surface water in the area is less polluted.

The nutrients were also low viz. nitrate (0.85 mg/l), iron (0.08 mg/l), magnesium (10.85 mg/l) indicated clean river water. The Dissolved oxygen (6.2 mg/l) indicating that the water bodies are safe for aquatic biodiversity.

Thus, it can be concluded that the physical quality and chemical quality is good and safe for aquatic biodiversity.

3.5.8.2 Ground Water Quality

The sources of potable water are the tube-wells and dug-wells in the area. Samples were collected from the available water resources around the plant site. The samples were collected and tested from different sites.

Analytical methods prescribed by APHA & approved Indian Standard methods were used for carrying out ground water quality monitoring.

Details of ground water sampling locations and their distance and directions are given in **Table** - **3.15** and shown in **Figure** - **3.8**.

Ground water analysis results are given in Table - 3.16.

| S. No. | Sampling Location | Coordinates | Approx. Aerial Distance | Direction | |
|---------|----------------------|----------------|-------------------------|----------------|--|
| SCWS 1 | Project Site | 28° 28' 21.1"N | Coro Zono | _ | |
| 201021 | rioject site | 76° 24' 29.0"E | Core zone | - | |
| SC/MS a | Villago - Moban Bari | 28° 28' 39.7"N | o c km | West direction | |
| 30103 2 | village - Monan Dan | 76° 23' 25.9"E | 0.5 KIII | | |
| SGWS 3 | Village - Jhanswa | 28° 28' 46.0"N | o r km | NE direction | |
| | | 76° 25' 15.8"E | 0.5 KIII | | |
| SGWS 4 | Village - Jamalpur | 28° 28' 32.0"N | 6.0 km | East direction | |
| | | 76° 28' 11.9"E | 0.0 KIII | | |
| | Villago Ibarli | 28° 29' 40.7"N | 2.0 km | NW/ direction | |
| 30103 5 | village - Juani | 76° 23' 12.6"E | 3.0 KIII | NVV direction | |
| SGWS 6 | Village -Nahar | 28° 24' 44.7"N | 7.0 km | SSW direction | |

Table - 3.15 Locations of Ground Water Sampling Stations

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| S. No. | Sampling Location | Coordinates | Approx. Aerial Distance | Direction |
|--------|----------------------------|----------------------------------|-------------------------|---------------|
| | | 76° 23' 56.6"E | | |
| SGWS 7 | Village - Bhali | 28° 25' 09.4"N 76° 28' 28.8"E | 8.0 km | WSW direction |
| SGWS 8 | Village-Akheri Madanpur | 28° 30' 31.0"N 76° 27' 39.2"E | 7.0 km | NE direction |

Source: SOI Toposhee

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| | | | | | | Study Period: | Summer Seaso | n (March to Ma | iy, 2019) | | | |
|--------|----------------------------|---------------|-----------------|-----------------|-----------------|---------------|-----------------|-----------------|----------------|-----------------|--------------------|-------------------|
| | | | Project | Village- | Villago | Villago | Villago | Villago | Villago Akhori | Villago | Specification as p | er IS 10500- 2012 |
| S. No. | Parameters | Unit | Site | Mohan | Jamalpur | Jharli | Nahar | Bhakli | Madanpur | Jhanswa | Requirement | Permissible Limit |
| | | | | Bari | | | | | | | (Acceptable Limit) | (Max.) |
| 1. | pH (at 25°C) | - | 7.42 | 7.58 | 7.28 | 7.82 | 7.52 | 7.72 | 7.93 | 7.64 | 6.5-8.5 | No Relaxation |
| 2. | Colour | Hazen Unit | BDL(DL 5.0) | BDL(DL 5.0) | BDL(DL 5.0) | BDL(DL 5.0) | BDL(DL 5.0) | BDL(DL 5.0) | BDL(DL 5.0) | BDL(DL 5.0) | 5 | 15 |
| 3. | Turbidity | NTU | BDL(DL 1.0) | BDL(DL 1.0) | BDL(DL 1.0) | BDL(DL 1.0) | BDL(DL 1.0) | BDL(DL 1.0) | BDL(DL 1.0) | BDL(DL 1.0) | 1 | 5 |
| 4. | Odour | - | Agreeabl e | Agreeabl e | Agreeable | Agreeable | Agreeable | Agreeable | Agreeable | Agreeable | Agreeable | Agreeable |
| 5. | Taste | - | Agreeabl e | Agreeabl e | Agreeable | Agreeable | Agreeable | Agreeable | Agreeable | Agreeable | Agreeable | Agreeable |
| 6. | Total Hardness as CaCO3 | mg/l | 227.00 | 258.00 | 153.0 | 409.0 | 135.0 | 191.00 | 224.00 | 193.00 | 200 | 600 |
| 7. | Calcium as Ca | mg/l | 63.09 | 59.52 | 31.74 | 93.06 | 23.9 | 27.78 | 51.58 | 43.65 | 75 | 200 |
| 8. | Alkalinity as CaCO3 | mg/l | 251.7 | 293.73 | 117.33 | 312.53 | 149.9 | 245.27 | 274.93 | 227.6 | 200 | 600 |
| 9. | Chloride as Cl | mg/l | 84.97 | 162.29 | 42.5 | 202.39 | 82.48 | 147.42 | 89.98 | 62.5 | 250 | 1000 |
| 10. | Cyanide as CN | mg/l | BDL(DL 0.02) | BDL(DL 0.02) | BDL(DL 0.02) | BDL(DL 0.02) | BDL(DL 0.02) | BDL(DL 0.02) | BDL(DL 0.02) | BDL(DL 0.02) | 0.05 | No Relaxation |
| 11. | Magnesium as | mg/l | | | | | | | | | 30 | 100 |
| | Mg | | 16.91 | 26.61 | 17.94 | 42.97 | 18.31 | 29.57 | 23.16 | 20.43 | | |
| 12. | Total Dissolved | mg/l | 410.00 | 502.00 | 278.00 | 781.00 | 342.00 | 536.00 | 408.00 | 361.00 | 500 | 2000 |
| | Solids | | 419.00 | J02.00 | 270.00 | 701.00 | 542.00 | 550.00 | 490.00 | 301.00 | | |
| 13. | Sulphate as SO4 | mg/l | 31.88 | 42.77 | 56.24 | 80.4 | 41.58 | 65.74 | 78.91 | 45.45 | 200 | 400 |
| 14. | Fluoride as F | mg/l | 0.88 | 0.79 | 0.85 | 0.95 | 0.82 | 0.95 | 0.77 | 0.91 | 1.0 | 1.5 |
| 15. | Iron as Fe | mg/l | 0.25 | 0.36 | 0.47 | 0.29 | 0.31 | 0.15 | 0.21 | 0.42 | 1.0 | No Relaxation |

Table - 3.16 Ground Water Analysis Study Period: Summer Season (March to May, 201

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| | | | Ductors | Village- | Villa et e | | | Villa et e | | VIIIt- | Specification as p | er IS 10500- 2012 |
|--------|-----------------|------|---------|----------|------------|--------------------|-------------------|--------------------|-----------------------------|---------------------|--------------------|-------------------|
| S. No. | Parameters | Unit | Site | Mohan | village- | village- Ibarli | Village- Nahar | Village- Bhakli | Village- Akneri Madappur | Village- Ihanswa | Requirement | Permissible Limit |
| | | | Site | Bari | Jamapu | 5118111 | Nariai | | Madanpui | Jilanswa | (Acceptable Limit) | (Max.) |
| 16. | Aluminium as Al | mg/l | BDL (DL | BDL (DL | BDL (DL | BDL (DL | BDL (DL | BDL (DL | BDL(DL 0.03) | BDL (DL | 0.03 | 0.2 |
| | | | 0.03) | 0.03) | 0.03) | 0.03) | 0.03) | 0.03) | | 0.03) | | |
| 17. | Boron | mg/l | BDL (DL | BDL (DL | BDL (DL | BDL (DL | BDL (DL | BDL (DL | BDL (DL 0.20) | BDL (DL | 0.50 | 2.4 |
| | | | 0.20) | 0.20) | 0.20) | 0.20) | 0.20) | 0.20) | | 0.20) | | |
| 18. | Phenolic | mg/l | BDL (DL | BDL (DL | BDL (DL | BDL (DL | BDL (DL | BDL (DL | BDL (DL 0.001) | BDL (DL | 0.001 | 0.002 |
| | Compounds | | 0.001) | 0.001) | 0.001) | 0.001) | 0.001) | 0.001) | | 0.001) | | |
| 19. | Anionic | mg/l | BDL (DL | BDL (DL | BDL (DL | BDL (DL | BDL (DL | BDL (DL | BDL (DL 0.02) | BDL (DL | 0.2 | 1 |
| | Detergents as | | 0.02) | 0.02) | 0.02) | 0.02) | 0.02) | 0.02) | | 0.02) | | |
| | MBAS | | | | | | | | | | | |
| 20. | Hexa Chromium | mg/l | BDL (DL | BDL (DL | BDL (DL | BDL (DL | BDL (DL | BDL (DL | BDL (DL 0.03) | BDL (DL | | |
| | as Cr+6 | | 0.03) | 0.03) | 0.03) | 0.03) | 0.03) | 0.03) | | 0.03) | | |
| 21. | Chromium as Cr | mg/l | BDL (DL | BDL (DL | BDL (DL | BDL (DL | BDL (DL | BDL (DL | BDL (DL 0.002) | BDL (DL | 0.05 | No Relaxation |
| | | | 0.002) | 0.002) | 0.002) | 0.002) | 0.002) | 0.002) | | 0.002) | | |
| 22. | Zinc as Zn | mg/l | BDL (DL | BDL (DL | BDL (DL | BDL (DL | BDL (DL | BDL (DL | BDL (DL 0.10) | BDL (DL | 5 | 15 |
| | | | 0.10) | 0.10) | 0.10) | 0.10) | 0.10) | 0.10) | | 0.10) | | |
| 23. | Copper as Cu | mg/l | BDL (DL | BDL (DL | BDL (DL | BDL (DL | BDL (DL | BDL (DL | BDL (DL 0.02) | BDL (DL | 0.05 | 1.5 |
| | | | 0.02) | 0.02) | 0.02) | 0.02) | 0.02) | 0.02) | | 0.02) | | |
| 24. | Manganese as | mg/l | BDL (DL | BDL (DL | BDL (DL | BDL (DL | BDL (DL | BDL (DL | BDL (DL 0.10) | BDL (DL | 0.1 | 0.3 |
| | Mn | | 0.10) | 0.10) | 0.10) | 0.10) | 0.10) | 0.10) | | 0.10) | | |
| 25. | Cadmium as Cd | mg/l | BDL (DL | BDL (DL | BDL (DL | BDL (DL | BDL (DL | BDL (DL | BDL(DL 0.002) | BDL (DL | 0.003 | No Relaxation |
| | | | 0.002) | 0.002) | 0.002) | 0.002) | 0.002) | 0.002) | | 0.002) | | |
| 26. | Lead as Pb | mg/l | BDL (DL | BDL (DL | BDL (DL | BDL (DL | BDL (DL | BDL (DL | BDL (DL 0.008) | BDL (DL | 0.01 | No Relaxation |
| | | | 0.008) | 0.008) | 0.008) | 0.008) | 0.008) | 0.008) | | 0.008) | | |
| 27. | Arsenic as As | mg/l | BDL (DL | BDL (DL | BDL (DL | BDL (DL | BDL (DL | BDL (DL | BDL (DL 0.002) | BDL (DL | 0.01 | No Relaxation |
| | | | 0.002) | 0.002) | 0.002) | 0.002) | 0.002) | 0.002) | | 0.002) | | |
| 28. | Mercury as Hg | mg/l | BDL (DL | BDL (DL | BDL (DL | BDL (DL | BDL (DL | BDL (DL | BDL (DL 0.001) | BDL (DL | 0.001 | No Relaxation |
| | | | 0.001) | 0.001) | 0.001) | 0.001) | 0.001) | 0.001) | | 0.001) | | |
| 29. | Sodium as Na | mg/l | 15.6 | 89.5 | 18.6 | 120.3 | 44.2 | 72.3 | 56.21 | 14.7 | | |

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| | | | Droject | Village- | Village | Village | Villaga | Village | Village Akheri | Village | Specification as per IS 10500- 2012 | |
|--------|--------------------------|-------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|----------------|-------------------|-------------------------------------|-----------------------------|
| S. No. | Parameters | Unit | Site | Mohan Bari | Jamalpur | Jharli | Nahar | Bhakli | Madanpur | Jhanswa | Requirement (Acceptable Limit) | Permissible Limit (Max.) |
| 30. | Potassium as K | mg/l | 3.3 | 4.8 | 3.1 | 8.2 | 3.9 | 6.2 | 3.4 | 2.9 | | |
| 31. | Phosphate as PO4 | mg/l | BDL (DL 0.02) | BDL (DL 0.02) | BDL (DL 0.02) | | |
| 32. | Nickel | mg/l | BDL (DL 0.005) | BDL (DL 0.005) | BDL (DL 0.005) | 0.02 | No Relaxation |
| 33. | Conductivity | µs/cm | 636.00 | 762.00 | 423.00 | 1186.00 | 518.00 | 819.00 | 752.00 | 548.00 | | |
| 34. | Total Suspended Solid | mg/l | BDL (DL 1.0) | BDL (DL 1.0) | BDL (DL 1.0) | BDL (DL 1.0) | BDL (DL 1.0) | BDL (DL 1.0) | BDL (DL 1.0) | BDL (DL 1.0) | | |

BDL - Below Detectable Limit

DL - Detection Level

Interpretation & Conclusion

The physico-chemical quality of groundwater was compared with drinking water standard (IS:10500- 2012). All the groundwater samples showed more or less similar and good quality of water; however, the groundwater at Village was slightly more enriched with mineral nutrients. The pH of water samples varies from 7.28 to 7.93 indicating neutral to slightly alkaline in nature. The maximum and minimum pH was recorded at village Akheri Madanpur and village Jamalpur. The colour and turbidity were BDL (DL 5.0) and BDL (DL 1.0); odour and taste were found agreeable at all sampling locations. The values of total hardness (135 to 409mg/l), alkalinity (117.33 to 312.53 mg/l) and total dissolved solids (278 to 781 mg/l) were found low, however, maximum hardness, dissolved solids alkalinity were found in the sample of Village Jharli.

However, all groundwater samples were not polluted based on low values of chlorides (42.5 to 202.39 mg/l) and sulphates (41.58 to 81.4 mg/l). The concentrations of other micro and macro nutrients were also at low level i.e. nitrate (6.09 to 11.42 mg/l), calcium (23.9 to 93.06 mg/l), magnesium (16.91 to 42.97 mg/l), and iron (0.15 to 0.47 mg/l). The fluoride (0.77 to 0.95 mg/l) concentration is at optimum level for the dental health of the consumers.

Thus, it can be concluded that the groundwater samples, including that from plant site, were observed to be good and complying to the drinking water standard (IS: 10500-2012). The groundwater sample at plant site was also of good quality. The groundwater, though hard, are suitable for drinking and for agriculture purpose.

3.5.9 SOIL ENVIRONMENT

3.5.9.1 Soil Quality and Characteristics

In order to assess the baseline characteristics of soil profile of the plant area representing project and nearby areas, the samples were analyzed for key and chemical parameters.

The sampling locations were finalized with the following considerations:

- >>>> To enable information on baseline characteristics and,
- >>>> To determine the impact of industrial and soil characteristics.

Representative soil samples were collected from 8 different specified locations within the study area of the plant site. Standard procedures were followed for the sampling and analysis of physico-chemical parameters.

Location of soil sampling stations are given in Table - 3.17 and shown in Figure - 3.9.

Soil analysis results are given in Table - 3.18

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| S. No. | Sampling Location | Coordinates | Approx. Aerial Distance | Direction | |
|----------|-----------------------|----------------|-------------------------|----------------|--|
| SGWS 1 | Project Site | 28° 28' 21.4"N | _ | _ | |
| 500051 | i roject site | 76° 24' 30.0"E | | | |
| SC/W/S 2 | Village - Mohan Bari | 28° 28' 53.7"N | o 5 km | West direction | |
| 301032 | village - Monair Dari | 76° 23' 25.7"E | 0.5 Km | west direction | |
| SGWS 3 | Village - Ihanswa | 28° 28' 48.4"N | o 5 km | NE direction | |
| | village - Jhanswa | 76° 25' 22.3"E | 0.5 Km | | |
| SGWS 4 | Village - Jamalnur | 28° 28' 15.3"N | 6 o km | East direction | |
| | village Samalpul | 76° 28' 14.5"E | 0.0 km | Last direction | |
| | Village - Iharli | 28° 30' 09.3"N | 2 0 km | NW direction | |
| 500055 | village sharn | 76° 23' 25.8"E | 5.0 Km | | |
| SGWS 6 | Village - Nahar | 28° 24' 46.1"N | 7.0 km | SSW direction | |
| 501750 | Village Maria | 76° 23' 55.5"E | 7.0 KM | | |
| SCW/S 7 | Village - Bhali | 28° 25' 18.3"N | 8 o km | WSW direction | |
| 500057 | Village Ditall | 76° 28' 48.7"E | 0.0 Km | | |
| SCW/S 8 | Village - Akheri | 28° 30' 54.6"N | 7.0 km | NE direction | |
| 501050 | Madanpur | 76° 27' 19.1"E | 7.0 KIII | NE direction | |

Table - 3.17 Locations of Soil Sampling Stations

Source: SOI Toposheet

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Table - 3.18

Soil Analysis

Study Period: Summer Season (March to May, 2019)

| Sa | | | | | | | | pling Locations | | | | |
|----------|--------------------------|--------|--------------|--------------|--------------|--------------|-------------------|-----------------|------------------|-----------------|--|--|
| S. No. | Parameters | Unit | Drojact Sita | Village- | Village- | Village- | Villago Ibarli | Villago Nabar | Villago Rhakli | Village- Akheri | | |
| | | | Project Site | Mohan Bari | Jhanswa | Jamalpur | Village- Jilal II | Village- Nallal | Village- Dilakii | Madanpur | | |
| 1 | pH (at 25°C) (1:2.5 soil | | 7.28 | 7.56 | 7.82 | 7.19 | 7.61 | 7.92 | 8.08 | 7.41 | | |
| 1. | water sus.) | - | | | | | | | | | | |
| 2 | Conductivity (1:2 soil | mS/cm | 0.34 | 0.28 | 0.68 | 0.33 | 0.53 | 0.24 | 0.33 | 0.42 | | |
| 2. | water sus.) | məyem | | | | | | | | | | |
| 3. | Soil Texture | - | Silty Loam | Sandy Loam | Silty Loam | Silty Loam | Loamy | Silty Loam | Silty Loam | sandy Loam | | |
| 4. Colou | Colour | - | Brownish | Yellowish | Brownish | Brownish | Yellowish | Brownish yellow | Brownish | Yellowish Brown | | |
| | Coloui | | | Brown | | | Brown | | | | | |
| 5. | Water holding capacity | % | 32.56 | 29.04 | 34.09 | 31.27 | 28.55 | 36.87 | 39.05 | 30.06 | | |
| 6. | Bulk density | gm/cc | 1.38 | 1.42 | 1.34 | 1.44 | 1.47 | 1.40 | 1.39 | 1.36 | | |
| 7. | Chloride | mg/kg | 157.87 | 138.46 | 227.64 | 165.15 | 198.11 | 59.46 | 99.46 | 188.04 | | |
| 8. | Calcium as Ca | mg/kg | 1631.76 | 1387.76 | 1216.64 | 1481.28 | 1157.76 | 1311.88 | 1373.56 | 1472.08 | | |
| 9. | Sodium as Na | mg/kg | 102.69 | 85.25 | 158.18 | 97.36 | 129.31 | 69.87 | 74.31 | 106.83 | | |
| 10. | Available Potassium as K | kg/ha | 254.96 | 216.84 | 196.35 | 231.45 | 180.9 | 204.98 | 214.62 | 230.01 | | |
| 11. | Organic matter | % | 0.79 | 0.76 | 0.65 | 0.67 | 0.72 | 0.57 | 0.55 | 0.71 | | |
| 12. | Magnesium as Mg | mg/kg | 407.94 | 346.94 | 304.16 | 370.32 | 289.44 | 327.97 | 343.39 | 368.02 | | |
| 13. | Available Nitrogen as N | kg/ha. | 141.43 | 128.95 | 138.62 | 142.74 | 124.84 | 159.84 | 162.89 | 143.37 | | |
| 14. | Available Phosphorus | kg/ha. | 31.86 | 40.11 | 39.28 | 35.21 | 58.16 | 40.52 | 45.35 | 54.73 | | |
| 15. | Total Zinc as Zn | mg/kg | 9.61 | 9.75 | 12.66 | 9.73 | 6.89 | 9.83 | 9.03 | 10.54 | | |
| 16 | Manganese as Mn | mg/kg | 233.83 | 208.55 | 204.73 | 248.13 | 225.44 | 230.62 | 211.84 | 241.45 | | |
| 17. | Chromium as Cr | mg/kg | BDL (DL 5.0) | BDL (DL 5.0) | BDL (DL 5.0) | BDL (DL 5.0) | | |
| 18. | Total Lead as Pb | mg/kg | 7.46 | 7.04 | 5.83 | 7.23 | 8.88 | 8.62 | 7.92 | 8.85 | | |
| 19. | Total Cadmium as Cd | mg/kg | BDL (DL 5.0) | BDL (DL 5.0) | BDL (DL 5.0) | BDL (DL 5.0) | | |
| 20. | Total Copper as Cu | mg/kg | 19.24 | 17.98 | 21.06 | 15.56 | 14.14 | 22.56 | 14.57 | 15.96 | | |
| 21. | Organic Carbon | % | 0.46 | 0.44 | 0.38 | 0.39 | 0.42 | 0.33 | 0.32 | 0.41 | | |
| 22. | SAR Value | - | 0.59 | 0.53 | 1.05 | 0.59 | 0.88 | 0.45 | 0.46 | 0.65 | | |

Source: Soil Analysis

Interpretation & Conclusion

The soil colour of the sample were found brown in colour indicating well drained soil samples. The textures of soil samples weresilt loam. Loam soils are best for plant growth because sand, silt, and clay together provide desirable characteristics. First, the different-sized particles leave spaces in the soil for air and water to flow and roots to penetrate. The roots feed on the minerals in the suspended water. All soil samples have slightly alkaline to alkaline nature, having pH range from 7.19 to 8.08. Water holding capacity (28.55 % to 39.05%) and bulk density (1.34 to 1.47 g/cc) were ideal for the crops. Physical quality of soil samples is good for the plantation.

All the major nutrients were present, namely organic matter (0.55 % to 0.79%) optimum, nitrogen (124.84 to 162.89 kg/ha) better to sufficient, phosphorus (31.86 to 58.16 kg/ha) less to average and potassium (180.9 to 254.9 kg/ha) sufficient. This indicates that soil fertility is good with nitrogen and potassium sufficient in some soil samples in the study area. Other nutrients were present in the soil samples, namely calcium (1157.76 to 1631.76 mg/kg), magnesium (289.44 to 407.94 mg/kg), zinc (6.89 to 12.66 mg/kg) and chromium BDL (DL 5.0).

The above discussion indicates that the soils in study area, in general, are good from physical and chemical quality and isfertile. The soil is suitable for plantation and greenbelt.

3.5.10 BIOLOGICAL ENVIRONMENT

3.5.10.1 Introduction

The sum of environments where the life forms exists is called the Biosphere, these includes a portion of land, water and air. Biological environment includes the Habitat (Place where the organism lives) and natural surroundings of all species (living organism species) of the particular area.

Biological study is essential to understand the impact of industrialization and urbanization on existing flora and fauna of the study area. Studies on various aspects of ecosystem play an important role in identifying sensitive issues for under taking appropriate action to mitigate the impact, if required.

The biological study was undertaken as a part of the EIA study report to understand the present status of ecosystem prevailing in the study area and to study the floristic and faunal diversity of the terrestrial and aquatic environment of the study area within the 10 km radius of the project site.

Some of the information was gathered from the local habitants. All the collected data were classified to interpret the impact of pollution on the flora and fauna of that region. Survey of the wild plants as well as cultivated crop plants was made and all the available information was recorded. Night survey was also conducted with the help of spotlight to record nocturnal animals, birds and reptiles.

Secondary data on flora and fauna, cropping patterns etc. were also collected from available literatures, internet, forest department and revenue department.

During biological environment study it has been found that through the local villagers and by direct evidence that some wildlife are harboring the area occasionally for their food, water and crossing from one place to another places. During the survey total 85 plants species and 54 faunal species were recorded by primary field observations and information of local villages. Total five schedules –I species were documented as per Wildlife Protection Act, 1972. Hence, conservation Plan is to be prepared for the conservation of these scheduled species.

The survey was conducted in the 10 km radius from the project location and its surroundings Plants and animal diversity was noted. Apart from agriculture, the villagers are also engaged in livestock keeping. The vegetation observed within the study area mainly comprises of sub-tropical flora. The list was made for the natural vegetation and their diversity was documented.

The study area is inadequately wooded and some parts are practically bare of trees. Tree species viz. khairi, jand, pahari kikar, kikar, babool, beri, barh, pipal, lasura, shisham, siris, neem, papri, gular, indokh, tut, gulmohar, simbal or samul, kandu, bakain and safeda are commonly found in the area. Kikar or pahari kikar is found all over the district. Shrub species commonly found in the study area are panwar, karia, khip, Aak, phog and Nagphani. Amarbel is a common parasite climber. Nagphani forms thick hedge round many villages in tehsil. The important grasses found in the district are anjan, dhaman, dub, kana, dabh, palwa and chirya. The palatable grasses like anjan, dhaman and dub have dwindled due to excessive grazing in village common land. Jand, neem, bakain, khairi, mesquite or pahari kikkar, guggal and eucalyptus have been planted to increase the forest wealth.

Core Zone: A total of around 275 trees of Acacia nilotica, Azadirachta indica and Prosopis cineraria have been recorded during survey in the core zone of the study area.

Buffer Zone: The selection of terrestrial and aquatic ecological sampling location was based on land use pattern, topography and habitat patterns of the study area. Ecological survey was carried out in forest and non-forest areas (agricultural fields, roadsides, urban & semi-urban wastelands, etc.) and the aquatic ecological survey was carried out in the study area.

Total 85 plant species were enlisted within the study area and details are incorporated in the list given below:

| S. No | Botanical Name | Local Name | Family | Habit | IUCN Status |
|-------|--------------------|------------|---------------|-------|-------------|
| 1 | Acacia leucophloea | Ronjh | Mimosaceae | Т | NA |
| 2 | Acacia nilotica | Babool | Mimosaceae | Т | NA |
| 3 | Acacia senegal | Kumttha | Mimosaceae | Т | NA |
| 4 | Acacia tortilis | Kikar | Mimosaceae | Т | NA |
| 5 | Achyranthes aspera | Chirchita | Amaranthaceae | Н | NA |
| 6 | Adhatoda vasica | Arusa | Acanthaceae | S | NA |
| 7 | Aegle marmelos | Bael | Rutaceae | Т | NA |
| 8 | Ailanthus excelsa | Mahanimb | Simarubaceae | Т | NA |

Table No. - 3.19 List of Existing floristic composition within Buffer zone

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|--------------------------------|--------|

| S. No | Botanical Name | Local Name | Family | Habit | IUCN Status |
|-------|---------------------------|-------------|-----------------|-------|-------------|
| 9 | Albizia lebbeck | Siris | Mimosaceae | Т | NA |
| 10 | Albizia procera | Safed Siris | Mimosaceae | Т | NA |
| 11 | Alstonia scholaris | Chatwan | Simarubaceae | Т | NA |
| 12 | Argemone mexicana | Satyansi | Papaveraceae | Н | NA |
| 13 | Aristida adscensionis | Lapla | Poaceae | G | NA |
| 14 | Artocarpus heterophyllus | Kathal | Moraceae | Т | NA |
| 15 | Azadirachta indica | Neem | Meliaceae | Т | NA |
| 16 | Balanites aegyptiaca | Hingot | Simaroubaceae | S | NA |
| 17 | Calligonum polygonides | Phog | Polygonaceae | S | NA |
| 18 | Callistemon sp. | Bottlebrush | Myrtaceae | Т | NA |
| 19 | Calotropis procera | Aak | Asclepiadaceae | S | NA |
| 20 | Capparis decidua | Kair | Capparaceae | S | NA |
| 21 | Cascabela thevetia | Peeli Kaner | Apocynanceae | Т | NA |
| 22 | Cassia fistula | Amaltas | Caesalpiniaceae | Т | NA |
| 23 | Cassia tora | Panwar | Caesalpinaceae | Н | NA |
| 24 | Catharanthus roseus | Sadabahar | Apocynaceae | S | NA |
| 25 | Cenchrus setigerus | Dhaman | Poaceae | G | NA |
| 26 | Chukrasia tabularis | Chakrasia | Cedreloideae | Т | LC |
| 27 | Citrus medica | Nimbu | Rutaceae | Т | NA |
| 28 | Cocculus hirsutus | Bajarbel | Menispermaceae | C | NA |
| 29 | Commiphora wightii | Gugal | Burseraceae | S | A2cd |
| 30 | Cordia dichotoma | Lasoda | Boraginaceae | Т | NA |
| 31 | Cryptostegia grandiflora | Dudhi | Periplocaceae | C | NA |
| 32 | Cynodon dactylon | Durva | Poaceae | G | NA |
| 33 | Dactyloctenium aegypticum | Makada | Poaceae | G | NA |
| 34 | Dalbergia latifolia | Shisham | Fabaceae | Т | NA |
| 35 | Datura innoxia | Dhatura | Solanaceae | Н | NA |
| 36 | Delonix regia | Gulmohar | Caesalpiniaceae | Т | NA |
| 37 | Desmostachya bipinnata | Dab | Poaceae | G | NA |
| 38 | Dichanthium annulatum | Karad | Poaceae | G | NA |
| 39 | Dodonea viscose | Reliya | Sapindaceae | Н | NA |
| 40 | Echinops echinatus | Untkateli | Asteraceae | Н | NA |
| 41 | Ficus benghalensis | Bargad | Moraceae | Т | NA |
| 42 | Ficus benjamina | Pukar | Moraceae | Т | NA |
| 43 | Ficus glomerata | Goolar | Moraceae | Т | NA |
| 44 | Ficus religiosa | Peepal | Moraceae | Т | NA |
| 45 | Ficus virens | Pilkan | Moraceae | Т | NA |
| 46 | Grevillea robusta | Silver oak | Proteaceae | Т | NA |
| 47 | Heteropogon contortus | Sukhala | Poaceae | G | NA |
| 48 | Imperata cylindrica | Dabh | Poaceae | G | NA |
| 49 | Mangifera indica | Aam | Anacardiaceae | Т | NA |

|--|

| S. No | Botanical Name | Local Name | Family | Habit | IUCN Status |
|-------|--------------------------|----------------|----------------|-------|-------------|
| 50 | Manilkara zapota | Chiku | Sapotaceae | Т | NA |
| 51 | Melia azedarach | Bakain | Meliaceae | Т | NA |
| 52 | Mimusops elengi | Maulsari | Sapotaceae | Т | NA |
| 53 | Morus alba | Sahtut | Moraceae | Т | NA |
| 54 | Neolamarckia cadamba | Kadam | Rubiaceae | Т | NA |
| 55 | Opuntia dillenii | Nag Phani | Cactaceae | S | NA |
| 56 | Parthenium hysterophorus | Gajar Ghas | Asteraceae | Н | NA |
| 57 | Phyllanthus amarus | Bhui Aonla | Euphorbiaceae | Т | NA |
| 58 | Phyllanthus emblica | Aonla | Euphorbiaceae | Т | NA |
| 59 | Plumeria alba | Champa | Apocynanceae | Т | NA |
| 60 | Polyalthia longifolia | Ashok | Anonaceae | Т | NA |
| 61 | Pongamia pinnata | Karanj | Fabaceae | Т | NA |
| 62 | Prosopis cineraria | Khejri | Mimosaceae | Т | NA |
| 63 | Prosopis juliflora | Vilayti Babool | Mimosaceae | S | NA |
| 64 | Psidium guajava | Amrud | Myrtaceae | Т | NA |
| 65 | Pterocarpus marsupium | Bija | Fabaceae | Т | NT |
| 66 | Punica granatum | Anar | Lythraceae | Т | NA |
| 67 | Rosa sp. | Gulab | Rosaceae | S | NA |
| 68 | Saccharum munja | Munj | Poaceae | G | NA |
| 69 | Saccharum spontaneum | Kaans | Poaceae | G | NA |
| 70 | Salvadora oleoides | Bada Peelu | Salvadoraceae | S | NA |
| 71 | Salvadora persica | Meswak | Salvadoraceae | S | NA |
| 72 | Sida cordifolia | Kharounti | Malvaceae | S | NA |
| 73 | Solanum nigrum | Mokoi | Solanaceae | Н | NA |
| 74 | Syzygium cumini | Jamun | Myrtaceae | Т | NA |
| 75 | Tephrosia purpurea | Dhamasa | Combretaceae | S | NA |
| 76 | Terminalia arjuna | Arjun | Combretaceae | Т | NA |
| 77 | Thespesia populnea | Pakur | Malvaceae | Т | NA |
| 78 | Thuja occidentalis | Vidhya | Cupressaceae | Т | NA |
| 79 | Tinospora cordifolia | Giloy | Menispermaceae | С | NA |
| 80 | Tribulus terrestris | Gokhru | Zygophyllaceae | Н | NA |
| 81 | Withania somnifera | Asgandh | Solanaceae | Н | NA |
| 82 | Wrightia tinctoria | Kapar Dudhi | Apocynanceae | Т | NA |
| 83 | Xanthium strumarium | Chirchita | Asteraceae | S | NA |
| 84 | Ziziphus mauritiana | Ber | Rhamnaceae | S | NA |
| 85 | Ziziphus nummularia | Jhar Beri | Rhamnaceae | S | NA |

Note: - NA= Not yet assessed, LC= Least Concerned. DD= Data deficient, VU= Vulnerable, A2cd= Criticaly

Endangered, NT= Near Threatend.

FAUNAL DIVERSITY

The study of fauna takes substantial amount of time to understand the specific faunal characteristics of area. The assessment of fauna has been done by extensive field survey of the area. During survey,

the presence of wildlife was assessed on the basis of the concerned animal sightings and the frequency of their visits in the project area which was later confirmed from forest department, Wildlife Department etc.

Total 12 faunal species have been encountered in the core zone of the study area out of which 3 mammal species, 1 herpetofauna species 7 Aves species and 2 species of butterflies have been noted.

Faunal diversity in the core zone

Mammals

| S.No | Species Name | Common Name | Family | IWPA/IUCN Status |
|------|---------------------|----------------------------|-----------|------------------|
| 1. | Funambulus pennanti | Five Striped Palm Squirrel | Sciuridae | Schedule IV |
| 2. | Rattus rattus | House Rat | Muridae | Schedule V |

Aves

| S.No | Species Name | Common Name | Family | IWPA/IUCN Status |
|------|-----------------------|------------------------|---------------|------------------|
| 1. | Acridotheres tristis | Common Myna | Sturnidae | Schedule IV |
| 2. | Nectarinia asiatica | Purple sunbird | Nectariniidae | Schedule IV |
| 3. | Pycnonotus cafer | Redvented Bulbul | Pycnonotidae | Schedule IV |
| 4. | Psittacula krameri | Rose ringed Parakeet | Psittacidae | Schedule IV |
| 5. | Passer domesticus | House Sparrow | Passeridae | LC |
| 6. | Streptopelia decaocto | Eurasian Collared Dove | Columbidae | Schedule IV |
| 7. | Ploceus philippinus | Baya weaver | Ploceidae | NA |

Note: - NA= Not yet assessed, LC= Least Concerned.

Herpetofauna

| S.No | Species Name | Common Name | Family | Status (IWPA/IUCN) |
|------|--------------------|------------------------|----------|--------------------|
| 1. | Calotes versicolor | Oriental Garden Lizard | Agamidae | NA |
| | | | | |

Note: - NA= Not yet assessed, LC= Least Concerned

Butterflies

| S.No | Species Name | Common Name | Family |
|------|-------------------|---------------------|-------------|
| 1. | Danaus chrysippus | Plain Tiger | Nymphalidae |
| 2. | Eurema hecabe | Common Grass Yellow | Pieridae |

Note: - NA= Not yet assessed, LC= Least Concerned.

Total 60 faunal species have been encountered in the buffer zone of the study area out of which 16 are mammals, 11 are herpetofauna, 28 are Aves and 5 are species of butterflies that have been recorded from the buffer zone (Table-3.20).

Table 3.20: Faunal Diversity in the buffer zone of the Study Area

Mammals

| S.No | Species Name | Common Name | Family | IWPA/IUCN Status |
|------|---------------------|----------------------------|-----------|------------------|
| 1. | Funambulus pennanti | Five Striped Palm Squirrel | Sciuridae | Schedule IV |
| 2. | Mus booduga | Little Indian Field Mouse | Muridae | Schedule V |
| 3. | Rattus rattus | House Rat | Muridae | Schedule V |

| S.No | Species Name | Common Name | Family | IWPA/IUCN Status |
|------|-------------------------|-----------------|-----------------|----------------------|
| 4. | Antilope cervicapra | Blackbuck | bovidae | Schedule-I |
| 5. | Canis aureus | Jackal | Canidae | Schedule-II, part-II |
| 6. | Vulpus bengalensis | Indian Fox | Canidae | Schedule-II, part-II |
| 7. | Felis chaus | Jungle cat | Felidae | Schedule-II, part-II |
| 8. | Herpestes edwardsii | Common mongoose | Herpestidae | Schedule-II, part-II |
| 9. | Macaca mulatta | Monkey | Cercopithecidae | Schedule-II, part-I |
| 10. | Presbytis entellus | Langur | Cercopithecidae | Schedule-II, part-I |
| 11. | Megaderma lyra | Bat | Megadermatidae | LC |
| 12. | Gazella bennettii | Indian gazelle | bovidae | Schedule-I |
| 13. | Boselaphus tragocamelus | Nil Gai | Bovidae | Schedule-III |
| 14. | Hystrix indica | Porcupine | Hystricidae | Schedule-IV |
| 15. | Lepus nigricollis | Hare | Leporidae | Schedule-IV |
| 16 | Hedgehog | Hedgehog | Erinaceidae | Schedule-III |

Note: - NA= Not yet assessed, LC= Least Concerned.

Aves

| S.No. | Species Name | Common Name | Family | IWPA/IUCN Status |
|-------|---------------------------|----------------------------|---------------|------------------|
| 1. | Acridotheres fuscus | Jungle Myna | Sturnidae | Schedule IV |
| 2. | Acridotheres ginginianus | Bank Myna | Sturnidae | Schedule IV |
| 3. | Acridotheres tristis | Common Myna | Sturnidae | Schedule IV |
| 4. | Centropus sinensis | Crow Pheasant | Cuculidae | Schedule IV |
| 5. | Chardrius bubius | Little Ringed Plover | Charadriidae | LC |
| 6. | Columba livia. | Blue Rock Pigeon | Columbidae | Schedule IV |
| 7. | Coracias benghalensis | Roller or Blue Jay | Coraciidae | LC |
| 8. | Corvus splendens | Common crow | Corvidae | Schedule V |
| 9۰ | Coturnix coturnix | Common Quail | Pheasianidae | Schedule IV |
| 10. | Dicrurus macrocercus | Black Drongo | Corvidae | Schedule IV |
| 11. | Francolinus francolinus | Black partridge | Pheasianidae | Schedule IV |
| 12. | Francolinus pondicerianus | Grey partridge | Pheasianidae | Schedule IV |
| 13. | Halcyon smyrnensis | White Throated Kingfisher | Alcedinidae | Schedule IV |
| 14. | Melanoperdix niger | Black Partridge | Pheasianidae | Schedule-I |
| 15. | Nectarinia asiatica | Purple sunbird | Nectariniidae | Schedule IV |
| 16. | Passer domesticus | House sparrow | Passeridae | LC |
| 17. | Pavo cristatus | Indian Peafowl | Pheasianidae | Schedule I |
| 18. | Ploceus benghalensis | Black breasted weaver bird | Ploceidae | NA |
| 19. | Ploceus philippinus | Baya weaver | Ploceidae | NA |
| 20. | Psittacula krameri | Rose ringed Parakeet | Psittacidae | Schedule IV |
| 21. | Pycnonotus cafer | Redvented Bulbul | Pycnonotidae | Schedule IV |
| 21. | Strenptopelia decaocto | Ring Dove | Columbidae | Schedule IV |
| 22. | Streptopelia chinensis | Spotted Dove | Columbidae | Schedule IV |
| 23. | Streptopelia decaocto | Eurasian Collared Dove | Columbidae | Schedule IV |

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| S.No. | Species Name | Common Name | Family | IWPA/IUCN Status |
|-------|---------------------------|-------------------|-------------------|------------------|
| 24. | Streptopelia senegalensis | Little Brown Dove | Columbidae | Schedule IV |
| 25. | Streptopelia traquebarica | Red turtle Dove | Columbidae | Schedule IV |
| 26. | Sturnus contra | Pied Myna | Sturnidae | Schedule IV |
| 27. | Threskiornis sp. | White Ibis | Threskiornithidae | LC |

Note: - NA= Not yet assessed, LC= Least Concerned.

Herpetofauna

| S.No | Species Name | Common Name | Family | IWPA/IUCN Status |
|------|-------------------------|-----------------------|---------------|------------------|
| 1. | Ancistrodon himalayahus | Pit viper | Viperidae | LC |
| 2. | Bufo melanostictus | Common Indian Toad | Bufonidae | LC |
| 3. | Bungarus caeruleus | Common Indian krait | Elapidae | Schedule IV |
| 4. | Bungarus fasciatus | Banded Krait | Elapidae | LC |
| 5. | Calotes versicolor | Common garden lizard | Agamidae | NA |
| 6. | Eublepharis macularius | Common leopard gecko | Eublepharidae | NA |
| 7. | Naja naja | Indian cobra | Elapidae | Schedule II |
| 8. | Ptyas mucosus | Common rat snake | Colubridae | Schedule II |
| 9. | Saara hardwickii | Spiny tailed lizard | Agamidae | Schedule II |
| 10. | Varanus bengalensis | Common Indian monitor | Varanidae | Schedule I |
| 11. | Vipera rapelli | Russell's viper | Viperidae | Schedule II |

Butterflies

| S.No | Scientific Name | Common Name | Family |
|------|-------------------|---------------------|--------------|
| 1. | Danaus chrysippus | Plain Tiger | Nymphalidae |
| 2. | Eurema hecabe | Common Grass Yellow | Pieridae |
| 3. | Junonia lemonias | Lemon Pansy | Nymphalidae |
| 4. | Lxias pyrene | Yellow Orange Tip | Pieridae |
| 5. | Pachliopta hector | Crimson Rose | Papilionidae |

Note: - NA= Not yet assessed, LC= Least Concerned, * Presence of species.

Agricultural Crops

The major crops produced in the state include Bajra, Guar, Gehu, Rai etc. Soils of Haryana are mainly sandy and sandy loam type. The soils are often dry, nutrient deficient and fast draining. The Agro Ecological Sub Region includes the Western Plain, Kachchh and a part of the Kathiawar Peninsula and the Agro Climatic Zone falls within the Western Dry Region.

The main crops of Jhajjar district are bajra, gehu, guar, rai etc. Bajra and guar are kharif crops whereas gehu and rai are rabi crops. Irrigation is carried out mainly through open wells and bore wells. The following table provides a detailed list of agricultural and horticultural crops cultivated in Jhajjar that were documented during field survey.

| S.No | Botanical Name | Vernacular Name | Family |
|------|---------------------|-----------------|----------------|
| 1. | Allium cepa | Pyaz | Amaryllidaceae |
| 2. | Allium sativum | Lehsun | Amaryllidaceae |
| 3. | Brassica compestris | Rai | Brassicaceae |

| Table 3.21: List of major Agricultural (| Crops |
|--|-------|
|--|-------|

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| S.No | Botanical Name | Vernacular Name | Family | | |
|------|--------------------|-----------------|------------|--|--|
| 4. | Hordeum vulgare | Jau | Poaceae | | |
| 5. | Pennisetum glaucum | Bajra | Poaceae | | |
| 6. | Punica granatum | Anar | Lythraceae | | |
| 7. | Sorghum bicolor | Jwar | Poaceae | | |
| 8. | Triticum aestivum | Gehu | Poaceae | | |
| 9. | Zea mays | Makka | Poaceae | | |
| 10. | Ziziphus numuraris | Ber | Rhamnaceae | | |

Table 3.22: List of Domesticated Animals

| S. No | Scientific Name | Vernacular Name | Family |
|-------|--------------------------|-----------------|-------------|
| 1. | Bos taurus | Gai | Bovidae |
| 2. | Bubalus bubalis | Bhains | Bovidae |
| 3. | Camelus bactrianus | Uth | Camelidae |
| 4. | Capra aegagrus hircus | Bakhri | Bovidae |
| 5. | Gallus gallus domesticus | Murga | Phasianidae |
| 6. | Ovis aries | Bher | Bovidae |
| 7. | Sus sp. | Suar | Suidae |

Medicinal Plants

During the primary survey and the site visit within 10 km radius from the project boundary and by discussion with local villagers and forest department staff regarding the availability of medicinally important plant within the area. The following is a potential list of medicinal plants that have been identified.

| S. No | Vernacular Name | Scientific Name | Family |
|-------|-----------------|-----------------------|----------------|
| 1. | Aak | Calotropis procera | Asclepiadacea |
| 2. | Babool | Acacia nilotica | Mimosaceae |
| 3. | Durva | Cynodon dactylon | Poaceae |
| 4. | Gheekumari | Aloe vera | Liliaceae |
| 5. | Neem | Azadirachata indica | Meliaceae |
| 6. | Safeda | Eucalyptus globulosus | Myrtaceae |
| 7. | Asagandh | Withania somnifera | Solanaceae |
| 8. | Gokhru | Tribulus terrestris | Zygophyllaceae |
| 9. | Dhatura | Datura metel | Solanaceae |
| 10. | Bhatkataiya | Solanum xanthocarpum | Solanaceae |
| 11. | Makoy | Solanum nigrum | Solanaceae |
| 12. | Giloy | Tinospora cordifolia | Menispermaceae |
| 13. | Sarphonka | Tephrosia purpuria | Fabaceae |
| 14. | Bala | Sida cordifolia | Malvaceae |
| 15. | Chirchita | Achyranthus aspara | Amaranthaceae |
| 16. | Gum acacia | Acacia senegal | Fabaceae |
| 17. | Aonla | Phyllanthes amblica | Phyllanthaceae |

Table 3.23: List of Medicinal Plants found in the Study Area

Endangered Flora

No endangered or endemic flora was recorded from harmful vegetation in core and buffer zone of the project area.

Endangered Fauna

60 species of animals could be seen in the vicinity of the stone quarry project. Pavo cristatus (Indian Peafowl), Melanoperdix niger(Monitor Lizard), Varanus bengalensis(Blackbuck), Gazella bennettii (Indian gazelle) and Antilope cervicapra from schedule-I and four species from part-II of Schedule-II are commonly seen in the buffer zone near forest edges and they are protected under wildlife protection act 1972.

Location of National Park and Wildlife Sanctuary

The nearest protected area from project boundary is Nahar Wildlife Sanctuary (~6.0 Km in South direction from project site). There are wide ranges of wildlife habitats in the district that includes a sanctuary in Nahar, forests and vegetations in Aravalli hills, community and private lands, marshy lands and water bodies such as ponds, canals and others. These habitats are the home for a variety of wildlife as mentioned above. There is gradual shrinkage in wildlife habitat both in quantity and quality of vegetations used as food by wild animals and birds. Prolonged dry season and lack of water during these periods pose major problems for wildlife in the area.

Not much work has been done in wildlife habitats in the division except for plantations. Fruit bearing plant species such as beri, neem, bar, papal etc are planted as routine forestry operation. In few places, there are waterholes such as small pond or water harvesting structures such as in Aravalli areas of Manethi, Nandha and others that act as source of drinking water for wild animals and birds.

3.5.11 Socio-Economic Environment

Socio-economic environment is an essential part of environmental study which incorporates various facts related to socio-economic conditions in the area and deals with the total environment.

Socio-economic study includes demographic structure of the area, provision of basic amenities viz. housing, education, health and medical services, occupation, water supply, sanitation, communication, transportation, prevailing diseases pattern as well as feature of aesthetic significance such as temples, historical monuments etc. at the baseline level. This would help in visualizing and predicting the possible impact depending upon the nature and magnitude of the project.

Socio-economic study of an area provides a good opportunity to assess the socio-economic conditions of an area. This study will possibly estimate the change in living and social standards of the particular area benefitted due to the project. The gross economic production of the area will be increased substantially due to the existence of this project. It can undoubtedly be said that this plant will provide direct and indirect employment and improve the infrastructural facilities and living standards of the area.

The fabrics of socio-economic changes are so complicated that this study would seem to be extremely limited, almost superficial and at times subjective in nature. More thorough and quantified socio-economic study will undoubtedly require vastly longer time and resources, and is, therefore, beyond the scope of the present EIA study. This EIA will give a reasonably clear picture of the socio-economic conditions prevailing in the study area.

3.5.11.1 Objectives of the Study

The objectives of this socio-economic report consist of:

- № To know the current socio-economic situation in the region to cover the sub sectors of education, health, sanitation, and water and food security.
- 80 To conduct socio-economic assessment study in Project Area
- 80 To recommend practical strategic interventions in the sector
- >>> To help in providing better living standards
- ∞ To provide employment opportunities.

3.5.11.2 Scope of Work

- 80 To study the Socio-economic Environment of area from the secondary sources
- >>> Data Collection and Analysis
- >>> Prediction of project impact
- ல Mitigation Measures

3.5.11.3 Methodology

80 Collection of Data

Data for this project was collected from primary sources like Field survey, Interviews of locals and secondary sources like Government department, Maps, Literature research etc. during field survey. JMEPL conducted the socio-economic baseline survey using a survey team of Field Assistants and a Supervisor apprising them about the project area and relevant documents.

The Survey was conducted using Simple Random Sampling method with a well-structured questionnaire prepared enabling subjects to reply appropriately. The questionnaires were designed to suit the subjects considering their rural background enabling them to furnish correct information and data to the extent possible. Primary data has been collected at village level, household level by questionnaires and focused group discussions.

The study area for the field survey has been divided into three major segments namely Primary Zone (0 - 3 km), Secondary Zone (3 - 7 km) and Outer Zone (7 - 10 km)

80 Presentation of Data and Analysis

The data collected were presented in a suitable, concise form for further analysis. The collected data were presented in the form of tabular or diagrammatic or graphic form. These tabulated data were interpreted and analyzed with the help of various qualitative techniques and ideographic approaches.

3.5.11.4 Background Information of the Area

Haryana is one of the 29 states in India, located in northern part of the country. It was carved out of the former state of East Punjab on 1 November 1966 on linguistic as well as on cultural basis. It is ranked 22nd in terms of area with less than 1.4% (44,212 km2) of India's land area. Chandigarh is the state capital, Faridabad in National Capital Region is the most populous city of the state and Gurugram is a leading financial hub of NCR with major Fortune 500 companies located in it. Haryana has 6 administrative divisions, 22 districts, 72 sub-divisions, 93 revenue tehsils, 50 subtehsils, 140 community development blocks, 154 cities and towns, 6,848 villages and 6222 villages panchayats.

The study area lies in two districts- Jhajjar and Rewari. Jhajjar and Riwari districts have their headquarters in the cities of Jhajjar and Rewari respectively.

Table 3.24 shows the socio-economic profile of the study area.

| Particular | Haryana | Jhajjar District | Matanhail Tehsil | Study Area |
|---------------------------------------|----------|------------------|------------------|------------|
| Area (in sq. kms.) | 44,212 | 1834 | - | - |
| Population | 25351462 | 958405 | 140273 | 116951 |
| Male | 13494734 | 514667 | 75468 | 62925 |
| Female | 11856728 | 443738 | 64805 | 54026 |
| Scheduled Tribes | 0 | 0 | 0 | 0 |
| Scheduled Castes | 5113615 | 170448 | 28872 | 23567 |
| Literacy (%) | 75.55 | 80.65 | 76.83 | 78 |
| Sex Ratio (Females per 1000 Males) | 879 | 862 | 859 | 896 |

Table - 3.24 Socio-Economic Profile of Study Area

Source: Census of India, 2011& Govt. of Haryana website

3.5.11.5 Baseline Data and Analysis

Baseline data was collected and analyzed by conducting a survey of the study area. Villages falling in the 10 km radius of plant site have been surveyed by proportional random sampling methods. The Socio-Economic Household Survey (SEHS) has been conducted by JMEPL team through questionnaires that have been designed to suit the subjects considering rural background enabling the population to furnish correct information and data to the extent possible. Further, secondary data was collected from Census of India data, Govt. offices/departments, Gram Panchayat and Aanganwadi etc.

The study area (buffer zone) was categorized on the basis of the distance of the villages from the plant site. Primary zone was identified from 0 to 3 km radius area, Secondary zone in 3 to 7 km and Outer zone in 7 to 10 km radius area from the plant site.

Information was collected from Stakeholders like Sarpanch, Gramsevak, Doctors, ANM, Aanganbadi karyakarta, school teachers etc. To ensure the accuracy of the primary data collected from the study areas, all village specific information was verified from the data of Census 2011 and

the secondary information collected from various government departments like health department, agriculture department, IMD etc.

3.5.11.6 Demographic Profile of the Study Area

The population as per 2011 Census records is 116,951 (for 10 km radius buffer zone). Total no. of household is 2713, 11231 and 9150 in primary, secondary and outer zone respectively. Sex ratio of 903, 889 and 895 (females per 1000 males) was observed in primary, secondary and outer zone respectively. SC population distribution is 2945, 11377 and 9245 in primary, secondary and outer zone respectively. There is no ST population in the study area. Average household size is 5.1. Demographic profile of study area is given in the **Table 3.25** below:

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| S. No. | Name | No. of Household | Total Population | Total Male Population | Total Female Population | Sex Ratio | SC Population | ST Population | Literacy Rate | Male Literacy Rate | Female Literacy Rate | Total Working Population | Main Worker | Marginal Worker | Non- Working Population |
|-----------|------------------------------|---------------------|---------------------|--------------------------|-------------------------------|--------------|------------------|------------------|------------------|--------------------------|----------------------------|--------------------------------|----------------|--------------------|-------------------------------|
| | | | | | | | 0 - | 3 km | | | | | | | |
| 1. | Jhanswa | 617 | 3170 | 1655 | 1515 | 915 | 583 | 0 | 78.09 | 89.70 | 65.64 | 1178 | 558 | 620 | 1992 |
| 2. | Jharli | 639 | 3346 | 1758 | 1588 | 903 | 1005 | 0 | 76.32 | 86.83 | 64.96 | 1056 | 881 | 175 | 2290 |
| 3. | Mohanbari | 261 | 1309 | 691 | 618 | 894 | 421 | 0 | 80.83 | 93.06 | 67.58 | 339 | 294 | 45 | 970 |
| 4. | Lilodh | 772 | 3646 | 1904 | 1742 | 915 | 618 | 0 | 79.57 | 91.15 | 67.57 | 1441 | 652 | 789 | 2205 |
| 5. | Sudhrana | 424 | 2153 | 1142 | 1011 | 885 | 318 | 0 | 77.97 | 90.13 | 64.44 | 979 | 795 | 184 | 1174 |
| | Sub-Total | 2713 | 13624 | 7150 | 6474 | 903 | 2945 | 0 | 78.56 | 90.17 | 66.04 | 4993 | 3180 | 1813 | 8631 |
| | | <u> </u> | <u>.</u> | 1 | <u> </u> | 1 | 3- | 7 km | | 1 | | <u>I</u> | 1 | <u>I</u> | 1 |
| 6. | Birar | 450 | 2200 | 1131 | 1069 | 945 | 253 | 0 | 79.40 | 89.78 | 68.54 | 589 | 462 | 127 | 1611 |
| 7. | Dhania | 287 | 1436 | 751 | 685 | 912 | 467 | 0 | 78.80 | 90.28 | 66.33 | 486 | 379 | 107 | 950 |
| 8. | Salhawas (Jhajjar) | 1165 | 5962 | 3097 | 2865 | 925 | 1244 | 0 | 76.09 | 86.92 | 64.36 | 1828 | 1531 | 297 | 4134 |
| 9. | Dhana | 279 | 1433 | 749 | 684 | 913 | 94 | 0 | 77.23 | 90.23 | 63.28 | 736 | 681 | 55 | 697 |
| 10. | Dhanirwas | 277 | 1454 | 762 | 692 | 908 | 642 | 0 | 72.12 | 80.79 | 62.79 | 604 | 575 | 29 | 850 |
| 11. | Jamalpur | 269 | 1368 | 705 | 663 | 940 | 153 | 0 | 74.33 | 84.58 | 63.91 | 422 | 374 | 48 | 946 |
| 12. | Ladain | 579 | 3040 | 1614 | 1426 | 884 | 695 | 0 | 79.63 | 89.92 | 68.24 | 995 | 918 | 77 | 2045 |
| 13. | Akehri Madanpur | 1030 | 5430 | 2901 | 2529 | 872 | 1144 | 0 | 73.70 | 84.14 | 62.21 | 2056 | 1499 | 557 | 3374 |
| 14. | Noganwa | 505 | 2761 | 1496 | 1265 | 846 | 783 | 0 | 71.12 | 79.33 | 61.42 | 783 | 555 | 228 | 1978 |
| 15. | Sasroli | 714 | 3946 | 2079 | 1867 | 898 | 878 | 0 | 74.09 | 83.56 | 63.54 | 1456 | 1282 | 174 | 2490 |
| 16. | Jhamri | 421 | 2334 | 1213 | 1121 | 924 | 129 | 0 | 77.28 | 88.92 | 64.69 | 895 | 492 | 403 | 1439 |
| 17. | Bazidpur Tappa Birohar | 47 | 255 | 139 | 116 | 835 | 0 | 0 | 79.28 | 94.96 | 61.17 | 105 | 64 | 41 | 150 |

Table - 3.25

Demographic Profile of the Study Area

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| S. No. | Name | No. of Household | Total Population | Total Male Population | Total Female Population | Sex Ratio | SC Population | ST Population | Literacy Rate | Male Literacy Rate | Female Literacy Rate | Total Working Population | Main Worker | Marginal Worker | Non- Working Population |
|-----------|----------------------|---------------------|---------------------|--------------------------|-------------------------------|--------------|------------------|------------------|------------------|--------------------------|----------------------------|--------------------------------|----------------|--------------------|-------------------------------|
| 18. | Goria | 881 | 4590 | 2449 | 2141 | 874 | 523 | 0 | 78.94 | 90.91 | 65.74 | 1852 | 912 | 940 | 2738 |
| 19. | Khanpur Khurd | 1726 | 7644 | 5461 | 2183 | 400 | 1009 | 0 | 81.06 | 86.91 | 65.66 | 4664 | 3888 | 776 | 2980 |
| 20. | Khanpur Kalan | 324 | 1620 | 849 | 771 | 908 | 216 | o | 77.77 | 88.63 | 66.08 | 738 | 454 | 284 | 882 |
| 21. | Khursaid Nagar | 179 | 885 | 471 | 414 | 879 | 0 | 0 | 78.44 | 89.45 | 66.67 | 374 | 207 | 167 | 511 |
| 22. | Jholri | 529 | 2691 | 1374 | 1317 | 959 | 1496 | 0 | 80.60 | 90.50 | 70.24 | 697 | 501 | 196 | 1994 |
| 23. | Bherangi | 337 | 1705 | 853 | 852 | 999 | 390 | 0 | 82.98 | 95.49 | 70.92 | 680 | 533 | 147 | 1025 |
| 24. | Kohard | 463 | 2200 | 1106 | 1094 | 989 | 402 | 0 | 81.44 | 92.80 | 70.59 | 1087 | 727 | 360 | 1113 |
| 25. | Judi | 583 | 2855 | 1458 | 1397 | 958 | 682 | 0 | 78.75 | 92.36 | 64.85 | 1051 | 956 | 95 | 1804 |
| 26. | Salhawas (Rewari) | 186 | 1139 | 598 | 541 | 905 | 177 | 0 | 69.99 | 85.60 | 52.37 | 441 | 205 | 236 | 698 |
| Sub- | total | 11231 | 56948 | 31256 | 25692 | 889 | 11377 | 0 | 77 | 88 | 65 | 22539 | 17195 | 5344 | 34409 |
| | | | - | | | | 7 - 1 | io km | | - | | | | | |
| 27. | Hamayunpur | 360 | 1743 | 931 | 812 | 872 | 330 | 0 | 76.78 | 87.11 | 65.33 | 707 | 437 | 270 | 1036 |
| 28. | Dhalanwas | 297 | 1628 | 910 | 718 | 789 | 467 | 0 | 68.40 | 79.98 | 53.77 | 609 | 355 | 254 | 1019 |
| 29 | Sundrehti | 536 | 2654 | 1411 | 1243 | 881 | 806 | 0 | 74.32 | 83.20 | 64.27 | 1016 | 965 | 51 | 1638 |
| 30 | Maliawas | 163 | 899 | 470 | 429 | 913 | 6 | 0 | 71.12 | 83.09 | 58.20 | 367 | 215 | 152 | 532 |
| 31. | Selanga | 591 | 3086 | 1635 | 1451 | 887 | 893 | 0 | 75.03 | 84.05 | 65.14 | 1012 | 510 | 502 | 2074 |
| 32. | Madalsahpur | 227 | 1097 | 564 | 533 | 945 | 120 | 0 | 78.50 | 89.69 | 67.02 | 421 | 294 | 127 | 676 |
| 33. | Ruriawas | 478 | 2518 | 1363 | 1155 | 847 | 482 | 0 | 74.57 | 83.42 | 64.48 | 693 | 577 | 116 | 1825 |
| 34 | Bhurawas | 730 | 3814 | 1998 | 1816 | 909 | 701 | 0 | 77.36 | 88.50 | 65.43 | 1781 | 1071 | 710 | 2033 |
| 35. | Amboli | 441 | 2355 | 1251 | 1104 | 882 | 437 | 0 | 75.09 | 83.87 | 65.09 | 1055 | 762 | 293 | 1300 |
| 36 | Khorra | 960 | 4710 | 2494 | 2216 | 889 | 597 | 0 | 75.97 | 86.98 | 63.70 | 1691 | 1155 | 536 | 3019 |
| 37. | Bahu | 1341 | 6995 | 3746 | 3249 | 867 | 1667 | 0 | 75.76 | 85.66 | 64.53 | 2139 | 1526 | 613 | 4856 |

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| S. No. | Name | No. of Household | Total Population | Total Male Population | Total Female Population | Sex Ratio | SC Population | ST Population | Literacy Rate | Male Literacy Rate | Female Literacy Rate | Total Working Population | Main Worker | Marginal Worker | Non- Working Population |
|-----------|-----------------|---------------------|---------------------|--------------------------|-------------------------------|--------------|------------------|------------------|------------------|--------------------------|----------------------------|--------------------------------|----------------|--------------------|-------------------------------|
| 38 | Khera Tharu | 132 | 664 | 346 | 318 | 919 | 8 | 0 | 79.15 | 90.37 | 67.25 | 304 | 160 | 144 | 360 |
| 39 | Mamtaz Pura | 226 | 1227 | 655 | 572 | 873 | 0 | 0 | 78.44 | 93.36 | 62.41 | 669 | 619 | 50 | 558 |
| 40 | Gujarwas | 241 | 1263 | 673 | 590 | 877 | 247 | 0 | 78.29 | 91.60 | 63.32 | 679 | 357 | 322 | 584 |
| 41. | Nahar | 1097 | 5272 | 2769 | 2503 | 904 | 1170 | 0 | 79.97 | 91.77 | 67.24 | 2066 | 1495 | 571 | 3206 |
| 42. | Jhal | 523 | 2659 | 1367 | 1292 | 945 | 642 | 0 | 78.81 | 89.33 | 68.09 | 663 | 585 | 78 | 1996 |
| 43 | Shadat Nagar | 459 | 2115 | 1064 | 1051 | 988 | 484 | 0 | 83.16 | 92.31 | 74.07 | 937 | 553 | 384 | 1178 |
| 44 | Nathera | 348 | 1680 | 872 | 808 | 927 | 188 | 0 | 82.86 | 97.11 | 67.91 | 743 | 347 | 396 | 937 |
| Sub- | Total | 9150 | 46379 | 24519 | 21860 | 895 | 9245 | 0 | 77 | 88 | 65 | 17552 | 11983 | 5569 | 28827 |
| Tota | 1 | 23094 | 116951 | 62925 | 54026 | 896 | 23567 | 0 | 78 | 89 | 65 | 45084 | 32358 | 12726 | 71867 |

Source: Census of India, 2011
3.5.11.7 Demographic Profile

The population as per 2011 Census records is 116951 (for 10 km radius buffer zone). **Table - 3.26** shows demographic profile of study area that total number of household is 2713, 11231 and 9150 in primary, secondary and outer zone respectively. Sex ratio of 903, 889 and 895 (females per 1000 males) was observed in primary, secondary and outer zone respectively. Average household size is 5.1.

| Zone | No. of Villages | Total Household | Total Population | Total Male Population | Total Female Population | Sex Ratio |
|---------------------------|--------------------|--------------------|---------------------|--------------------------|-------------------------------|-----------|
| Primary Zone (0 - 3 Km) | 5 | 2713 | 13624 | 7150 | 6474 | 903 |
| Secondary Zone (3 - 7 Km) | 21 | 11231 | 56948 | 31256 | 25692 | 889 |
| Outer Zone (7 - 10 Km) | 18 | 9150 | 46379 | 24519 | 21860 | 895 |
| Study Area (10 Km) | 44 | 23094 | 116951 | 62925 | 54026 | 896 |

 Table - 3.26

 Summary of Demographic Profile of the Study Area (Plant and Mine Site)

Source: Census of India, 2011



Figure - 3.10: Demography Profile of the study area

3.5.11.8 Vulnerable Group

While developing an action plan, it is very important to identify the population who fall under the marginalized and vulnerable groups and special attention has to be given towards these groups while making action plans. Special provisions should be made for them. In the observed villages, schedule caste (S.C.) population is 23567 (20.15%) and there is no Schedule Tribe population; 93384 (79.85%) of the population has been observed as Others.

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| Zone | No. of Villages | No. of Villages Total Total Household Population | | SC Population | ST Population | Others Population | |
|---------------------------|-----------------|--|--------|------------------|------------------|----------------------|--|
| Primary Zone (0 - 3 Km) | 5 | 2713 | 13624 | 2945 | 0 | 10679 | |
| Secondary Zone (3 - 7 Km) | 21 | 11231 | 56948 | 11377 | 0 | 45571 | |
| Outer Zone (5 - 10 Km) | 18 | 9150 | 46379 | 9245 | 0 | 37134 | |
| Study Area (10 Km) | 44 | 23094 | 116951 | 23567 | 0 | 93384 | |

Table - 3.27 SC/ST Population of the Study Area

Source: Census of India, 2011



Figure 3.11: SC / ST Population within 10 Km Study Area

3.5.11.9 Literacy Rate

Literacy Rate is the percentage of people in the area with the ability to read and write. The analysis of the literacy levels is done in the study area. The 10 km radius study area demonstrates a literacy rate of 77.57% as per census data.

The male literacy rate in the study area works out to be 88.80% whereas the female literacy rate, which is an important indicator for social change, is observed to be 65.27% in the study area as per the census data 2011. This indicates that there is a need to focus in sociological aspect in the region and enhance further development.

The distribution of literates and literacy rates in the observed village is given in Table- 3.28.

In the present study, the literacy rate is average level in the study area. Male and Female literacy rate of villages are varying place to place. Although Female literacy rate in the region is coming out low as compared to male. **Table - 3.28**

| | No. of | Total | No. of | No. of | Total | Male | Female |
|---------------------------|----------|------------|----------|----------|----------|----------|----------|
| Zone | NO. OI | Literate | Male | Female | Literacy | Literacy | Literacy |
| | villages | Population | Literate | Literate | Rate (%) | Rate (%) | Rate (%) |
| Primary Zone (o - 3 Km) | 5 | 9289 | 5510 | 3779 | 78.56 | 90.17 | 66.04 |
| Secondary Zone (3 - 7 Km) | 21 | 38772 | 24008 | 14764 | 77.29 | 88.38 | 64.93 |
| Outer Zone (5 - 10 Km) | 18 | 31064 | 18499 | 12565 | 76.87 | 87.85 | 64.85 |
| Study Area (10 Km) | 44 | 79125 | 48017 | 31108 | 77.57 | 88.80 | 65.27 |

Literacy Level of the Study Area

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Source: Census of India, 2011



3.5.11.10 Economic Activities

The economy of an area is defined by the occupational pattern and income level of the people in the area. The occupational structure of residents in the study area is studied with reference to work category. The population is divided occupation wise into three categories, viz., main workers, marginal workers and non-workers. The main workers include cultivators, agricultural laborers, those engaged in household industry and other services.

The marginal workers are those engaged in some work for a period of less than 180 days during the reference year. The non-workers include those engaged in unpaid household duties like, students, retired persons, dependents, beggars, vagrants etc. besides institutional inmates or all other non-workers who do not fall under the above categories.

| Zone | No. of Villages | Total Workers | Main Workers | Marginal Worker | Non Worker |
|---------------------------|--------------------|------------------|-----------------|--------------------|---------------|
| Primary Zone (0 - 3 Km) | 5 | 4993 | 3180 | 1813 | 8631 |
| Secondary Zone (3 - 7 Km) | 21 | 22539 | 17195 | 5344 | 34409 |
| Outer Zone (5 - 10 Km) | 18 | 17552 | 11983 | 5569 | 28827 |
| Study Area (10 Km) | 44 | 45084 | 32358 | 12726 | 71867 |

Table - 3.29 Working Population of the Study Area

Source: Census of India, 2011

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Figure - 3.13: Working Population of the Study Area

Work Forces of the Study Area

The above pie chart shows that the percentage of main working population, marginal working population and non-working population is 27.67%, 10.88% and 61.45% respectively in the surveyed villages. As per the analysis of all the villages the ratio of non-working population is more than working population.

3.5.11.11 Conclusion

The socio-economic condition of the study area assessed on the basis of surveyed villages and census data gives clear picture of its population, average household size, literacy rate, sex ratio etc. A part of population is suffering from the lack of permanent job to run their day to day life and get basic facility.

All villages have road connectivity and government bus facilities available. The area needs improvement in the basic needs such as transportation services, education and drinking water supply. In spite being educated up to secondary levels, people lack the understanding of keeping the clean vicinity. It is important for the project proponent to take action for developing proper sanitation facilities to keep the project area disease free. The infrastructure and amenities available in the area denotes the economic wellbeing of the region. The study area as a whole possesses average infrastructural facilities. The project would lead to direct and indirect employment opportunities. The unskilled and semi-skilled categories of labour are available from the nearby villages and towns. Further, many of the agricultural laborers are being attracted to take up the steady, round the year employment at industry site.

While people are happy with this project and the increase in employment opportunities, more attention and care should be taken so that the population get more exposure to modern facilities of education and development for a bright future.

Hence, the long-term positive impacts on socio-economic conditions of the area are anticipated. *Identification of Needs*

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During the survey the needs of the people were identified and as per their requirement they have

been enlisted below. It has been identified that Electricity, employment and other needs.

Table - 3.30

Need of the Area

| Needs | Details |
|-----------------------|---|
| Sanitation | Proper toilet facilities are required but common toilets will not work due to responsibility issues. Also, behavior modification and awareness regarding hygiene is a must. Toilets facility is required in these villages but for people with kuchha houses is mainly their concern. This should be coupled with awareness and behavior modification exercise for health and hygiene |
| | Low-income communities which do not have adequate sanitation facilities are exposed to a high risk of infection with Sanitation and hygiene related diseases. Children under the age of 3 are particularly susceptible to diarrheal diseases. There is an acute need for sanitation in poor areas. Sanitation is the key infrastructure component which is required to reduce the unacceptably heavy toll of Sanitation and bygiene related disease |
| Healthcare facilities | Healthcare facility like a permanent and regular dispensary with doctors and nurses for common ailments and deliveries is a requirement. It can be common to all the nearby villages. People spend huge amounts on treatment of ailments and there are no facilities in these villages. Ambulances can be run in the village on a regular basis so patients can be taken in emergencies. |
| | There is no healthcare facility in the vicinity and so a regular practicing doctor is needed along with a dispensary for minor illnesses and deliveries. People are completely dependent on unqualified doctors. These are basically quacks. |
| Drinking water | Water facility for each household will help the people during summers and reduce the inconvenience caused to them as they put in considerable time in fetching water. Also water for irrigation is required to improve the production in agriculture. |
| Livelihood options | People need livelihood options to raise income levels. This can be explored through SHGs and training programmes through proper market linkages. They have no option but to look for work each day. This is affecting their life in every possible way. SHGs, technical training is options that need to be explored to raise their income levels. Youth and female members can also be engaged in a big way to contribute to the family income. The dependent population is high here. So more livelihood or income generation options are required. Moreover old age pension schemes will give some financial support to the bread-earners as well. |
| Infrastructural needs | All the basic needs are required in these Villages ✓ Pucca roads ✓ Pucca houses ✓ Drinking water facility for each household ✓ Private toilets with water facility & sensitization about their use ✓ Transport to take patients to hospitals and students to school |
| Others | ✓ Awareness programme for villages. ✓ Cultural programme for community |

Recommendation and Suggestion

The village development plans are made in consultation with the community through Gram Sabah; these appear to address the needs of the community. However, it may be noted that at the implementation stage these plans often are fraught with problem of inadequate funds, lack of proper planning, corruption, vested interests and political agendas. Hence while ascertaining the scope for convergence with the government activities, care must be taken to ascertain realistic possibilities for implementation.

- Women empowerment– Home based income generation activities, vocational training programme, Common education centre for increase the literacy.
- Education free uniform, construction of common rooms and library, computer education and physical education, additional schools for girls, furniture and equipment in schools.
- Vocational Trainings establishment of a vocational training center within the villages with a curriculum designed to suit market demands. Vocational training for disabilitypersons.
- Agriculture/livestock –infrastructure such as agriculture electric connections, assistance with buying improved tools and equipment, capacity building, supply and/or knowledge of better variety of seeds, pasture land development and trainings on animal husbandry& facility of veterinary doctor.
- Health improvement in sanitary conditions of the villages, assistance with construction of latrines, improvement in drainage system, health camps and awareness campaigns for diseases like malaria, typhoid, tuberculosis, yellow fever and pneumonia. Repairing of PHCs and Aanganbadi centers.
- Persons with disability: Establishment of center for special education, sensitization of the community towards disabled and awareness on Govt.

3.5.12 CONCLUSION

The environment baseline study was conducted in the project area by both secondary data and primary data collections. Abiotic factors including air, water and soil were studied for the core and buffer zone.

It was found that most of the parameters were within the limits as per the Standards. Similarly, the study for the biotic factors was conducted. It can be concluded that the present environment status of the study area is good enough for the project activity. Adoption of adequate pollution control measures will protect the surrounding environment.



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CHAPTER - 4 ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

4.1 ENVIRONMENTAL IMPACT STUDY

The anticipated environmental impacts of the proposed project would be mainly due to the construction and operational activities. The environmental parameters likely to be affected are related to many factors, viz. physical, social, and economic, agriculture and aesthetic.

The industrial operations can disturb the environment in various ways, such as change in air, noise level; water and soil quality of that particular area. While for the purpose of development and economic up-liftment of people, there is need for establishment of industries, but these have to be environmental friendly. Therefore, it is essential to assess the impacts of proposed project on different environmental and socio-economic parameters; so that, abatement measures could be planned in advance for minimizing the impacts wherever feasible.

The likely impacts on different environmental parameters due to the proposed project are discussed below.

4.2 METHODOLOGY OF IMPACT ASSESSMENT

The impact assessment has been undertaken following a systematic process that identifies, predicts and evaluates the impacts the project could have on aspects of the physical, biological, social/ socio-economic and cultural environment, and identifies measures that the project will take to avoid, minimise/reduce, mitigate, offset or compensate for adverse impacts; and to enhance positive impacts where practicable. The stages of the impact assessment process comprise of the following:

- Impact identification: to identify the potential impact of the project on the various environmental parameters.
- Impact prediction: to determine what could potentially happen to resources/receptors as a consequence of the project and its associated activities.
- Impact evaluation: to evaluate the significance of the predicted impacts by considering their magnitude and likelihood of occurrence, and the sensitivity, value and/or importance of the affected resources/ receptors.
- Impact mitigation: to identify appropriate and justified measures to mitigate negative impacts and enhance positive impacts.

4.3 BASIS OF IMPACT ASSESSMENT

The impact of the proposed project would be assessed on the basis of their characteristics i.e. nature, type, extent, duration, intensity & frequency and its significance.

Characteristics of Impacts

The impact is described in terms of its characteristics such as nature, type etc. Impact characteristics are given in Table - 4.1.

| Characteristic | Classification | Description | | | | | | | | |
|----------------|----------------|---|--|--|--|--|--|--|--|--|
| Nature | Positive | When impact is considered to represent improvement to baseline or introduce a new positive factor/change. | | | | | | | | |
| | Negative | When impact is considered to represent adverse change from the baseline or introduce a new undesirable factor/change. | | | | | | | | |
| | Neutral | When there is no impact to represent any change from the baseline and not introducing any new factor/change. | | | | | | | | |
| Туре | Direct | Resulting from a direct interaction between a project activity and the receiving environment / receptors. | | | | | | | | |
| | Indirect | Resulting from other activities that happened as a consequence of the project. | | | | | | | | |
| | Cumulative | Impacts that act together with other impacts (including those from concurrent or planned future third party activities) to affect the same resources and/or receptors as the Project. | | | | | | | | |
| Extent | Project Area | When impact due to the project related activities is restricted within premises of project area i.e. core zone. | | | | | | | | |
| | Local | When impact due to the project related activities is restricted within the immediate surroundings i.e. upto 3 km radius. | | | | | | | | |
| | Zonal | When impact due to the project related activities is restricted within the study area i.e. up to 10 km radius. | | | | | | | | |
| | Regional | When an impact due to the project activity extends within as well as beyond 10 km radius. | | | | | | | | |
| Duration | Short - term | When the impact is usually temporary or last for a short time or will have an effect soon rather than in the distant future. | | | | | | | | |
| | Long- term | When impact would occur during the development of the project and either takes a long time or lasts a long time or cause a permanent change in the affected receptor/resource. | | | | | | | | |
| Intensity | Low | When resulting in slight changes of prevailing baseline conditions and quality of existing physical environment is good. Ecological environment as well as human receptors are not likely to be affected due to the proposed project activity. | | | | | | | | |
| | Medium | When resulting in changes of prevailing baseline conditions which are within the benchmark norms and quality of existing physical environment shows some signs of stress. Ecological environment as well as human receptors could be sensitive to change in quality of prevailing baseline condition, but human receptors retain an ability to adapt to change. | | | | | | | | |
| | High | When resulting in changes of prevailing baseline conditions which are exceeding the benchmark norms and quality of existing physical environment is already under stress. Ecological environment as well as human receptors would be impacted to the larger extent and the ability of human receptors to adapt to changes would be undermined. | | | | | | | | |

Table - 4.1

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| Characteristic | Classification | Description |
|----------------|-------------------|--|
| Frequency | Remote (R) | When resulting in remote or one off chance of an event due to an activity on a receptor/ resource. |
| | Occasional (O) | When an impact due to an activity is occurring intermittently from time to time on a receptor/resource. |
| | Periodic (P) | When an impact due to an activity is resulting on periodic basis for a week or a month on a resource/receptor. |
| | Continuous (C) | When an impact due to an activity is continuously resulting on a resource/receptor. |

Significance of Impacts

Impacts are described in terms of 'significance'. Significance is a function of the magnitude & sensitivity / importance of the impact.

Classification of impact significance is given in Table - 4.2.

| Significance of impact | | | | | | | | | | | | | | |
|------------------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| Significance | Description | | | | | | | | | | | | | |
| Insignificant | Vegligible impact or where a resource or receptor (including people) will not be affected n any way by a particular activity, or the predicted effect is deemed to be 'negligible' or imperceptible' or is indistinguishable from natural background variations. | | | | | | | | | | | | | |
| Minor | Where an effect will be experienced, but the impact is well within accepted standards/guidelines with or without mitigation. | | | | | | | | | | | | | |
| Moderate | Where an effect will be experienced and the impact is within accepted standards/guidelines with mitigation. | | | | | | | | | | | | | |
| Major | Impact where an accepted limit or standard may be exceeded or the impact occurs to the highly valued/sensitive resource/receptors. | | | | | | | | | | | | | |

Table - 4.2 Significance of Impact

Irreversible and Irretrievable commitments of environmental components

Determining the irreversible and irretrievable commitment of the resources is one of the major stages of impact evaluation, which gives an understanding about the potential impacts that are likely to affect future generations of the area and facilitates for adoption of proper mitigation measure regarding the same.

| Table - 4.3 |
|--|
| Irreversible and Irretrievable commitments of environmental components |

| Commitment of resources | Description |
|-------------------------|--|
| Irreversible | Irreversible commitment of resources refers to the impact or loss of the resources |
| | that cannot be recovered or reversed. Irreversible is a term that describes the loss |
| | of future options. It applies primarily to the impacts of use of nonrenewable |
| | resources or to those factors that are renewable only over long periods of time. |
| Irretrievable | Irretrievable is a term that applies to the loss of production, harvest, or use of |
| | natural resources. Irretrievable commitment of resources may be considered as the |
| | loss of resources as a result of change (both reversible & irreversible) due to any |
| | project activity that cannot be regained or recovered. |

4.4 INTERACTION MATRIX

The interaction matrix enables a methodical identification of the potential interactions each project activity may have on the range of resources/receptors within the Area of Influence for the Project.

The interaction matrix for the project activities and likely impacted resources/receptors is presented in Table - 4.4 which covers potential interactions, regardless of probability of occurrence. The matrix consists of a list of resources/ receptors that could be affected against a list of project activities.

Entries in the matrix cells are tick marked to indicate whether:

- An interaction is not reasonably expected (blank);
- > The interaction is reasonably possible and may lead to potential impact (tick marked).

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| | Project Activity | Pre | -constru Phase | uction | | Cons | truction | Phase | 2 | | | | Operat | ion Ph | ase | | _ | Miscella | ineous |
|-----------|--|------------------|-------------------|--|--|----------------------------|-----------------------------------|------------------------|-----------------------------------|--|---|--|------------------|----------------|---------------------------|----------------------|------------------|---|-----------------------|
| S. No. | Likely Impacted Resources / Receptors | Land Acquisition | Site Clearing | Site preparation / Change in Topography | Givil works such as earth moving and building structures including temporary structures | Heavy Equipment operations | Disposal of construction waste | Generation of Sewerage | Influx of construction workers | Transportation of construction material | Raw Material transportation, storage and handling | Crushing of coal, storage, and handling/stock pilling | Grinding process | Kiln operation | Operation of power source | Abstraction of water | Waste management | CER & CSR activities carried out by company | Greenbelt Development |
| Α. | Physical | | | | | | | | 1 | | L . | 1 | 1 | | 1 | 1 | r | 1 | |
| 1. | Air | | √ | | √ | √ | | | | √ | √ | | √ | | | | | | |
| 2. | Noise & / Vibration | | | | V | 1 | | | | \checkmark | V | | V | | | | | | |
| 3. | Land Use | √ | | | | | | | | | | | | | | | | | |
| 4. | Topography | | | √ | | | | | | | | | | | | | | | |
| 5. | Geology | | | | | | | | | | | | | | | | | | |
| 6. | Drainage Pattern | | | √ | √ | | | | | | | | | | | | | | |
| 7۰ | Surface Water | | | | | | | | | | | | | | | | | | |
| 8. | Ground Water | | | | | | | | | | | | | | | √ | | | |
| 9. | Soil | | V | V | \checkmark | | \checkmark | | | | V | | | | | | √ | | |
| В. | Biological | - | | - | - | | | | | | - | - | | | | | | - | |
| 1. | Flora | | 1 | 1 | | | √ | | | | 1 | | | | | | 1 | | 1 |
| 2. | Fauna | | √ | | | | | | 1 | | √ | | | | | | √ ∖ | | √ \ |
| 3. | NP/WLS/BR/reserves/Forests etc. | | | | | | | | | | | | | | | | | | |
| С. | Social / Socio-Economic | | | | | | | | | | | | | | - | - | - | | |
| 1. | Demography | | | | | | | | \checkmark | | | | | | | | | | |

Table - 4.4 Interaction Matrix

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| | Project Activity | Pre | construe Phase | ction | | Cons | truction | Phase | • | | | 1 | Operat | ion Ph | ase | | | Miscella | neous |
|-----------|--|------------------|-------------------|--|--|----------------------------|-----------------------------------|------------------------|-----------------------------------|--|---|--|------------------|----------------|---------------------------|---------------------------|--------------------------------------|---|-----------------------|
| S. No. | Likely Impacted Resources / Receptors | Land Acquisition | Site Clearing | Site preparation / Change in Topography | Civil works such as earth moving and building structures including temporary structures | Heavy Equipment operations | Disposal of construction waste | Generation of Sewerage | Influx of construction workers | Transportation of construction material | Raw Material transportation, storage and handling | Crushing of coal, storage, and handling/stock pilling | Grinding process | Kiln operation | Operation of power source | Abstraction of water | Waste management | CER & CSR activities carried out by company | Greenbelt Development |
| 2. | Physical Displacement | | | | | | | | | | | | | | | | | | |
| 3. | Land Use (w.r.t. Population influx) | | | | | | | | V | | | | | | | | | | |
| 4. | Habitation | | | | | | | | | | | | | | | | | | |
| 5۰ | Economy & Livelihood | √ | | | | | | | √ | | √ | | | | | | √ | √ | |
| 6. | Social & Cultural Structure | √ | | | | | | | √ | | | | | | | | | √ | |
| 7۰ | Infrastructure & Public Services | √ | | | √ | | | | √ | | | | | | | | | √ _ | |
| 8. | Public Health | | | | | | √ | √ | | | | | √ | | | | √ | √ √ | |
| 9. | Education | | | | | | | | | | | | | | | | | √ | |
| 10. | Agriculture | √ | | | | | | | | | | | | | | | | | |
| 11. | Transport Infrastructure | | | | | | | | \checkmark | 1 | \checkmark | | | | | | | | |
| D. | Occupational Health | 1 | | | | | | | | 1 | | T | | | 1 | | | T | |
| 1. | Injury | | | | | \checkmark | | | | √ | √ | | V | | | | | | |
| 2. | Health | | | | | | \checkmark | \checkmark | | | V | | √ | | | | | | |
| 3. | Non - routine risk | | | | | V | | | | | V | | √ | | | | V | | |
| | Legends | | | Show no interactions is reasonably | | | | | | | V | | | | Show with | interac one of t po | tions rea he outco otential ir | sonably po mes may le npact | ssible ad to |

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According to the interactions identified between project activities and resource/receptors as described in the above table, it is evident that the following aspects are likely to have impact due to the proposed project (**Table: 4.5**) and therefore, to be considered for Impact Assessment:

| S. No. | Likely Im | Likely Impacted Resources / Receptors | | | | |
|--------|----------------------------|---------------------------------------|--|--|--|--|
| Α. | Physical | Air Quality | | | | |
| | | Noise Level | | | | |
| | | Soil Environment | | | | |
| | | Topography | | | | |
| | | Drainage Pattern | | | | |
| В. | Biological environment | Flora | | | | |
| | | Fauna | | | | |
| с. | Socio economic environment | Demography | | | | |
| | | Land use (w.r.t. population influx) | | | | |
| | | Economy & Livelihood | | | | |
| | | Social & Cultural Structure | | | | |
| | | Infrastructure & Public Services | | | | |
| | | Public Health | | | | |
| | | Education | | | | |
| | | Transport Infrastructure | | | | |
| D. | Occupation Health & Safety | Injury | | | | |
| | | Health | | | | |
| | | Non-Routine Risk | | | | |

| Table - 4.5 | | | | |
|---------------------------------------|--|--|--|--|
| Likely Impacted Resources / Receptors | | | | |

Source: Interaction Matrix

The impact of proposed project related activities on various environmental parameters were assessed and are given below:

4.5

ANTICIPATED IMPACT ON TOPOGRAPHY & LAND USE PATTERN AND MITIGATION MEASURES

80 Anticipated Impacts

There will be significant impact / change in topography and land use pattern of the area due to proposed project.

- Topography of the site is generally flat with an elevation of 221 225 m. During construction phase, some level of cutting and filling will need to be done to maintain an even topography within the project area. No change is envisaged.
- The present land use of the proposed site is agricultural; proposed project will change the land use to Industrial permanently.

Impact Evaluation

Impact Evaluation is given in table below:

Impact Evaluation Element Change in the existing land use due to proposed project New proposed project will lead potential changes in land use from agricultural to Potential Effect / Concern Industrial Characteristics of Impacts Positive Negative Neutral Nature V Direct Indirect Cumulative Type V **Project** Area Local Zonal Regional Extent v Short - term Long-term Duration v Low Medium High Intensity V Periodic (P) Remote (R) Occasional (O) Continuous (C) Frequency V Significance of Impact Insignificant Minor Moderate Major Significance V

Impact Evaluation for Change in Land Use Pattern

4.6 ANTICIPATED IMPACT ON AIR QUALITY AND MITIGATION MEASURES

Construction Phase

∞ Anticipated Impacts

Increase in dust and NO_x concentration due to Leveling activity and Heavy vehicular movement.

- The main sources of dust emission are the movement of equipment at site, leveling, grading, earthwork and foundation works.
- Exhaust emissions from vehicles and equipment to be deployed during the construction phase is also likely to result in marginal increase in the levels of SO₂, NO_x, PM, CO and unburnt hydrocarbons.

The impact will be for short duration. This will be confined within the plant boundary and is expected to be negligible outside the plant boundary. The impact will, however, be reversible, marginal and temporary in nature.

80 Mitigation Measures

- Sprinkling of water on construction site and on unpaved roads.
- Development of sufficient vegetation.
- Construction equipment having PUC certificate will be deployed during the activity to restrict exhaust emission.
- Proper upkeep and maintenance of vehicles.

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In addition to above, dust will also be generated from stockpiles of construction material (aggregates and sand). To prevent this, stockpiles will be aligned properly with slopes stabilized and max. height will be maintained.

Operation Phase

∞ Anticipated Impacts

Increase in concentration of Fugitive emissions and Stack emissions (PM).

- The operational phase of the proposed project comprises of various activities and each of them will impact the air quality due to:
 - ∞ Fugitive emissions
 - ∞ Stack emissions
 - (A) Fugitive Emissions

Fugitive emissions in Grinding Unit are due to various process and non-process related activities which are given below:

- Process related activities
 - ✓ Material Handling and Transfer
 - Loading and unloading operation of raw material and finished product
 - Transfer operations (Transfer Points)
 - \circ Silos Vent
 - ✓ Milling Operations
 - Primary and Secondary crushing of gypsum
 - Grinding of clinker, fly ash and Gypsum
- Non-process related activities
 - ✓ Vehicular Traffic
 - Movement of raw material and finished product by trucks / trailer from main gate to designated place inside the plant and vice-versa
 - Movement of personnel vehicles
 - ✓ Material Storage
 - Material (e.g. gypsum) stored in covered yard

80 Mitigation Measures

Adequate pollution control measures will be taken to keep the fugitive emissions from all sources within the statutory norms, brief of which are given below:

- The crushed gypsum from gypsum crusher will be transported through covered conveyor belt.
- Water spray nozzles will be provided over the conveyor belt.
- Bag filters will be installed at all material transfer points.
- Sprinkling of water on roads will be done.
- Regular cleaning and sweeping of roads, near-by area of storage yard etc. will be done

Details on fugitive emission control measures are given in Chapter - 10 of this EIA / EMP Report.

A) Stack Emissions

In a Grinding unit, the major emission from stack is Particulate Matter (PM) emissions. In addition, gaseous pollutants (SO₂, NO_x and CO) are also anticipated from vehicular emissions only.

80 Mitigation Measures

- Efficient Air Pollution Control Equipment (APCE) like Bag House / Bag Filter will be installed at Cement Mill and transfer points to keep the emissions within the permissible limits.
- Vehicles and machineries will be regularly maintained. Proper upkeep and maintenance of vehicles will be done.

Hence, the overall quality of the ambient air will be maintained within the limit prescribed by CPCB / HSPCB after the commencement of the operation of proposed project.

4.6.1 Air Quality Predictions through Mathematical Modeling

For obtaining quantitative value of impacts, modelling for air environment is carried out. Mathematical modelling is an established and accepted technique to predict the impacts. In this section, impact on air environment due to emissions to be generated from the proposed project has been assessed.

Prediction of impacts on air environment has been carried out employing mathematical model based on a steady state Gaussian plume dispersion model designed for multiple point sources for short term. In the present case, AERMOD version 8.2 dispersion model based on steady state Gaussian plume dispersion, designed for multiple sources and developed by United States Environmental Protection Agency [USEPA] has been used for simulations from Industrial sources. The concentrations have been predicted in all directions covering all types of weather conditions. Spatial distributions of all the pollutants are also presented in the form of Isopleths.

4.6.1.1 Pollutants/Model Options Considered for Computations

The model simulations deal with major pollutant Particulate Matter (PM) emitted from the proposed activity.

4.6.1.2 Model Options Used for Computations

The options used for short-term computations in AEROMOD are:

- The plume rise is estimated by Briggs formulae, but the final rise is always limited to that of the mixing layer;
- >>>> Stack tip down-wash is not considered;
- Buoyancy Induced Dispersion is used to describe the increase in plume dispersion during the ascension phase;
- ∞ Calms processing routine is used by default;
- >>> Wind profile exponents is used by default, 'Irwin';
- >>>> Flat terrain is used for computations;
- It is assumed that the pollutants do not undergo any physio-chemical transformation and that there is no pollutant removal by dry deposition;
- 80 Washout by rain is not considered;

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- to Cartesian co-ordinate system has been used for computations; and
- 👏 The model computations have been done for total 20 km with 500-m interval.

4.6.1.3 Model Input Data

a) Meteorological Data

Meteorological inputs required are Temperature, Relative Humidity, Wind Speed and Wind Direction etc. which was recorded at site during Summer Season (March to May, 2019). Hourly Meteorological Data has been enclosed as **Annexure - 4** along with this EIA / EMP Report.

b) Stack Emissions

Stack emission details are given in Table - 4.6.

| Stack attached to | Height | | Emission rate | Temp. | | Exhaust Gas | | | |
|--------------------------|------------------------|-----------------------|---------------|--------------------------|---------------------|---------------|----------|-------------------|-----------------|
| | from Internal | of | | of Exit | | Density | Specific | Volumetric | |
| | ground level (m) | Diameter (Top) (m) | (gm/sec) | Exhaust Gases (°C) | Velocity (m/sec) | Temp. (°C) | (kg/Nm³) | Heat (kj/kg°C) | Flow (m³/hr) |
| Cement Mill Bag House | 55 | 3.2 | 2.7 | 100 | 15.28 | 100 | 1.29 | 8.2 | 337679 |

Table - 4.6 Proposed Stack Emission Details

c) Vehicular transportation

- ✓ Width of Roads
- ✓ Additional number of trucks 779 (Inward & Outward)
- ✓ Truck details (such as width 2.5 m, height 3.1 m, length 6.8 m, capacity 40 Tonnes) etc.
- Existing value has been covered in the Background Ambient Air Quality Monitoring Emission rate for the pollutants has been calculated based on following equation:

```
E = A EF Deterioration factor * no. of vehicles / day
```

where,

- E = Emission rate of each pollutant (expressed as gm /day or TPD)
- A = velocity of vehicle in m3/sec. (60 km/hr. for the project)
- EF = Emission factor for the vehicles
- Source: CPCB National Summary Report, 2010

4.6.1.4 Modeling Procedure

Prediction of ground level concentrations (GLC's) due to proposed project has been made by AERMOD version 8.2 as per CPCB guidelines. It is US-EPA approved model to predict the air quality. The model uses rural dispersion and regulatory defaults options as per guidelines on air quality models (PROBES/70/1997-1998). For this study, uniform polar receptors on flat terrain have been assumed.

4.6.1.5 Presentation of Results

In the present case, model simulations have been carried using the hourly Triple Joint Frequency data. Short-term simulations were carried to estimate concentrations at the receptors to obtain an optimum description of variations in concentrations over the site in 10 km radius covering 16 directions.

The incremental concentrations are estimated for the monitoring period. For each time scale, i.e. for 24 hr the model computes the highest concentrations observed during the period over all the measurement points.

Existing value has been covered in the Background Ambient Air Quality Monitoring.

Table - 4.7

Peak Incremental Concentration of Particulate Matter due to Proposed Project (including transportation)

| S. No. | Scenarios | PM Concentration (µg/m³) |
|--------|---|-----------------------------|
| 1. | Max. Monitored Baseline Concentration | 88.4 |
| 2. | Predicted incremental Maximum Concentration | 0.10 |
| 3. | Resultant Maximum Concentration | 88.5 |
| 4. | NAAQS (dated Nov., 2009) | 100 |

For Particulate Matter, maximum GLC for Proposed Grinding Unit is found to be 0.10 µg/m3 at 6.94 km away in SSW direction from the project boundary (**Figure 4.1**).

The maximum GLCs after implementation of the proposed project are very much likely to be within the prescribed NAAQ standards.

Proper mitigation plan for dust control will be implemented in the plant premises. The Isopleth showing the incremental GLCs of PM is given in figure no. 4.1.



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Figure 4.1: Isopleth showing the incremental GLCs of PM

Impact Evaluation

Ambient Air Quality monitoring results are given in Chapter - 3 of this Final EIA/EMP report. From this it is evident that AAQ results are well within the prescribed norms. Impact evaluation is given in table below.

| Impact Evaluation Element | Change in Air Quality due to Proposed Project | | | | | |
|----------------------------|--|----------------|--------------|----------------|--|--|
| Potential Effect/ Concern | Impact on health of humans and nearby biological/ecological receptors due to point sources of air emissions including fugitive emissions due to proposed | | | | | |
| | project. | | | | | |
| Characteristics of Impacts | | | | | | |
| Naturo | Posi | tive | Negative | Neutral | | |
| inature | | | √ | | | |
| Tuno | Direct | Indirect | Cumulative | | | |
| Туре | √ | | | | | |
| Extent | Project Area | Local | Zonal | Regional | | |
| EXTERN | | | √ | | | |
| Duration | Short - | term | Long- term | | | |
| Duration | | | ٧ | / | | |
| Intoncity | Low | | Medium | High | | |
| intensity | | | √ | | | |
| Freedomen | Remote (R) | Occasional (O) | Periodic (P) | Continuous (C) | | |
| Frequency | | | | √ √ | | |
| Significance of Impact | | | | | | |
| Significanco | Insignificant | Minor | Moderate | Major | | |
| Significance | | | √ | | | |

4.7 ANTICIPATED IMPACT ON NOISE ENVIRONMENT AND MITIGATION MEASURES

Construction Phase

80 Anticipated Impacts

Increase in noise level due to construction equipment.

- During construction phase, noise will be generated due to following activities / processes:
 - Movement /operation of transport and construction vehicles / equipment
 - Transportation of equipment, materials and people
 - Other important activities involved in construction stage such as excavation, earthmoving, compaction, concrete mixing, crane operation, steel erection, mechanical /electrical installation
 - Piling work during laying down of foundation for infrastructure

The noise generation during construction phase will be temporary and will be limited to the plant site.

® Mitigation Measures

- Equipment will be kept in good condition to keep the noise level within 90 dB(A).
- Workers will be provided necessary protective equipment e.g. ear plugs, earmuffs.

Operation Phase

- Increase in noise level within the plant area
- For proposed project, installation of equipment/ machinery will be with low generation of noise as per design and also, will be housed in insulated ceiling. Therefore, noise level of the surrounding area will not increase significantly. Following noise abatement measures will be taken:
 - Persons working just close to machine and machine operators will be provided with personal protective equipment viz. Ear plugs / Ear muffs etc.
 - Proper maintenance, oiling and greasing of machines at regular intervals will be done to reduce generation of noise.
 - Greenbelt of appropriate width at the plant boundary will be developed.
 - Regular monitoring of noise level will be carried out and corrective measures in concerned machinery will be adopted accordingly.

Impact Evaluation

Ambient Noise Level monitoring results are given in Chapter - 3 of this Final EIA/EMP report. From this, it is evident that results are well within the prescribed norms. Impact evaluation is given in table below.

| Impact Evaluation Element | Change in Noise Level due to the proposed project | | | | | |
|----------------------------|---|----------------|--------------|----------------|--|--|
| Potential Effect/ Concern | Impact on health of humans and biological factors/receptors due to noise generated due to the proposed project during day and night time and also on occupational health of the workers exposed to noise. | | | | | |
| Characteristics of Impacts | | | | | | |
| Naturo | Posit | ive | Negative | Neutral | | |
| Nature | | | √ | | | |
| Turne | Direct | Indirect | Cumu | lative | | |
| Туре | √ | | | | | |
| Evtopt | Project Area | Local | Zonal | Regional | | |
| Extent | √ | | | | | |
| Duration | Short - | term | Long- term | | | |
| Duration | v | / | | | | |
| Intonsity | Low | | Medium | High | | |
| intensity | | | \checkmark | | | |
| Frequency | Remote (R) | Occasional (O) | Periodic (P) | Continuous (C) | | |
| requercy | | | | √ | | |
| Significance of Impact | | | | | | |
| Significanco | Insignificant | Minor | Moderate | Major | | |
| Significance | | | √ | | | |

Impact Evaluation for Ambient Noise Level

4.8 ANTICIPATED IMPACT ON WATER QUALITY AND MITIGATION MEASURES

Construction Phase

- **80** Anticipated Impacts
- Nominal quantity of water will be used during construction period. The peak hourly demand during the construction, stagnant pools of water would promote breeding of mosquitoes and generally create unsanitary conditions. however, adequate arrangements will be made to ensure proper drainage of waste water from the construction site, so that water do not from stagnant pools no aggravate soil erosion.
- The wastewater during construction will contain only suspended impurities. The water would pass through settlement ponds and recycled for use in gardening and other non consumption activities.

80 Mitigation Measures

- The waste water will be taken to soak pit and septic tank.
- Storm water drains will be made immediately after starting construction activity. The drains will be properly aligned in conformity with the site drainage pattern so that the alteration is kept to the minimum and flooding or soil erosion does not occur.
- Sedimentation pits will be provided at appropriate location to trap the silt laden runoff water and prevent excessive silt from going outside. The storm water drains will be diverted to a water reservoir to collect the runoff. This stored water will be utilized for civil construction purpose.

Operation Phase

- Total water requirement for the proposed project will be 550 KLD (Phase I: 300 KLD & Phase - II: 250 KLD) which will be sourced from Ground Water.
- Approx. 12 KLD domestic waste water will be generated; which will be treated in STP and the treated water (10 KLD) will be utilized for greenbelt development / plantations and dust suppression.
- No waste water will be discharged outside the plant premises. Therefore, operation of proposed grinding unit will not pose any adverse impact on the ground water resources of the area.
- Rain water harvesting will be practiced inside the plant premises. Regular monitoring of water quality will be carried out. Training and awareness programmes on water conservation measures will also be organized for the locals.

Impact Evaluation

Impact evaluation is given in table below.

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Impact Evaluation for Water Environment

| Impact Evaluation Element | No change in the water environment due to proposed project. | | | | | |
|----------------------------|---|-------|----------|---------|--|--|
| Potential Effect/ Concern | No effect envisaged. | | | | | |
| Characteristics of Impacts | | | | | | |
| Natura | Positive | | Negative | Neutral | | |
| Nature | | | | √ | | |
| Significance of Impact | | | | | | |
| Significance | Insignificant | Minor | Moderate | Major | | |
| | √ | | | | | |

4.9 ANTICIPATED IMPACT ON SOIL QUALITY AND MITIGATION MEASURES

Construction Phase

- During construction activity, the impact on soil will be limited to the construction site only.
 Impact on soil during construction would be mainly due to the left out of construction material used.
- Careful design, planning and good site management would minimize wastage of materials such as concrete, mortars and cement grouts. Construction wastes will be segregated as much as possible at site itself to increase the feasibility of recycling concrete and masonry as filling material and steel pieces as saleable scrap.

Litter disposal and collection points will be established around the work sites. Empty packaging materials, drums, glass, tin, paper, plastic, pet bottles, wood, thermocol and other packaging materials, etc. will be disposed through recyclers (locally called *kabadis*). The construction spoils will be temporarily stored at designated dumpsite located inside the plant premises.

Operation Phase

- The soil of the area may get affected due to operational activities, if proper care is not taken.
 Degradation of soil quality due to settling of air borne dust
 - i) Changes in soil texture due to settling of air borne dust or due to wash off of solid particulates by surface or ground water. This will lead to change in porosity, permeability and other physical characteristics of soil of the area.
 - ii) Changes in soil chemistry due to addition of foreign material from polluted air and water due to unit activities in the area.
- Mitigation measures include: Efficient Air Pollution Control Equipment (APCE) like Bag House will be installed at major stacks of grinding unit to keep the emissions within 30 mg/Nm³. Adequate stack height helps to control dust emissions. No waste water will be discharged outside the plant premises.

A horticulturist has been engaged who ensures soil quality improvement in the plant area, by adequate manuring and fertilizing. Therefore, no adverse impact on the soil quality of the area is anticipated.

Besides, soil samples will be collected and tested at regular intervals from the nearby areas. This helps in mitigation of any harmful impact on soil due to the project activity, if any.

Impact Evaluation

Impact evaluation is given in table below.

Impact Evaluation for Soil Environment

| Impact Evaluation Element | Change in soil texture & soil chemistry | | | | | | |
|----------------------------|--|----------------|--------------|----------------|--|--|--|
| Potential Effect/ Concern | Impact on soil quality of nearby areas due to generation & settling of air borne dust due to proposed project. | | | | | | |
| Characteristics of Impacts | | | | | | | |
| Naturo | Posit | ive | Negative | Neutral | | | |
| inature | | | \checkmark | | | | |
| Tupo | Direct | Indirect | Cumula | tive | | | |
| туре | 1 | | | | | | |
| Extent | Project Area | Local | Zonal | Regional | | | |
| Extent | | √ | | | | | |
| Duration | Short - | term | Long- term | | | | |
| Duration | | | √ | | | | |
| Intensity | Low | | Medium | High | | | |
| intensity | | | √ | | | | |
| Frequency | Remote (R) | Occasional (O) | Periodic (P) | Continuous (C) | | | |
| riequency | | | | √ | | | |
| Significance of Impact | | | | | | | |
| Significanco | Insignificant | Minor | Moderate | Major | | | |
| Significative | | | √ | | | | |

4.10 ANTICIPATED IMPACT ON BIOLOGICAL ENVIRONMENT AND MITIGATION MEASURES

There are no direct or indirect evidence of presence of any major wildlife in the core and buffer areas of the project. There is no National Park, Wildlife Sanctuary, Biosphere Reserves (existing as well as) in the study area except one Wildlife Sanctuary (Nahar Wildlife Sanctuary) and two Reserve Forest (Bir Sarkar RF & Nahar RF) within 10 km radius of the project area.

There may be an impact on the biological environment of the area during construction phase & operation of Clinker Grinding Unit, if proper care will not be taken:

- Particulate matter emissions from stack and fugitive emissions due to transportation activity & material handling may degrade the soil quality of surrounding environment that may affect the biodiversity of surrounding environment.
- ii) Particulate matter emission may cause migration of wild animals and bird from the vicinity of Project area.

iii) Fugitive emissions (dust) may impact nearby terrestrial flora. The settlement of dust on the laminar surface of plants can impede the efficiency of photo-transduction and thereby, affect the productivity of plants. In some of the plant, it may also smother the leaf surface blocking stomata, resulting in reduced transpiration.

However, the proposed project will have no significant impact on surrounding ecology and biodiversity as following mitigative measures will be adopted by Wonder Cement Limited:

- » Scaling up the greenbelt development and plantation in and around the Plant site.
- >>> Use of water sprinkler on the haul road to control fugitive emissions in the surrounding environment.
- ∞ Using paved roads for transportation to minimize fugitive emissions.
- » Transporting material in close truck and storing it under tarpaulin cover.
- Transport vehicles and machinery will be properly maintained and periodically checked for pollution level to reduce noise and gaseous emission in the surrounding environment.

Impact Evaluation

Impact evaluation is given in table below.

Impact Evaluation for Biological Resources

| Impact Evaluation Element Change in the biological resources of the area due to proposed project operation | | | | | | | |
|--|--|----------------|--------------|----------------|--|--|--|
| impact Evaluation Element | and generation of emissions | | | | | | |
| Potential Effect/ Concern | Loss of habitat, Impact on health of biological receptors due to area and line sources of air emissions including fugitive dust emissions during operation activities. | | | | | | |
| Characteristics of Impacts | | | | | | | |
| Nature | Posi | tive | Negative | Neutral | | | |
| ivacui e | | | √ | | | | |
| Туре | Direct | Indirect | Cumulative | | | | |
| | √ | | | | | | |
| Evtont | Project Area | Local | Zonal | Regional | | | |
| Extent | | √ | | | | | |
| Duration | Short - | term | Long- term | | | | |
| Duration | | | · √ | | | | |
| Intonsity | Low | | Medium | High | | | |
| intensity | · √ | | | | | | |
| Freedoment | Remote (R) | Occasional (O) | Periodic (P) | Continuous (C) | | | |
| riequency | | | | √ | | | |
| Significance of Impact | | | | | | | |
| Significanco | Insignificant | Minor | Moderate | Major | | | |
| Significance | √ | | | | | | |

4.11 ANTICIPATED IMPACT ON SOCIO-ECONOMIC ENVIRONMENT AND MITIGATION MEASURES

Construction Phase

80 Anticipated Impacts

• Impact of the project will be beneficial as it will cause overall development of the area in

respect of the infrastructure development, educational growth, health facilities etc.

- About 500 nos. of people will get employment during the construction stage on daily average basis. Local people will be given preference for employment on the basis of their skill and experience.
- The project will result in growth of the surrounding areas by increased direct and indirect employment opportunities in the region including ancillary development and supporting infrastructure.
- Further, the project will also lead to the development of market, trade centers, activities etc.

Operation Phase

Project potential impacts on socio-economic environment are summarized below and categorized either as positive / beneficial or negative / adverse impacts.

Positive impacts

ະ Employment

Employment opportunities will be created by Wonder Cement Limited during planning and preparation, construction and operational phases of the project and it will provide a sustainable and safe working environment for workers.

80 Community Skills Development

The employees will be benefited from the training programmes that are instituted by Wonder Cement Limited to enable the community labour force to work in different areas of production.

80 Improved Standards of Living

Employment opportunities created by the project will increase income and therefore improve the overall standards of living in the area.

80 Community Organizational Capacity Development

Through engagement of community members in development structures such as Community Development Committees, the community organizational capacity will be developed.

>>> Improved Water Supply

Supply of safe water for the community by Wonder Cement Limited will improve health standards and living conditions in the villages.

80 Economic Exposure and Development

Implementation of the project will make financial institutions as well as related economic facilities, infrastructure and services available to the people. This will expose and introduce the local population to factors of economic development including the banking system, financial services, and credit and investment schemes.

In order to maximize the project's positive impacts during the construction phase, it is that local and national workers be used as much as possible and also, whenever possible, local companies to supply the construction materials, therefore stimulating the job market and the local economic activities.

Adverse Social Impacts

∞ Health Impacts

The project has the potential for triggering health impacts through air pollutants from heavy vehicles, increased dust, creation of breeding grounds for disease vectors, population influx which might introduce new diseases in the area, and inadequate sanitation facilities.

🔊 Livelihood change

Due to the labour intensity of the manufacturing sector, the project will attract the more able-bodied persons from the community which in turn will lead to low labor availability in other sectors of the economy including agricultural, education and health skilled workers. Local employment opportunities will be created by the project. This impact will not be significant due to low level of education and skills in the area which will result in sourcing skilled workforce from outside the immediate area. But the magnitude of this impact will be high due to high number of dependents in a household.

Mitigation Measures

Nitigating Health Impacts

An awareness programme on health hazards can be implemented to safeguard the employees as well as the local population health. M/s. Wonder Cement Limited also provide assistance, in conjunction with government, to the medical service for the villages. This way, the health issues can be monitored and addressed.

80 Managing Loss of Livelihood and Income

To cushion the population against impacts of manufacturing unit closure, comprehensive retrenchment packages that include adequate advance warning to employees and contractors to allow them to source alternative opportunities should be undertaken.

Impact Evaluation

Impact evaluation is given in table below.

Impact Evaluation for Socio-economic Environment

| Impact Evaluation Element | Impact on socio economics due to the proposed project. | | | | | |
|----------------------------|--|----------|------------|----------|--|--|
| Potential Effect/ Concern | Proposed project will provide direct & indirect employment opportunities to the local residents, which will help to increase their earning and better living standard as well as further up-liftment of socio-economic status of the area. | | | | | |
| Characteristics of Impacts | • • | | | | | |
| Naturo | Positive | | Negative | Neutral | | |
| inature | √ | | | | | |
| Tupo | Direct | Indirect | Cumulative | | | |
| Туре | √ | | | | | |
| Evtont | Project Area | Local | Zonal | Regional | | |
| | | | √ | | | |

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| Duration | Short - | term | Long- term | | | |
|------------------------|------------------------|----------------|--------------|----------------|--|--|
| Duration | | | √ | | | |
| Intoncity | Lov | N | Medium | High | | |
| intensity | | | √ | | | |
| Fraguancy | Remote (R) | Occasional (O) | Periodic (P) | Continuous (C) | | |
| requency | | | | √ | | |
| Significance of Impact | Significance of Impact | | | | | |
| Significanco | Insignificant | Minor | Moderate | Major | | |
| Significance | | | √ | | | |

4.12 ANTICIPATED IMPACT ON OCCUPATIONAL HEALTH AND MITIGATION MEASURES

The cement manufacturing industry is labour intensive and uses large scale and potentially hazardous manufacturing processes. The industry experiences accident rates that are high compared with some other manufacturing industries. Cement industries experience risk of a number of hazards inherent to the cement production process. Some examples of such hazards are:

- ∞ Exposure to dust,
- ∞ Noise exposure,
- ∞ Physical hazards,
- >>>> Other industrial Hygiene issues

These mainly impact on those working within the industry, although health hazards can also impact on local communities.

Exposure to Dust

Exposure to fine particulates is associated with work in most of the dust-generating stages of Cement Plant, but most notably from, raw material handling, and clinker / cement grinding. Workers with long term exposure to fine particulate dust are at risk of pneumoconiosis, emphysema, bronchitis, and fibrosis.

Methods to prevent and control exposure to dust include the following:

- » Control of dust through implementation of good housekeeping and maintenance;
- ∞ Use of air–conditioned, closed cabins;
- Use of dust extraction and recycling systems to remove dust from work areas, especially in grinding mills;
- © Use of PPE, as appropriate (e.g. masks and respirators) to address residual exposures following adoption of the above-referenced process and engineering controls.

Noise and Vibration Exposure

Exhaust fans and grinding mills, kiln, compressors, and motors are the main sources of noise and vibrations in Grinding Unit. Control of noise emissions will include the use of silencers for ID fans, room enclosures for mill operators, noise barriers, and, if noise cannot be reduced to acceptable levels, personal hearing protection (ear plugs/muffs).

Physical hazards

Injuries during Project operation are typically related to slips, trips, and falls; contact with falling / moving objects; and lifting / over-exertion.

Other injuries may occur due to contact with, or capture in, moving machinery (e.g. dump trucks, front loaders, forklifts). Activities related to maintenance of equipments, including crushers, mills, mill separators, fans, coolers, and belt conveyors, represent a significant source of exposure to physical hazards. Such hazards may include the following:

- ∞ Falling / impact with objects;
- >>>> Hot surface burns; and
- ∞ Transportation
- ∞ Contact with allergic substances.

Following management measures will be ensured to prevent the physical hazards in the plant:

- Any person working on equipment with moving parts personally ensures the equipment is de-energized, isolated and locked/tagged out.
- Any person working from a position with the potential risk for a fall from height uses fall protection.
- » Prescribed PPE has been provided to all workers exposed to open processes or systems.
- » In case of any accident immediate & proper medical care will be provided at the plant site.

| High Risk Categories: | Prevention: | |
|--|---|--|
| Contractors | Contractor Safety Management | |
| Young/Temporary Employees | Special Safety Induction | |
| Direct Causes | | |
| Traffic and Mobile Plant | Driver Training | |
| Falls from Heights, Objects falling from Heights | Safety Procedures for Work at Heights, Overhead Protection | |
| Caught in Starting/Moving Equipment | Plant Isolation Procedures | |

4.13 ANTICIPATED IMPACT DUE TO TRANSPORTATION OF RAW MATERIAL AND FINISHED PRODUCT AND MITIGATION MEASURES

Proposed Clinker Grinding Unit is well connected with SH - 22 (~ 8.0 Km in SSE direction) and MDR - 130 (~4.0 km in NW direction). Nearest town to the proposed project site is Matanhail ~12.0 km in NNE direction from the project site and nearest city is Charki Dadri ~18.0 km in NW direction from the project site. Nearest Railway Station is Jharli Railway Station which is ~4.0 km in NNW direction from the project site and nearest Airport is Indira Gandhi International Airport, New Delhi ~65.0 km in ENE direction from the project site. Road facilities for the transportation of materials are already present near plant premises (as mentioned in the above paragraph). This will be used for inflow of raw material & finished product.

Also, the existing road infrastructure is good enough to bear the increased traffic load. However, internal and nearby roads shall be maintained as and when needed to facilitate transportation.

Fly ash and gypsum will be transported through closed bulkers; thus, no harmful effect is anticipated on the surrounding environment due to transportation of raw materials.

Existing Traffic Survey

Traffic survey has been conducted for 24 hours at SH- 22 which is approximately ~ 8.0 Km in SSE direction. The traffic survey monitoring was done in April, 2019 to predict the future traffic growth and the load on the plant road and surroundings due to the proposed project.

Measurements of traffic density were made continuously for 24 hours by visual observation and counting of vehicles under four categories, viz., heavy motor vehicles, light motor vehicles, two/four wheelers and others. Total numbers of vehicles per hour under the four categories were determined. The details of the traffic volume count have been provided in Table 4.8 given below:

Table - 4.8

Traffic Volume Count Survey (SH-22)

| | | Type of vehicle | | | | | | | |
|--------|-------------------|-----------------------------|---|----------|-------|-----|---------|-------|-------------------|
| S. No. | Time | Motor Cycle / Scooter | Passenger Car / Van / Auto- rickshaw | Tractors | Truck | Bus | Trailer | Cycle | Total vehicles |
| 1. | 6:01 to 7:00 am | 1 | 2 | 5 | 68 | 12 | 2 | 2 | 92 |
| 2. | 7:01 to 8:00 am | 2 | 2 | 3 | 43 | 11 | 5 | 1 | 67 |
| 3. | 8:01 to 9:00 am | 4 | 5 | 2 | 37 | 13 | 4 | 2 | 67 |
| 4. | 9:01 to 10:00 am | 6 | 6 | 1 | 24 | 15 | 5 | 1 | 58 |
| 5. | 10:01 to 11:00 am | 7 | 4 | 0 | 20 | 14 | 4 | 0 | 49 |
| 6. | 11:00 to 12 noon | 6 | 5 | 0 | 18 | 11 | 3 | 1 | 44 |
| 7. | 12:01 to 1:00 pm | 5 | 3 | 1 | 19 | 13 | 4 | 0 | 45 |
| 8. | 1:01 to 2:00 pm | 6 | 4 | 0 | 17 | 12 | 2 | 1 | 42 |
| 9. | 2:01 to 3:00 pm | 7 | 6 | 2 | 21 | 13 | 0 | 1 | 50 |
| 10. | 3:01 to 4:00 pm | 5 | 4 | 1 | 22 | 14 | 1 | 2 | 49 |
| 11. | 4:01 to 5:00 pm | 6 | 8 | 0 | 25 | 10 | 0 | 1 | 50 |
| 12. | 5:01 to 6:00 pm | 8 | 9 | 2 | 29 | 12 | 3 | 1 | 64 |
| 13. | 6:01 to 7:00 pm | 10 | 11 | 4 | 33 | 11 | 4 | 0 | 73 |
| 14. | 7:01 to 8:00 pm | 7 | 9 | 3 | 34 | 13 | 5 | 0 | 71 |
| 15. | 8:01 to 9:00 pm | 3 | 7 | 4 | 38 | 11 | 5 | 2 | 70 |
| 16. | 9:01 to 10:00 pm | 5 | 8 | 5 | 50 | 13 | 4 | 2 | 87 |
| 17. | 10:01 to 11:00 pm | 4 | 6 | 2 | 48 | 16 | 3 | 1 | 80 |
| 18. | 11:01 to 12:00 pm | 3 | 5 | 3 | 51 | 15 | 5 | 2 | 84 |
| 19. | 12:01 to 1:00 am | 2 | 3 | 5 | 58 | 13 | 4 | 0 | 85 |

| | | Type of vehicle | | | | | | | |
|----------|-----------------|-----------------------------|---|----------|-------|-----|---------|-------|-------------------|
| S. No. | Time | Motor Cycle / Scooter | Passenger Car / Van / Auto- rickshaw | Tractors | Truck | Bus | Trailer | Cycle | Total vehicles |
| 20. | 1:01 to 2:00 am | 1 | 1 | 4 | 60 | 12 | 3 | 2 | 83 |
| 21. | 2:01 to 3:00 am | 0 | 2 | 2 | 55 | 11 | 4 | 1 | 75 |
| 22. | 3:01 to 4:00 am | 1 | 0 | 0 | 59 | 13 | 4 | 1 | 78 |
| 23. | 4:01 to 5:00 am | 2 | 1 | 1 | 64 | 12 | 5 | 0 | 85 |
| 24. | 5:01 to 6:00 am | 0 | 1 | 4 | 71 | 14 | 3 | 1 | 94 |
| Grand to | otal | 101 | 112 | 54 | 964 | 304 | 82 | 25 | 1642 |



Figure 4.2: Traffic Volume Count

Conclusion

Figure 4.2 clearly shows that Trucks (59%) runs mainly on SH - 22 followed by Bus (18%), Passenger Car / Van / Auto / Auto-rickshaw (7%), Motor Cycle/Scooter (6%), Trailer (5%), Tractor (3%) and Cycle (2 %).

Table - 4.9

Traffic Volume Count: SH-22

| S. No. | Type of Vehicle | No. of vehicles / day | | | |
|--------|-------------------------------------|-----------------------|--|--|--|
| 1. | Motor Cycle / Scooter | 101 | | | |
| 2. | Passenger Car / Van / Auto-rickshaw | 112 | | | |
| 3. | Tractors | 54 | | | |
| 4. | Truck | 964 | | | |
| 5. | Bus | 304 | | | |
| 6. | Trailer | 82 | | | |
| 7. | Cycle | 85 | | | |
| | Total | 1642 | | | |

Source: Survey

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| No. of Vehicles with respect to PCU |
|-------------------------------------|
|-------------------------------------|

| S. No. | Vehicle Type | Number of Vehicles / day | Passenger Car Unit (PCU) Factor | Total Number of Vehicle (PCU) / day |
|--------|-------------------------------------|-----------------------------|------------------------------------|--|
| 1. | Motor Cycle / Scooter | 101 | 0.75 | 76 |
| 2. | Passenger Car / Van / Auto-rickshaw | 112 | 1 | 112 |
| 3. | Tractors | 54 | 4 | 216 |
| 4. | Truck | 964 | 2.2 | 2121 |
| 5. | Bus | 304 | 2.2 | 669 |
| 6. | Trailer | 82 | 2.2 | 180 |
| 7. | Cycle | 85 | 0.4 | 10 |
| | Total | 1642 | | 3384 |
| | | PC | U / hr = (PCU / day) / 24 | 141 |

Existing Traffic Scenario and LOS (Level of Service)

| Road | V (Volume in PCU/hr.) | C (Capacity in PCU/hr.) | Existing V/C Ratio | LOS |
|---------|--------------------------|----------------------------|-----------------------|-----|
| SH - 22 | 141 | 625 | 0.22 | В |

Capacity as per IRC: 64-1990

| V/C | LOS (Level of Service) | Performance |
|-----------|------------------------|-----------------------|
| 0.0 - 0.2 | А | Excellent |
| 0.2 - 0.4 | В | Very Good |
| 0.4 - 0.6 | С | Good / Average / Fair |
| 0.6 - 0.8 | D | Poor |
| 0.8 - 1.0 | E | Very Poor |

Additional Traffic due to Proposed Project

Both raw and finished materials will be transported by road. Due to the proposed project, there will be additional trucks to the existing traffic volume. Adequate parking facilities will be provided to accommodate additional trucks within the plant premises.

Additional traffic during operation of the plant due to raw material and finished products transportation has been given in Table - 4.10(a) & 4.10(b)

| Table - 4.10 (A) | |
|--|---|
| Inward Traffic due to the Raw Material Transportatio | n |

| Material | Proposed requi (Phase | quantity ired ·I & II) | Source / Origin Destination | Type of vehicle and Capacity | Number of Trips (approx.) |
|----------|-----------------------------|------------------------------|---|------------------------------------|---------------------------------|
| | МТРА | TPD | | | Per Day |
| Clinker | 4.40 | 12753 | Existing Cement Plant in Nimbahera, Dist. Chittorgarh, Rajasthan / Outsourced | Truck / 40 tonnes | 318 |

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| Material | Proposed requ (Phase | quantity ired -I & II) | Source / Origin Destination | tination Vehicle and Capacity | |
|--------------------|----------------------------|------------------------------|--|----------------------------------|---------|
| | МТРА | TPD | | cupacity | Per Day |
| Fly ash | 1.4 | 4057 | Thermal Power Plants, IGSTPP and CLP, Jharli, Jhajjar | Truck / 40 tonnes | 101 |
| Mineral Gypsum | 0.25 | 774 | RSMML, Nagaur/ Bikaner (Raj.) | Truck / 40 | 18 |
| Chemical Gypsum | - 0.25 | /24 | Dye & dye Intermediate plants in Surat Vapi Gujarat | tonnes | |
| | | | | Total | 437 |

* Considering 100% by Road to Calculate Maximum Pollution Load with 345 working days

Table - 4.10(B)

Outward Traffic due to the Finished Product Transportation

| Material | Quantity Phase-I & II | | Source / Origin Destination | Type of vehicle and Capacity | Number of Trips (approx.) |
|----------|--------------------------|-------|-----------------------------|------------------------------|------------------------------|
| | МТРА | TPD | | | Per Day |
| Cement | 5.0 | 13698 | Wonder Grinding Unit | Truck / 40 tonnes | 342 |
| | Total | | | 342 | |

*Considering 100% by Road to Calculate Maximum Pollution Load with 365 working days

Total No. of increased trucks / tankers per day (inward) = 437

Total No. of increased trucks / tankers per day (outward) = 342

Total No. of increased trucks / tankers per day (outward) = 437 + 342 = 779

Increase in PCU / day = 779 x 3= 2337

Modified Traffic Scenario and LOS (Level of Service)

| Road | Increased PCU / hr. | V (Volume in PCU/hr.) | C (Capacity in PCU/hr.) | V/C Ratio | LOS |
|---------|---------------------|-----------------------|----------------------------|--------------|-----|
| SH - 22 | 2337/24= 97.37 | 141 + 97.37 = 238.37 | 625 | 0.38 | В |

Traffic Projection & Impact due to Transportation:

Due to the proposed project, there will be addition of Heavy and Light motor vehicles in the existing traffic.

The LOS value is "Very Good" for SH - 22. Thus, it can be concluded that the present road network is good enough to bear the increased traffic load. However, internal and nearby roads will be maintained as and when needed to facilitate transportation. The current study has been prepared for Phase - I & II of the project.

Proper mitigation measures will be adopted by M/s. Wonder Cement Limited to minimize traffic flow to the best possible extent resulting in low level of dust, noise and gaseous emissions.

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Anticipated Impacts

- 🔊 Increase in traffic density will lead to air pollution.
- 80 Movement of vehicles will cause noise pollution.
- » No direct impact is envisaged on the flora and fauna of the area.
- » Increased traffic may cause accidental incidences and public health problems.

Mitigation Measures

- >>> Vehicles with PUC Certificate will be hired.
- >>> Vehicles will be covered with a tarpaulin and not over loaded.
- >>> Un-necessary blowing of horn will be avoided.
- » Roads will be maintained in good condition to reduce noise due to traffic.
- 🔊 Greenbelt development.

Impact Evaluation

Impact evaluation is given in table below.

Impact Evaluation due to Transportation of Raw Material and Products

| Impact Evaluation Element | Change in traffic density due to transportation of raw material and products by road. | | | | |
|----------------------------|---|----------------|--------------|----------------|--|
| Potential Effect/ Concern | Increased load on existing transportation infrastructure and air emissions due to transportation of material. | | | | |
| Characteristics of Impacts | | | | | |
| Natura | Positive | | Negative | Neutral | |
| Nature | | | \checkmark | | |
| Turn e | Direct | Indirect | Cumulative | | |
| Туре | √ | | | | |
| Eutont | Project Area | Local | Zonal | Regional | |
| EXTERN | | | | √ | |
| Duration | Short - | term | Long- term | | |
| Duration | ν | / | | | |
| Intensity | Low | | Medium | High | |
| intensity | | | √ | | |
| Frequency | Remote (R) | Occasional (O) | Periodic (P) | Continuous (C) | |
| riequency | | | | √ | |
| Significance of Impact | | | | | |
| Significanco | Insignificant | Minor | Moderate | Major | |
| Significance | | | √ | | |

4.14 IMPACT DUE TO SOLID AND HAZARDOUS WASTE GENERATION

No solid waste will be generated from the cement manufacturing process. Dust collected from air pollution control equipment will be totally recycled in process. Sludge from Sewage Treatment Plant (STP) will be used as manure for greenbelt development / plantation.

No hazardous waste will be generated except the used oil which will be collected in drums, temporarily stored at earmarked place and will be sold to the authorized CPCB recyclers.

4.15 SUMMARY AND CONCLUSION

The environmental impact evaluation of possible effects as a result of plant site activities and operation on various environmental parameters is primarily based on careful study of Clinker Grinding Unit operations, surrounding environment etc. For various proposed project activities, effective 'Control Technology' has been suggested with a view to mitigate the adverse impact of unit operation on environmental parameters. The summary of anticipated adverse environmental impacts and mitigation measures are given in Table - 4.11.

Table - 4.11

Anticipated Adverse Environmental Impacts and Mitigation

| Discipline | Anticipated Impact | Mitigation Measures | |
|------------------------|--|---|--|
| Construction Phase | | | |
| Air | Increase in dust and NO _x concentration due to levelling activity and Heavy vehicular movement | * Sprinkling of water in the construction area and on unpaved roads * Proper maintenance of vehicles. * Use of vehicles meeting PUC norms | |
| Noise | Increase in noise level due to Construction Equipment | * Equipment will be kept in good condition to keep the noise level within 90 dB(A) * To provide necessary protective equipment e.g. ear plugs, earmuffs | |
| Water | Increase in suspended solids due to soil run-off during heavy precipitation due to Loose soil at construction site | * Adequate drainage system for runoff water during construction phase | |
| Operation Phase | | | |
| Air | Increase in concentration of Particulate Matter Emissions | Installation & maintenance of pollution control equipment like Bag House / Bag Filters Storage of clinker, fly ash and cement in silos Storage of gypsum in covered shed. All the roads inside the plant premises will be concreted Vacuum Sweeping for better housekeeping Water sprinkling to reduce the PM emission level | |
| Noise | Increase in noise level within the plant area | * Equipment designed to conform to occupational noise levels prescribed by regulatory agencies * Earmuffs/ Earplugs will be provided to persons working in high noise zone * Properly insulated enclosures will be provided to equipment making excessive noise * Installation of Compressor in closed building * Greenbelt development / plantation will help in attenuating noise | |
| Water | Generation of waste water | Domestic waste water from plant canteen and toilets will be treated in STP and treated water will be utilized for greenbelt development/plantation. Blow down water will be used in Greenbelt and dust | |

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| Discipline | Anticipated Impact | Mitigation Measures |
|---------------------------|---|---|
| | | suppression. |
| Soil | Degradation of soil quality due to settling | * Use of efficient pollution control systems |
| | of air borne dust | * Used oil generated from the plant will be stored in |
| | | designated place to prevent contamination in soil. |
| | | * All the raw material will be covered |
| | | * All the raw material movement roads will be concreted |
| | | to minimise fugitive dust emission |
| Biological Environ | iment | |
| a. Terrestrial | Positive as greenbelt of appropriate width | - |
| Ecology | will be developed and maintained by M/s. | |
| | Wonder Cement Ltd. in the area | |
| b. Aquatic | No impact as no effluent will be | - |
| Ecology | discharged outside the plant premises | |
| Socio-economic | Overall development of the area in | - |
| Environment | respect of the infrastructure | |
| | development, educational growth, health | |
| | facilities etc. | |

Considering all the above, it may be observed that the proposed project will remain an ecofriendly, which will produce very negligible dust emission and have no effluent discharge.

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CHAPTER - 5 ANALYSIS OF ALTERNATIVES (TECHNOLOGY AND SITE)

5.1 ANALYSIS OF ALTERNATIVES

As per EIA Notification dated 14th Sept., 2006, as amended from time to time; the Chapter on "Analysis of Alternatives (Technology & Site)" is applicable only, if the same is recommended at the Scoping stage.

As per the ToR points issued by SEIAA, Haryana *vide* letter no. SEIAA/HR/2019/141 dated 05th July, 2019 for the proposed project, the Analysis of Alternatives (Technology & Site) is required.

The proposed technology by M/s. Wonder Cement Plant for manufacturing of cement is one of the best and proven technologies; hence, no alternative technology has been analyzed.

5.1.1 Justification for the Site Selection

This site has been selected and finalized based on:

- i) Availability of raw material i.e. Fly ash
- ii) Power availability in this part of the State is good
- iii) Nearest to road & rail for transportation of raw material and finished product

From the above considerations, the proposed site falling under the Village: Jhanswa, Sub-Tehsil: Salhawas, Tehsil: Matanhail, District: Jhajjar (Haryana) has been found suitable for setting up the proposed Clinker Grinding Unit.



CHAPTER - 6 ENVIRONMENTAL MONITORING PROGRAMME

6.1 INTRODUCTION

Post-Project Monitoring is an essential part to check the impact of project related activities. Hence, monitoring of various environmental parameters will be carried out on a regular basis to ascertain the following:

- 80 Status of Pollution within the plant site and in its vicinity
- » Generate data for predictive or corrective purpose in respect of pollution
- 80 Examine the efficiency of pollution control system adopted at the site
- ⁸⁰ To assess environmental impacts.

Monitoring will be carried out at the site as per the norms of CPCB.

Environmental Monitoring Programme will be conducted for various environmental components as per the conditions stipulated in Environmental Clearance Letter issued by SEIAA, Haryana and Consent to Operate issued by HSPCB.

Six monthly compliance reports will be submitted on regular basis to RO, MoEFCC, Chandigarh by 1st of June and 1st of December. Compliance report for conditions stipulated in CTO will be submitted to HSPCB, Haryana on regular basis as per the CTO stipulations.

Various environmental components and pollution sources, which will be monitored under environmental monitoring programme are stack emission, ambient air quality, water quality and noise levels. Details of the Environmental Monitoring programme, which will be undertaken for various environmental components, are detailed below.

6.2 MEASUREMENT METHODOLOGIES

6.2.1 Instruments to be used

The following instruments will be used for data collection work in the monitoring Schedule:

- >>> Weather Monitoring Station (WMS)
- ∞ Respirable Dust Sampler (RDS) PM₁₀
- ∞ Fine Particulate Sampler (FPS) PM_{2.5}
- 80 Stack Monitoring Kit for PM measurement
- ∞ Sound Level Meter
- ல Water Level Indicator

6.2.2 Monitoring Programme

The post-project monitoring will be included details of any major/ minor impact in the core zone and area within buffer zone for the following parameters:

- ∞ Micro-meteorological data
- 🔊 Ambient air quality monitoring
- ∞ Stack monitoring
- 🔊 Noise level monitoring
- >>> Water quality and level monitoring
- >>> Medical Check-up of the employees

6.2.3 Monitoring Schedule

Details of the environmental monitoring schedule / frequency, which will be undertaken for various environmental components, as per conditions of EC / CTE / CTO are given in **Table - 6.1**.

| S. No. | Description | Frequency of Monitoring |
|--------|------------------------------|---|
| 1. | Meteorological Data | Hourly |
| 2. | Ambient Air Quality | Twice a Week & Continuous Online Monitoring |
| 3. | Stack Monitoring | Monthly & Continuous Online Monitoring |
| 4. | Water Quality | As per CGWA NOC |
| 5. | Water Level | Monthly as per CGWA NOC |
| 6. | Noise Level Monitoring | Monthly & as per EC / CTO |
| 7. | Medical Check-up of Employee | Yearly |

Frequency for Post Project Monitoring

Table - 6.1

6.2.4 Locations of Monitoring Stations

The location of the monitoring stations will be selected on the basis of prevailing micrometeorological conditions of the area like Wind direction and Wind speed, Relative Humidity, Temperature.

AAQM stations will be set up for assessment of ambient air quality and monitoring will be carried out on selected locations. Noise level monitoring will be carried out on plant boundary and in high noise generating area within the plant site. Water sampling locations will be decided on the basis of general slope of the area and drainage pattern. Locations for the post-project monitoring are given in **Table - 6.2**

Table - 6.2

Locations for Post Project Monitoring

| S. No. | Description | Location |
|--------|--------------------------------|---|
| 1. | Meteorological data | Plant Site |
| 2. | Ambient Air Quality | Plant Boundary in upwind and downwind direction |
| 3. | Stack emissions | Cement Mill |
| 4. | Ground Water Level and Quality | As per CGWA NOC |

| 5. | Noise Level Monitoring | Plant Boundary, High noise generating areas within the Plant Boundary and as per CTO conditions |
|----|------------------------|---|
| 6. | Health Check-up | Occupational Health Centre/ Outsource Health Centre |

6.2.5 Methodology Adopted

Post-project monitoring will be carried out as per conditions stipulated in Environmental Clearance Letter issued by SEIAA (Haryana), consent issued by HSPCB as-well-as according to CPCB guidelines. Plant site is considered as core zone and the area lying within 10 km radius from the plant site is considered to be the buffer zone where slight occasional impacts may be observed on physical and biological environment. Details of Post Project Monitoring Programme are given in **Table - 6.3.**

| Attributes | Sampling | | Measurement | Test Presedure |
|---|--|--|--|--|
| Attributes | Network | Frequency | Method | lest Procedure |
| A. Air Environment | | | | |
| Meteorological • Wind speed • Wind direction • Temperature • Relative humidity • Bainfall | Minimum 1 site in the project impact area | Regularly by Weather Monitoring Station | Automatic weather station | - |
| Pollutants • PM10 • PM2.5 • SO2 • NO2 | 4 locations at plant boundary | Revised National Ambient Air Quality Standards (NAAQS) vide MoEFCC circular, dated 16.11.2009 | Gravimetric method Gravimetric method EPA Modified West & Geake method Arsenite modified Jacob & Hochheiser | - Absorption in Potassium Tetra Chloromercurate followed by Colorimetric estimation using P- Rosaniline hydrochloride and Formaldehyde (IS: 5182 Part - II). Absorption in dill NaOH and then estimated colorimetrically with sulphanilamide and N (I-Nepthyle) Ethylene diamine Dihydrochloride and Hydrogen Peroxide (CPCB Method). |
| • CO | | | Non-Dispersive | - |

Table - 6.3 Post Project Monitoring

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| Attributos | Sampling | | Measurement | Test Procedure |
|---------------------------|-----------------|---------------|-------------------|-------------------------------------|
| Attributes | Network | Frequency | Method | lest Procedure |
| | | | Infra-Red (NDIR) | |
| | | | Spectroscopy | |
| B. Stack Monitoring | | | | |
| Pollutant | Stack of Cement | As per CPCB | As Per CPCB Guide | Gravimetric method |
| PM | Mill | Guide Line | Line | |
| | | and Indian | | |
| | | Standard | | |
| | | 11255 (1985). | | |
| C. Water Environment | | | | |
| pH, Turbidity, Colour, | Monthly water | Diurnal and | As per IS 10500- | Samples for water quality should be |
| Odour, Taste, TDS, | level and | Season wise | 2012 | collected and analyzed as per: IS: |
| Total Hardness, | quarterly water | | | 2488 (Part 1-5) methods for |
| Calcium hardness, | quality as per | | | sampling and testing of Industrial |
| Magnesium hardness, | CGWA NOC | | | effluents. |
| Chloride, Fluoride, | | | | Standard methods for examination |
| Sulphate, Nitrates, | | | | of water and wastewater analysis |
| Alkalinity, Iron, Copper, | | | | published by American Public |
| Manganese | | | | Health Association. |
| D. Noise | | | | |
| Noise levels at Day & | 3 locations | Monthly | As per CPCB | As per CPCB norms |
| night time -Leq dB (A) | | | norms | |

6.3 DATA ANALYSIS

Monitoring data analysis will be done by MoEFCC approved laboratory as per CPCB guidelines & timely submitted to concerned authority (specified in Environment Clearance Letter issued by SEIAA, Haryana and Consent issued by HSPCB) on regular basis.

6.4 DETAILED BUDGET

The budget for Environment Monitoring is as below:

- ✓ Capital Cost: Rs. 1.7 Crores
- ✓ Recurring Cost: Rs. 0.15 Crores/ annum.

- 000---

CHAPTER - 7 ADDITIONAL STUDIES

7.1 INTRODUCTION

As per EIA Notification dated 14thSept., 2006, as amended from time to time; First Technical Presentation (for ToR approval) for the proposed project was held before SEIAA, Haryana on 12th June, 2019. The committee has prescribed Standard Terms of Reference (ToR) with Project Specific ToR for the proposed project for the preparation of Environmental Impact Assessment (EIA) Report and Environmental Management Plan (EMP).

As per the Standard Terms of Reference (ToR) with project specific ToR prescribed by SEIAA, Haryana *vide* letter no. SEIAA/HR/2019/141 dated 05th July, 2019; following Additional Studies has to be carried out for the proposed project:

- 1. Public Consultation
- 2. Hydro-geological Study and Rainwater Harvesting Plan
- 3. Risk Assessment and Disaster Management Plan

7.2 PUBLIC CONSULTATION

Public Hearing for Proposed Clinker Grinding Unit with Cement Production Capacity of 5.0 MTPA (2.5 MTPA: Phase - I & 2.5 MTPA: Phase - II) and D.G. Set (6.5 MW) at village: Jhanswa, Sub-Tehsil: Salhawas, Tehsil: Matanhail, District: Jhajjar (Haryana) was conducted by Haryana State Pollution Control Board at the project site and it is lined with EIA Notification 14th September 2006. Details of the Public Hearing are appended herewith the Final EIA/EMP Report:

- Public Hearing Proceedings
- Public Hearing Notice published in National Newspapers "Indian Express, Chandigarh edition" and in "The Tribune" dated 24th July 2019and Local Newspapers "Dainik Jagran" dated 25th July, 2019.
- Photographs of Public Hearing
- Action Plan for the issues raised during Public Hearing.

7.2.1 Public Hearing Proceedings

Public Hearing Proceedings along with attendance sheet have been enclosed as **Annexure** - **9** along with this Final EIA/EMP Report

7.2.2 Public Hearing Notice Published In Newspapers "Dainik Jagran" on dated 25th July 2019and "The Tribune"& "The Indian Express" on dated 24th July, 2019.



7.2.3 Public Hearing Photographs



7.2.4 Action Plan for issues raised during public hearing

Public hearing for obtaining Environmental Clearance for Proposed Clinker Grinding Unit with Cement Production Capacity of 5.0 MTPA (2.5 MTPA: Phase - I & 2.5 MTPA: Phase - II) and D.G. Set (6.5 MW) by M/s. Wonder Cement Limited located at Village: Jhanswa, Sub-Tehsil: Salhawas, Tehsil: Matanhail, District: Jhajjar (Haryana) organized by Shri Krishan Kumar, Regional Officer, Haryana State Pollution Control Board, Bahadurgarh under the chairmanship of Shri Jag Niwas, ADC, Jhajjar. Out of the total215 (including 14 govt. officials) participants, most of the people supported the project. Issues / Points / Opinions of Local Public raised during the Public hearing along with action plan including Budgetary Allocation is as follows:

| S. No. | Name of the Person | Issues / Points / Opinions of Local Public | Reply by the Project Proponent | Action Plan along with |
|--------|--|---|---|---|
| | | | (During & after the PH) | Budgetary Allocation |
| Α. | Employment | | | • |
| 1. | Shri Inder Singh, V & P.O. Jhanswa Sub Tehsil Salhawas, Distt. Jhajjar | First of all, he thanked A.D.C., Jhajjar (Chief Guest) and company staff and appraised the company policy regarding environment. Further, he demanded employment for local persons living near to the proposed | Preference in the employment will be given to the locals/nearby villagers as per the required eligibility and their qualification. | Total manpower required for the proposed project is 230 (Phase-I: 178, Phase-II: 52). Preference in the employment will be given to the |
| 2. | Shri Subedar Sukhbir Singh V& P.O. Jhanswa Sub Tehsil Salhawas Distt. Jhajjar | plant. He thanked the Chief Guest and welcome the company's proposal. Further, he also demanded that employment should be given to the persons of the local area. | | locals/nearby villagers as per the required eligibility, skill sets and their qualification. |
| 3. | Sh. Sunill Pradhan, Ex. Sarpanch, V. & P.O. Jamalpur Sub Tehsil Salhawaws, Distt. Jhajjar | He thanked the Chief Guest and the company staff for the installation of the plant by saying that such plant shall provide employment to the persons of this area. He further demanded that such type of plant should be installed more and more so that employment may be provided to the persons of this area. | | |
| 4. | Sh. Ravinder Singh, Sarpanch | He expect that Wonder Cement will give | Company will provide employment | |

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| S. No. | Name of the Person | Issues / Points / Opinions of Local Public | Reply by the Project Proponent | Action Plan along with Budgetary Allocation |
|--------|--|--|--|---|
| | V.& P.O. Jamalpur, Sub Tehsil Salhawas Distt. Jhajjar. | employment to the locals as practiced by the nearby industries. | opportunities to the locals/nearby villagers of this area either directly or indirectly. | |
| 5. | Sh. Pramjit Singh Dhankar, Advocate V&PO Jhanswa Sub Tehsil Salhawas Distt. Jhajjar. | Company should give preference to employment to the locals/ nearby villagers. | The company will provide employment opportunities to the locals/nearby villagers. | |
| 6. | ADC, Jhajjar | Company should provide solutions in the written letter for Priority wise classification for the employment. | Company has already provided local employment to more than 2000 person in their existing captive plant situated at Nimbahera, Chittorgarh Rajasthan and the same policy will be followed for the proposed project. Company will provide employment opportunities to the locals/nearby villagers of this area either directly or indirectly. as the company will engage the people for transportation of raw materials, plantation activities and plant process as part of indirect employment. | |
| В. | Pollution | I | | |
| 1. | Ex. Subedar Umed Singh V& P.O. Jhanswa Sub Tehsil Salhawas Distt. Jhajjar | He stated that If the company will assure that appropriate measure for proposed plant to control dust and noise pollution will be taken. Then we all welcome the wonder cement to propose the plant in our village. | We assure to take all the mitigation measures to control the dust and noise pollution in the proposed project as per the prescribed norms. Company is strongly committed to follow norms related to environment protection. To control the environmental pollution, | Company has allocated Rs. 28 Crores (Rs. 14.0 crores for each phase) as capital cost of EMP and Rs.4.0 crores/annum(Rs. 2.0 crores for each Phase) as recurring cost of EMP. |
| 2. | Sh. Pramjit Singh Dhankar, Advocate V&PO Jhanswa Sub | Norms for the environment pollution should be strictly followed. | The company will strictly follow the norms to control the environmental | |

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| S. No. | Name of the Person | Issues / Points / Opinions of Local Public | Reply by the Project Proponent (During & after the PH) | Action Plan along with Budgetary Allocation |
|----------|--|---|---|---|
| | Tehsil Salhawas Distt. Jhajjar. | | pollution. | |
| С. | CSR Related | | • | |
| 1. 2. | Shri Inder Singh, V & P.O. Jhanswa Sub Tehsil Salhawas, Distt. Jhajjar Sh. Randhir Singh. V & PO Jhanswa, Sub Tehsil | The roads are narrow and requested to widen them to avoid the discomfort to the villagers with the help of Dist. administration. He requested that special attention towards employment and pollution free | Company will coordinate with administration regarding the road widening issue. Company will do the best to address the stated issue with the help of district | Company has proposed to spend a total of Rs. 13.45 Cr (Phase-I: Rs. 7.7 Crores, Phase – II: Rs. 5.75 Crores) towards CER activities based on the proposed project cost of Rs. 830 Cr [Phase-1: Rs. 480 Crores |
| | Salhawas Distt. Jhajjar. | environment will be given and further requested that there is problem of shortage of water for the animals. So kindly make necessary arrangement like Johad. | administration. | and Phase-II: Rs. 350 Crores]. Some part of the CER budget would be allocated for |
| 3. | ADC, Jhajjar | Company should provide solutions in the written letter for Relaxation of the cement cost for the local villagers. | Relaxation in the price of the cement to the local villagers. Company doesn't follow such policy. | would be allocated for widening of village roads. Company will also work with district administration to address genuine concern of villagers. |

Issues / Points / Opinions of Local Public received through Written Letters

| S. No. | Name of the Person | Issues / Points / Opinions of Local Public | Reply by the Project Proponent (During & after the PH) | Action Plan along with Budgetary Allocation |
|--------|-----------------------------|--|---|--|
| Α. | Employment | | | |
| 1. | Shri Ravinder Singh, | The establishment of proposed clinker | Preference in the employment will be given | Total manpower required |
| | V & P.O. Jhanswa Sub Tehsil | grinding unit by Company is expected to | to the locals/nearby villagers as per the | for the proposed project |
| | Salhawas, Distt. Jhajjar | provide employment to local people. | required eligibility and their qualification. | is 230 (Phase-I: 178, Phase- |

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| S. No. | Name of the Person | Issues / Points / Opinions of Local Public | Reply by the Project Proponent (During & after the PH) | Action Plan along with Budgetary Allocation |
|--------|--|--|---|--|
| 2. | Shri Dharamveer V & P.O. Jhanswa Sub Tehsil Salhawas Distt. Jhajjar | The company should give priority to local people as per their qualification. | | II: 52). Preference in the employment will be given to the locals/nearby |
| 3. | Sh. Mangeram V & P.O. Jhanswa Sub Tehsil Salhawas Distt. Jhajjar | He expects that Wonder Cement will give employment to the locals as practiced by the nearby industries. | | villagers as per the required eligibility, skill sets and their |
| 4. | Sh. Rajesh V & P.O. Jhanswa Sub Tehsil Salhawas Distt. Jhajjar | Employment opportunities by establishment of proposed clinker grinding unit by Company will provide development in the local area. | | quanication. |
| 5. | Smt. Sunita devi V & P.O. Jhanswa Sub Tehsil Salhawas Distt. Jhajjar | The proposed unit will provide employment for the development of my village and he welcomes the company. | Thank you for your support. | |
| 6. | Sh. Umed Singh V & P.O. Jhanswa Sub Tehsil Salhawas Distt. Jhajjar | The establishment of proposed unit will provide employment to youths which is welcomed by us. | Preference in the employment will be given to the locals/nearby villagers as per the required eligibility, skill sets and their qualification. | |
| 7. | Sh. Surendra V & P.O. Jhanswa Sub Tehsil Salhawas Distt. Jhajjar | He has been using cement products from the company which is of good quality. Now, the company is establishing their unit in our area and without emitting any pollutant. Hewelcomes the establishment of proposed unit. | Thank you for your support. | |
| 8. | Sh. Sanjay Kumar V. Jhaswa, Sub Tehsil Matanhail Distt. Jhajjar. | It appears that establishment of this proposed plant will lead to development and employment in nearby areas. | Preference in the employment will be given to the locals/nearby villagers as per the required eligibility, skill sets and their qualification. | |
| 9. | Sh. Harish Kumar | The proposed unit will provide employment | Thank you for your support. | |

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| S. No. | Name of the Person | Issues / Points / Opinions of Local Public | Reply by the Project Proponent (During & after the PH) | Action Plan along with Budgetary Allocation |
|--------|--|---|---|--|
| | V. Jhaswa Sub Tehsil Matanhail, Distt. Jhajjar. | for the development of my village and he welcomes the company. | | |
| 10. | Sh. Tarminarayan V. Jhaswa Sub Tehsil Matanhail, Distt. Jhajjar. | Hehas no objection regarding the proposed grinding unit. The proposed unit will provide employment to local people which will cause improvement of economic status of locals. | Preference in the employment will be given to the locals/nearby villagers as per the required eligibility, skill sets and their qualification. | |
| 11. | Sh. Inder Singh V. Jhaswa Sub Tehsil Matanhail, Distt. Jhajjar. | He welcomes the establishment of proposed grinding unit. The proposed unit will provide employment to local people and there will be no environment degradation. | | |
| 12. | Sh. Vijay Singh V. Jhaswa Sub Tehsil Matanhail, Distt. Jhajjar. | He welcomes the establishment of proposed grinding unit. The proposed unit will provide employment to local people. | | |
| 13. | Sh. Khajan Singh V. Jhaswa Sub Tehsil Matanhail, Distt. Jhajjar. | He wishes that company should get EC for the sake of development in the state. | Thank you for your support. | |
| 14. | Sh. Bhim Singh V. Jhaswa Sub Tehsil Matanhail, Distt. Jhajjar. | He welcomes the establishment of proposed grinding unit. The proposed unit will provide employment to youths | Preference in the employment will be given to the locals/nearby villagers as per the required eligibility, skill sets and their | |
| 15. | Sh. Bhim Singh V. Jhaswa Sub Tehsil Matanhail, Distt. Jhajjar. | He has no objection regarding the proposed grinding unit. The proposed unit will provide employment to local people which will cause improvement of economic status of locals | qualification. | |

7.3 HYDRO-GEOLOGICAL STUDIES AND RAINWATER HARVESTING PLAN

7.3.1 Investigation Methodology

- 80 Understanding of project proposal through existing information in the form of pre-feasibility report, draft project report and other project's rationale.
- Preliminary review of background information about study area through analysis of published articles/ Journals /reports/topographic maps/geological maps or site specific technical reports.
- Topographic studies of proposed project site with the help of primary & secondary data, GPS survey in order to determine elevation, gradient, physical/terrain features for ground truthing.
- Detailed survey in core and buffer zone including geology, types of aquifers governing the groundwater regime of the area, depth to water level, seasonal changes along with groundwater quality, groundwater abstraction structures, discharge and other details, surface water features including surface water bodies and drainage pattern.
- Secondary data collection i.e. climate, rainfall, soil, topography, geological set-up, drainage, cropping pattern etc. From authentic sources (PHED, Agriculture/Irrigation department, Central Ground Water Board, Geological survey of India).
- So Groundwater resources evaluation based on the norms recommended by Groundwater Estimation Committee (GEC), 2009, integration of all available data and hydro-geological interpretations.
- 80 Evaluation of present scenario, assessment of potential developmental impacts on water resources and future course of action for protecting the natural environment
- Mitigation plan including rainwater harvesting/artificial groundwater recharge based on rainfall intensity and recharge capacity of aquifers, design considerations if any.

7.3.2 Objectives

- To analyze physiographic conditions of the study area with the help of field observations,
 GPS readings, Survey of India (SOI) toposheets and Satellite images.
- Detailed Hydro-geological investigation in Core (Plant area) as well as Buffer Zone (10 km) so as to establish the water balance in the area
- To observe surface water features and their impact on groundwater balance.
- To ascertain the impact of proposed grinding unit on groundwater conditions of the surrounding area.
- To work out scope of Rainwater harvesting within the grinding unit and design suitable recharge system to the extent possible within the plant area.
- To suggest ways and means of creating artificial recharge to negate adverse impact on groundwater regime and their impact on ground water regime of the area
- Study of aquifer system of Core and Buffer Zone

• Preparation of Hydro-geological Report

Water Conservation measures including rainwater harvesting to augment ground water storage.

7.3.3 Physiographic, Drainage Pattern and Rainfall

The area forms a part of Indo- Ganga alluvial plain. Physiographical the district is mainly covered with sand dunes and alluvial plains, very small portion especially in the southwestern part of the district have small isolated hills. Alluvial plains are by and large flat. The general slope is north east to south west and is of the order of 0.48 m /km from north to south and increases towards south west. In absence of natural drainage the area is drained by main drain No 8 of the district. The canal system of the district, if required is also utilized to drain rainwater during rainy season. The soil of the area is fine to medium textured. It comprises sand to sandy loam. The soil of the area is classified as arid brown and sierozem.

7.3.4 RAINFALL & CLIMATE

The climate of the area can be classified as tropical, steppe, semi-arid and hot which is mainly characterized by the extreme dryness of the air except during monsoon months, intensely hot summer and cold winters. During three months of south west monsoon from last week of June to September the moist air of oceanic origin penetrates in the area and cause high humidity, cloudiness and monsoon rainfall. The period from October to December constitutes post monsoon seasons. The cold weather seasons prevails from January to the beginning of March and followed by the hot weather or summer season, which prevails up to the last week of June.

The normal rainfall of the area is about 481mm spread over 23 days, out of which 85% of the rainfall received during the monsoon period and 15% during non-monsoon period. Rainfall profile of the area has been shown **in Figure 7.1** and rainfall statistics of the study area in **Table 7.1**

| Year | Rainfall | Year | Rainfall |
|------|----------|------|----------|
| 1982 | 693.526 | 1998 | 612.565 |
| 1983 | 705.967 | 1999 | 300.626 |
| 1984 | 506.933 | 2000 | 528.171 |
| 1985 | 669.581 | 2001 | 499.539 |
| 1986 | 395-357 | 2002 | 278.702 |
| 1987 | 259.197 | 2008 | 612.3 |
| 1988 | 713.481 | 2009 | 380.9 |
| 1989 | 343.342 | 2010 | 485.7 |
| 1990 | 619.31 | 2011 | 331.3 |
| 1991 | 489.736 | 2012 | 232.8 |
| 1992 | 398.913 | 2013 | 285.5 |
| 1993 | 633.982 | 2014 | 340.8 |
| 1994 | 648.92 | 2015 | 455.6 |
| 1995 | 695.905 | 2016 | 472.5 |
| 1996 | 639.268 | 2017 | 428.6 |
| 1997 | 524.515 | 2018 | 477.1 |

Table 7.1: Rainfall Statistics of Study Area

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Figure 7.1: Rainfall Profile of Study Area

Regional Geology of the area

The table given below gives an insight into the distribution and characteristics of surface materials in different zones of the study area:

| Quaternary | Recent Newer Alluvium | | Aeolian deposits: wind-blown fine sand and silt, sand dunes, fluvial deposits, unconsolidated sand, silt, clay, kankars | |
|--------------|---|------------------------------|---|--|
| | Pleistocene | Older Alluvium | etc. Fluvial deposits: Unconsolidated gravel, sands, silts, clays and kankar. | |
| | Middle Miocene to lower Pleistocene | Siwalik system | Sandstone, boulders, conglomerate, siltstone, claystone, clays and sand | |
| Tertiary | Oligocene Eocene | Kasauli beds Subathu beds | Sandstone, claystone, siltstone and purple shales Limestone, shales (Gypseous) | |
| Pre-Cambrian | Delhi & Aravali systems | | Phyllites, mica schist, quartzites. | |

7.3.5 AQUIFER TYPES

The area has been found to be occupied by fairly thick and regionally extensive confined/unconfined aquifers exist down to a depth of 300m to 400m. In alluvium, sand, silt, kankar and gravel beds constitute potential water bearing zones. Ground water at shallow depths occurs under unconfined conditions, whereas at deeper levels, confined/semi confined conditions prevail.

7.3.6 LITHOLOGICAL DETAILS

The ground water in the area occurs in the alluvium of Quaternary age. The permeable granular zones comprising fine to medium sand and occasionally coarse grained sand and gravel. The study of the borehole data of the area generated by CGWB indicates that clay group of formations dominates over the sand group. The litho logical correlation clearly indicates the presence of clay layer at the top of the surface.

Granular zones that occur are inter bedded with clay in alluvial formations, form the principal groundwater reservoir. The upper surface of zone of saturation is represented by water level in dug wells. The basement also encountered at a depth of 300 meter near JHAJJAR. Two to four permeable granular zones with in an aggregate thickness varying between 23 meter and 50 meter have been encountered down to the depth of the bedrock.

7.3.7 WATER LEVEL, YIELD AND SEASONAL FLUCTUATION

The pre monsoon water levels in plant area are in general between 16 to 18mbgl and between 15 to 17mbgl in post monsoon period with a seasonal fluctuation of 1 to 2m. In general quality of water is saline and not suitable for human consumption. Area does not have deep tubewells due to the quality problem. However, few shallow tubewells exist in the area and have yield of 15oto 300 LPM.

YIELD POTENTIAL

During the investigation it was found that no deep tube wells are present in 1km radius of the investigated area. Few dug wells or DCB with a depth range of 25m are present in the area. These ground water extracting structures have discharge between 9,000 to 18,000 lit/hr.

GROUND WATER MOVEMENT

In the investigated area the movement of ground water is governed mainly by topography. The major hydro geological formations in the area are alluvium. In the alluvium formation, ground water occurs in pore spaces below the zone of saturation. The movement of ground water in alluvium is controlled by grain size and interstitial pore. The elevation of water table in the district varies from 206 m to 250m above mean sea level the average gradient of the water table is of the order of 0.48m/km. the general slope of water table in area is conversing towards the center of district or more precisely around Jhajjar. It is also observed that the flow of water in the western part of the district is towards south west to north east and south east to North West.

7.3.8 Groundwater Resources Evaluation

Ground water resources of an area can be distinguished under two categories: -

- 1. Dynamic ground water resources
- 2. Static ground water resources

7.3.9 Dynamic ground water resources

Dynamic ground water is that amount of water, which is found in the natural zone of fluctuation in an aquifer due to ground water recharge. Total ground water recharge (R_T) of the area can be estimated by assessing the various components of the following equation: -

 $R_T = Rr + Rs + R_I + S_I + Rc - \dots (I)$

Where,

Rr = Recharge from Rainfall

Rs = Recharge from Irrigation due to surface water

R_I = Recharge from Irrigation due to ground water

S_I = Recharge through surface water bodies

Rc = Recharge to confined aquifers.

7.3.10 Ground water resources in the core zone

The investigated area covers 21.78 hectares (217800 sq.m.). This land has been acquired from the WBIDC. The main source of ground water recharge is recharge due to rainfall by direct percolation.

RECHARGE DUE TO RAINFALL (Rr)

(A) BY GROUNDWATER TABLE FLUCTUATION METHOD

Recharge due to rainfall is computed by specific yield and water table fluctuation method as below: -

 $Rr = A \times S.F \times Sy$ ------(III)

Where,

Rr= Recharge due to rainfall in the investigated area

A = Rechargeable area = 21000 m²

SF = Seasonal fluctuation in water level = 1 m

Sy = Specific yield = 15% for Alluvium

= 21780sq.mx106 x 1 × 0.15

= Rr≈0.031 mcm/annum

(B) BY RAINFALL INFILTRATION FACTOR METHOD

In areas where groundwater level monitoring is not adequate in space & time, rainfall infiltration may be adopted. The ground water estimation committee, Govt. of India (1997) has suggested norms of recharge from rainfall under various hydro geological conditions. For areas as that of Jhanswa having alluvial area of sandy nature and favorable hydro geological conditions of shallow water level and well-developed drainage, rainfall infiltration factor has been suggested as 20% to 25% of the normal rainfall. At an average level infiltration factor for the area can be taken as 22%.

R_{r1} = Area x Annual Rainfall x R.I. factor

= 0.2178 x106 x 0.532x 0.22

= 0.025mcm/annum

As per the recommendations of Groundwater Estimation Committee (GEC), 2009, if the difference between the two, expressed as a percentage of rainfall infiltration method is greater than or equal to -20% or less than or equal to +20%, then the recharge is taken as the value estimated by the water table fluctuation method. If it is less than -20%, then it is taken as 0.8 times the value estimated by rainfall infiltration factor method. If it is greater than +20%, then recharge is taken as equal to 1.2 times the value estimated by rainfall infiltration factor method.

The difference between the two is 0.24 mcm/annum or greater than -20%, and then the recharge is taken as the value estimated by the water table fluctuation method ie. Rr \approx 0.031 mcm/annum.

TOTAL DYNAMIC RESERVES

Considering all above recharge components, total dynamic reserves in the investigated area will be:

 $R_T = R_r$

Rr≈0.031 mcm/annum.

GROUND WATER DRAFT

Ground water draft in the area can be estimated by assessing the various components of the following equation:

 $D_T = Di + Dd + Din + Dw + Det + Do----- (B)$

 D_T = Total ground water draft

Di = Ground water draft for irrigation in the area

Dd = Ground water draft for domestic use in the area

Din = Ground water draft for industrial use in the area

Dw = Ground water draft for irrigation & domestic use around

Det = Ground water draft by way of evapo-transpiration

Do = Ground water draft as outflow from unconfined aquifer

TOTAL GROUND WATER DRAFT OF AREA (DT)

Total water requirement for the proposed cement grinding unit will be550KLD. This entire water requirementwill be met out from Groundwater for this proposed project. Therefore; the total groundwater draft for project activities is calculated as below. Therefore, proposed groundwater draft within the core zone will be calculated based on 330 plant working days.

Dr= 0.181mcm/annum

Ground water resources (buffer zone)

The area of Buffer zone (314 Sq.km. – 0.021 sq.km = 313.98 sq.km.) lies in Matanhail block of Jhajjar district. This buffer zone has Alluvium as main aquifer. Main recharging factors in this area is recharge due to rainfall and due to return flow from the applied irrigation.

RECHARGE DUE TO RAINFALL (R_{RB})

(A) BY GROUNDWATER TABLE FLUCTUATION METHOD

The groundwater recharge for the buffer zone has alluvium as main aquifer. Entire area of buffer zone has been irrigated by open wells / tube wells, canal. It has been observed in the key wells penetrating alluvium aquifer that average rise in water table is 1 to 2m.

Recharge due to rainfall in the buffer zone is computed by specific yield water table fluctuation method as below: -

Rr1 = Area \times S.F. \times Sy

= 313.98 x 0.8 × 0.15

= 37.68mcm/annum

Rr≈ 37.68 mcm/annum

(B) BY RAINFALL INFILTRATION FACTOR METHOD

The ground water recharge can also be roughly estimated by rainfall infiltration method. For areas as that of Jhajjar district having alluvium blanket and favorable hydro-geological conditions, rainfall infiltration factor has been suggested as 20-25% of the normal rainfall by GEC, 2009. At an average level, infiltration factor for the area can be taken as 22%.

R_{r2} = Area x Annual Rainfall x R.I. factor

- = 313.98x 0.532 x 0.22
- = 30.74 mcm/annum

As per the recommendations of Groundwater Estimation Committee (GEC), 2009, if the difference between the two, expressed as a percentage of rainfall infiltration method is greater than or equal to -20% or less than or equal to +20%, then the recharge is taken as the value estimated by the water table fluctuation method. If it is less than -20%, then it is taken as 0.8 times the value estimated by rainfall infiltration factor method. If it is greater than +20%, then recharge is taken as equal to 1.2 times the value estimated by rainfall infiltration factor method.

The difference between the two is 0.2257 mcm/annum or +220%, then the recharge is taken as the value estimated by the water table fluctuation method ie. 37.68 mcm/annum.

RECHARGE DUE TO GROUND WATER APPLIED FOR IRRIGATION (RIB)

Ground water recharge from the return flow of irrigation water is normally taken as 30% of the total water applied for irrigation as suggested by the committee. Total groundwater applied for irrigation is 11.32 mcm/annum. Ground water recharge from the above factors is as under

37.74 x 0.3 = 11.32 mcm/annum

R_{IB} = 11.32 mcm/annum

RECHARGE DUE TO SEEPAGE FROM CANALS (SCB)

Recharge from the applied irrigation from canal water and seepage from canal is work out to be 15.88 mcm/annum.

TOTAL RECHARGE OF BUFFER ZONE (RB)

 $\mathbf{R}_{\mathbf{B}} = \mathbf{R}\mathbf{B} + \mathbf{R}_{\mathbf{B}} + \mathbf{R}_{\mathbf{IS}}$

- = 37.68 + 11.32 + 15.88
- R_B = 64.88 mcm/annum

GROUND WATER DRAFT OF BUFFER ZONE

From equation no. (B)

$D_{TB} = D_{iB} + D_{dB} + D_{inB} + D_{oB} + D_{etB}$

In the investigated area, ground water draft will occur due to applied irrigation, due to domestic use, due to industrial use. Evatranspiration losses are negligible as water table is deep. Hence ground water draft can be computed by reducing the equation (B) to:

 $D_{TB} = D_{iB} + D_{dB} + D_{inB}$

DRAFT DUE TO APPLIED IRRIGATION (D_{iB})

The ground water draft in the buffer zone takes place mainly by dug well and tube wells used for irrigation. There are about 5250 dug wells/tube wells tapping alluvium aquifer. It has been stated earlier that in the area ground water structures usually have a discharge of 9000 to 18000 lit/hr. The annual draft has been calculated after considering that these structures will operate only for four months a year. The annual ground water withdrawal from these wells is as under: With pumps

3500 x 72 x 120 = 30.24 mcm/annum

Without pumps

1750 x 36 x 120 = 7.5 mcm/annum

Hence groundwater draft due to applied irrigation works out to be 37.74 mcm/annum

DRAFT DUE TO DOMESTIC USE (DdB)

The population as per 2011 Census records is 116951 (for 10 km radius buffer zone). Demographic profile of study area shows that total number of household is 2713, 11231 and 9150 in primary, secondary and outer zone respectively. Sex ratio of 903, 889 and 895 (females per 1000 males) was observed in primary, secondary and outer zone respectively. Average household size is 5.1.

| Summary or | f Demographic Profile of the S | tudy Area |
|------------|--------------------------------|-----------|
|------------|--------------------------------|-----------|

| Zone | No. of Villages | Total Household | Total Population | Total Male Population | Total Female Population | Sex Ratio |
|-------------------------|--------------------|--------------------|---------------------|--------------------------|-------------------------------|-----------|
| Primary Zone (0 - 3 Km) | 5 | 2713 | 13624 | 7150 | 6474 | 903 |

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| Zone | No. of Villages | Total Household | Total Population | Total Male Population | Total Female Population | Sex Ratio |
|---------------------------|--------------------|--------------------|---------------------|--------------------------|-------------------------------|-----------|
| Secondary Zone (3 - 7 Km) | 21 | 11231 | 56948 | 31256 | 25692 | 889 |
| Outer Zone (7 - 10 Km) | 18 | 9150 | 46379 | 24519 | 21860 | 895 |
| Study Area (10 Km) | 44 | 23094 | 116951 | 62925 | 54026 | 896 |

Source: Census of India, 2011



Figure - 7.2: Demography Profile of the study area

In the buffer area, the population is about 116951(as per 2011 census). Considering 100 litters (0.1 m3) as domestic consumption in rural and semi urban area (as per GERC Report 1997), the total water withdrawal for domestic use will be:

DdB = 116951 x 0.1 x 365

= 4.2 mcm/annum

Cattle consumption is assumed to be 10% of projected domestic consumption, which comes out to be 0.42 mcm/annum. Ground water withdrawal for drinking and livestock uses by the villages located in the buffer zone has been estimated as 4.62 mcm/annum.

DdB = 4.62 mcm/annum

TOTAL DRAFT IN THE BUFFER ZONE

 $D_{TB} = D_{iB} + D_{dB}$

= 37.74 + 4.62

D_{тв} = 42.36 mcm/annum

SURPLUS DYNAMIC RESERVES OF BUFFER ZONE

Surplus ground water reserves are those reserves, which are available for utilization and are expected to recharge every year. Therefore, surplus reserves (Rw) are computed as follows:

 R_{WB} = Total Dynamic Reserves - Total ground water draft

 $R_{WB} = R_{TB} - D_{TB}$

R_{WB} = 64.88 – 42.36 = 22.52 mcm/annum

R_{WB}= 22.52 mcm/annum

Total recharge to the buffer zone is 64.88mcm/annum. Total ground water pumpage is 42.36 mcm, indicating that the area is under Semi Critical zone and present stage of ground water development is 65% of the long term ground water recharge.

The area of buffer zone lies in Matanhail tehsil. As per the available reports of Govt. agencies the ground water development in block Matanhail is given below in the table.

| Block name | Net annual ground Water availability (Ham) | Existing Gross Ground water Draft for Irrigation (Ham) | Existing Gross Ground water Draft for All uses (Ham) | Allocation Domestic Industrial Up to next 25 years (Ham) | Net Ground water Availability For future Irrigation Development (Ham) | Stage Ground Water Development (%) | Category of block |
|---------------|--|--|--|---|---|---|----------------------|
| Matanhail | 6272 | 4840 | 4873 | 44 | 241 | 78% | Semi Critical |

7.3.11 SUMMARY AND CONCLUSION

- The regional water level ranges between 15 m to 17m below ground level during the post monsoon period. Pre-monsoon water level are 16 m to 18m below ground level. The seasonal fluctuation is reported to be around 1 to 2m.
- Groundwater quality in general is marginally saline to saline in most part of the area. Except area near the canal.
- Fresh water also occurs in very small pockets in some of the dug cum bore wells. Aquifers having fresh water have very limited area extent both horizontally and vertically.
- Below a relatively thin layer of fresh water in dug well zone, the quality deteriorates with depth and hence area may not be suitable for installation of deep tube wells.
- As per the available report of CGWB, in Jhajjar district quality of ground water is saline beyond 80m below ground level.
- Ground water occurs both in un-confining, semi confining and confining conditions. Permeable granular zone of fine to medium sand form the main water bearing formations. Clay is the main dominating formation of the area.
- Granularzones like fine to medium sand occur inter-bedded with clay form the main water bearing formations.
- For buffer zone total recharge due to rainfall & irrigation return flow works out to be 64.88 mcm. Total discharge works out to be 42.36 mcm& stage of development is 65%.

- Total recharge from rooftop, paved are of plant area will be 28383cum. To accommodate that amount of water twelve injections well with desilting & filter pits are proposed.
- > Natural recharge through open land works out to be 11914 cum.
- > Total rainwater available for groundwater recharge through all these recharge structures works out to be about 40297 Cum.

7.4 RAINWATER HARVESTING

Rainwater harvesting is a technique of collection and storage of rainwater into natural reservoirs or tanks, or the infiltration of surface water into subsurface aquifers (before it is lost as surface runoff). Uses include water for garden, water for livestock, water for irrigation, water for domestic use with proper treatment, and indoor heating for houses etc. In many places, the water collected is just redirected to a deep pit with percolation. The harvested water can be used as drinking water as well as for storage and other purposes like irrigation.

It makes use of a natural resource and reduces flooding, storm water runoff, erosion, and contamination of surface water with pesticides, sediment, metals, and fertilizers. Also, it is excellent source of water for landscape irrigation, with no chemicals such as fluoride and chlorine, and any dissolved salts and minerals from the soil.

The basic principal of Rainwater harvesting systems is to channelize rainwater from a catchment surface (roof or other raised solid surface), through a distribution system (gutters, downspouts and pipes) and then into storage tank. The storage tank can be above ground or underground and can be made from a variety of materials including plastic and metal. Water storage tanks should be covered to prevent mosquito breeding and to reduce evaporation losses, contamination and algal growth.

The total fresh water requirement for project operations is 550 KLD (Phase-I :300 KLD & Phase-II:250 KLD). This requirement will be met by groundwater resources only.

7.4.1 ARTIFICAL GROUND WATER RECHARGE

NEED FOR ARTIFICAL GROUND RECHARGE

Based on the assessment of long term ground water recharge, total requirement & proposal of meeting this requirement from ground water but by doing this status of ground water become overexploited. To minimize the effect on ground water status, it is necessary that ground water storage of the area must be augmented by rainwater harvesting so that the existence of industry does not adversely affect the ultimate ground water status.

NATURE OF PROBLEM

Rainfall is only source of water in the area; rainfall & evapotranspiration are two major factors controlling the quantum of rainwater available for recharge. The investigated area receives rainfall for just 26 to 30 days a year. Thus, not only the total rainfall but also its availability is confined to few days during which entire water resources planning has to be done.

The other important factors controlling the natural recharge to ground water are rainfall intensity, hydrogeology & depth of water level. It is observed that majority of rainfall occurs in 3-5 major storms lasting only a few hours. Natural recharge to ground water is further restricted due to impervious hard strata. Some of water, which infiltrates during rainy period, is entrapped in the soil and it never reaches the water level. This water is ultimately lost due to potential evapotranspiration.

The rates of Potential Evapo–Transpiration (PET) are very high in the area. On an average, annual PET is higher than the rainfall in the area. Thus any artificial recharge by indirect techniques should be such that most of the water stored on surface is put to ground water within the shortest possible time to avoid losses.

As indicated earlier, hydro geologically the area is composed of sand and sandy loom and is most favorably constituted for artificial ground water recharge through Injection wells, recharging ponds etc. This will help in augmenting the groundwater storage around the tube wells and open wells so that they can sustain in long term.

7.4.2 Components of Rainwater Harvesting System

Rainwater harvesting system comprises components of various stages - transporting rainwater through pipes or drains, filtration, and storage in tanks for reuse or recharge. The common components of a rainwater harvesting system involved in these stages are illustrated here.

 Catchments: The catchment of a water harvesting system is the surface which directly receives the rainfall and provides water to the system. It can be a paved area like a terrace or courtyard of a building, or an unpaved area like a lawn or open ground. A roof made of reinforced cement concrete (RCC), galvanized iron or corrugated sheets can also be used for water harvesting.

| Type of Catchments | Run-off Coefficients |
|--|----------------------|
| Roof Catchments | |
| • Tiles | 0.8-0.9 |
| Corrugated Metal sheets | 0.7-0.9 |
| Ground surface coverings | |
| Concrete | 0.6-0.8 |
| Brick pavements | 0.5-0.6 |
| Untreated Ground Catchments | |
| Soil on slopes less than 10% | 0.0-0.3 |
| Rocky natural catchments | 0.2-0.5 |

Run-off Coefficients for Various Catchment Surfaces

- 2. Coarse mesh at the roof to prevent the passage of debris
- **3. Gutters:** Channels all around the edge of a sloping roof to collect and transport rainwater to the storage tank. Gutters can be semi-circular or rectangular and could be made using locally

available material such as plain galvanized iron sheet (20 to 22 gauges), folded to require shapes.

- Semi-circular gutters of PVC material can be readily prepared by cutting those pipes into two equal semi-circular channels.
- Bamboo or betel trunks cut vertically in half.

The size of the gutter should be according to the flow during the highest intensity rain. It is advisable to make them 10 to 15 per cent oversize. Gutters need to be supported so they do not sag or fall off when loaded with water. The way in which gutters are fixed depends on the construction of the house; it is possible to fix iron or timber brackets into the walls, but for houses having wider eaves, some method of attachment to the rafters is necessary.

- 4. Conduits: Conduits are pipelines or drains that carry rainwater from the catchment or rooftop area to the harvesting system. Conduits can be of any material like polyvinyl chloride (PVC) or galvanized iron (GI), materials that are commonly available. Since the oneday maximum rainfall is 150 mm (6.3 mm per hour) the diameter of conduit per 200 square meter roof areas will be 65 mm.
- 5. First-flushing: A first flush device is a valve that ensures that runoff from the first spell of rain is flushed out and does not enter the system. This needs to be done since the first spell of rain carries a relatively larger amount of pollutants from the air and catchment surface.
- 6. Filter: The filter is used to remove suspended pollutants from rainwater collected over roof. A filter unit is a chamber filled with filtering media such as fiber, coarse sand and gravel layers to remove debris and dirt from water before it enters the storage tank or recharges structure.
- **7. Storage Facility and Recharge Structures:** Storage tanks may be constructed with respect to the shape, size and the material of construction. Rainwater may be directed into the groundwater aquifers through any suitable structures like dug wells, bore wells, recharge trenches and recharge pits.

7.4.2.1 METHODS OF RAINWATER HARVESTING SYSTEM

Following methods shall carry out the rainwater harvesting

- 1. Roof top & paved area rainwater harvesting through injection wells.
- 2. Natural groundwater recharge through open land.

7.4.2.2 DESIGN OF ROOF TOP AND SURFACE RUNOFF HARVESTING SYSTEM

Rainfall intensity = 20mm/hr.

Rooftop rainwater runoff: -

The industrial roofs are of RCC finished with cement sand mortar. Most of the water can be collected with roof drains hence 85% rainwater can be available. About 15% of water is lost in evaporation etc. The water is collected through rainwater drains from rooftop. The roof should be finished to avoid percolation and **should be cleaned every year before rains**. The roof top rainwater & surface runoff rainwater shall be collected through existing rainwater drains.

Surface Runoff of Rainwater

The subsurface reservoirs are technically feasible alternative for storing surplus monsoon runoff. Wide spectrums of techniques are in vogue to recharge ground water reservoir. The artificial recharge techniques vary widely depending upon hydro geological studies of the area. The detailed hydro geological studies were carried out and it was found that water table of area is 15m to 17m in post monsoon period.

The maximum rate at which water can enter the soil at particular point depends upon infiltration capacity. The infiltration capacity depends upon soil type, moisture content, organic matter, vegetative cover, season, air entrapment, etc. The infiltration and percolation capacity are closely related. The infiltration takes place due to gravity but capillary force diverts gravity water.

The infiltration capacity of land formation is not suitable for surface percolation system hence for recharge of ground water reservoir through injection well system is proposed. This system will improve both quality & quantity of water.

Runoff coefficient for rooftop area can be taken as 85%. Similarly, for cemented area it has been taken as 70% and for open land it can be taken as 15%.

Average runoff coefficient taken for the area is as under:

| 1. Average ru | = 85% | | | | |
|---------------|-------|--|---|--|--|
| | | | - | | |

| 2. Average runoff coefficient for Paved area | = 70% |
|--|-------|
| 2. Average runoff coefficient for Paved area | = /07 |

3. Average runoff coefficient for open land (alluvium) = 15%

Design of Silting Pit

After getting the total amount of rainwater available for recharge with peak rate of runoff, it is necessary to design the required silting & filter pits of appropriate dimensions so that they can accommodate total runoff water. Design of silting pit in sandy/ sandy loam soil become very necessary because of the fact that clay has very fine particles usually remain suspended in the rainwater runoff and required time for the settlement. If rainwater in injected in the subsurface without passing it through the settling pit, it will retard the intake capacity of the inverted wells. This may result in clogging and short life of recharging structures. Settling pit design has one most important factor settling velocity, which can be calculated as under:

Settling Velocity

$$V_s = 418 (S_s - S) d^2 {(3t+70)/100}$$

Where,

 S_s = Specific gravity of particles = 2.65

S= Specific gravity of fluid = 1

d = Dia of particle = 0.02 cm

t = temperature = 40° C

 $= 418 (2.65-1) (0.02)^{2} {(3x40+70)/100}$

```
= 0.524 mm/sec
```

Vs = 0.0524 cm/sec

7.4.3 RAINFALL RECHARGE INSIDE THE INDUSTRIAL UNIT

A. Roof Top Rainwater Runoff

The Industrial area has different buildings with RCC and V shaped roof to collect water from flat RCC roof drain pipes has been constructed. These drain pipes are connecting to main rainwater collection pipes, provided with collection chambers. In case of V shaped roof rainwater is collected through gutters attached at the end of the roof and these gutters are connected to rainwater pipes. Total rainwater thus available will be diverted to recharge tube wells through PVC pipes and injected into the aquifer after passing through the filter pit.

Average Rainwater Runoff Available:

 $= A x R_f x A_v R_c$

Where,

A = Roof top area =36000 Sq.m.

R_f = Rainfall = 532 m.m. (Average)

Average rainwater runoff available

= 36000 x 0.532 x 0.85

= 16280 Cum. ----- (A)

B. Black Topped Roads and Cemented Area

The project area has approach roads from entry gate to different buildings. The said roads are 8m, 6m, and 2m wide. The project area also has parking and other cemented portion. Slope of these cemented area and roads are maintained in such a way that the available runoff should move towards the proposed open drains and this water is to be taken to the recharge tube wells. Total road and cemented area is about 32500 sq.m. Taking 70% as runoff coefficient for paved area, the availability of water has been worked out as under

Average Rainwater Runoff Available from Paved Area:

= A x Rf x AvRc Where, A = Total Paved area = 32500 Sq.m. Rf = Rainfall = 0.532 m.m. (Average) Average rainwater runoff available = 32500 x 0.532 x 0.7 = 12103 Cum. ----- (B)

C. Open land

The total area of industry is 217800 Sq.m, out of which rooftop area is 36000 Sq.m. paved area is 32500 Sq. m., Balance open land and greenbelt area is 149300 Sq. m. Taking 15% as natural recharge coefficient for sandy loam area the expected recharge to underground aquifer will be:

```
= 149300 x 0.532 x 0.15
```

= 11914Cum. ----- (C)

Total Rainwater Recharge

= (A) + (B) + (C)

```
=16280 + 12103 + 11914
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=40297Cum----- (i)
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7.4.4 DESIGN OF DESILTING & FILTER PIT WITH INJECTION WELL

Peak rate of runoff =0.85 x 0.02 x 36000 + 0.7 x 0.02 x 32500= 612 + 455

= 1067 Cum/hr. = 1067000 liters/hr.

Design of Silting Pit

Surface Loading = 1067000 x 0.0532= 56764.4 Lit/hr/m²

Assumed depth of Tank = 1.5m.

Design detention period $= 1.5/\{0.0532 \times 36\} = 0.785$ hours

Volume of water in 1 hr. = (1067000/1000) x (0.795/24) = 35.31 Cum

Area = 35.31/1.5 = 23.54 m²

Area of one pit = 23.54/5 = 4.70 m²

Hence Width = 2m Length = 2m

The rainwater of roof top and surface runoff shall be used for artificial recharge through Five injection wells having 20 m depth through silting pit $(1 \times 3 \times 1.5m)$ & filter pit $(2 \times 2 \times 2.8m)$.

7.4.5 PRECAUTIONS

While carrying out roof top rainwater harvesting & surface runoff utilization works following precautions must be taken so that maximum benefits are derived.

- The roof tops of the buildings to be used for collecting rainwater must be cleaned before the onset of first rainfall so that any dust, leaves, pollutants do not enter the filtration tank. Grating must be used to trap debris or tree leaves before rainwater enters the drainpipes.
- A steel wire mesh maybe enveloped around the slotted pipe of injection well to minimize the clogging of slots.
- The filter material must be washed with water before putting in the filtration tank as these may be covered with silt or clay. Every year, before the onset of first monsoon, the filter material must be taken out and washed and then put back in the filtration tank & other recharge structures so that silt/clay deposited during the filtration process of preceding year is removed and original filtration rate is achieved.

7.5 RISK ASSESSMENT AND DISASTER MANAGEMENT PLAN

7.5.1

Risk Assessment and Damage Control

Risk assessment is the determination of quantitative or qualitative value of risk related to a concrete situation and a recognized threat.

Activities requiring assessment of risk due to occurrence of most probable instances of hazard and accident are both onsite and off-site.

7.5.2 Hazard Identification and Risk Assessment (HIRA) for Clinker Grinding Units

The grinding unit's experiences lower accident rates compared with some other manufacturing industries. Physical hazards are likely to occur in Clinker Grinding Unit.

Mainly, the fatal accidents are visible on those working within the industry; impact on the health of local communities might also occur due to clinker grinding unit.

Physical Hazards

Injuries during Project operation are typically related to slips, tips, and falls; contact with falling / moving objects; and lifting / over-exertion. Other injuries may occur due to contact with, or capture in, moving machinery (e.g. dump trucks, front loaders, forklifts). Activities related to maintenance of equipment, including mills, mill separators, fans, coolers, and belt conveyors, represent a significant source of exposure to physical hazards. Such hazards may include the following:

- >>>> Falling / impact with objects
- ∞ Hot Surface burns
- ∞ Transportation
- ∞ Contact with allergic substances

Management measures to prevent the physical hazards in the proposed project

- ∞ Any person working with equipments having moving parts will personally ensure that equipment is de-energized, isolated and locked/tagged out.
- Any person working at an elevation more than or equal to 6 feet have a potential risk of falling from a height hence, will use fall protection systems such as anchor points, Body harness and connectors.
- » Any person doing flame welding, cutting or brazing will be provided with PPEs.
- » Safety helmets will be used to protect workers from any falling accidents.
- Barriers like toe boards or mesh guards will be provided to prevent items from slipping or being knocked off the edge of a structure.
- Danger areas will be clearly marked with suitable warning signs indicating that access is restricted to essential personnel wearing hard hats while the work is in progress.
- In case of any accidental issues, immediate and proper medical care will be provided at the project site.

Events Pertaining to the Manufacturing Process

The following areas are identified as hazard prone in case of Grinding unitwhere Disaster management plan is required.

(i) Handling of Cement

Cement is the fine dust which requires proper care in handling, storage and packing to avoid any health hazards.

(ii) Handling of Alternative fuel - Diesel (HSD)

Storage area will be designed to withstand the load of material stocked and any damage from the material spillage.

The possibility of fire may be occurred due to its flammable, ignitable and reactive property. Thus, adequate fire fighting systems will be provided for the storage area, along with the areas in the facility.

(iii) Handling of fine dust

The relevant PPEs will be provided during cleaning to the workers with sufficient care during the maintenance operation.

• Fire

Fire can be observed in the Chemical Gypsum spillage, Electrical rooms, Transformer area, Empty bag go-down, Diesel Storage tank & flammable gas cylinder storage area due to accidental failure scenario.

Suitable fire extinguishers, fire hydrant system and fire buckets will be provided for fighting the fire during emergency. Employees working in such areas will be imparted training for first aid firefighting to prevent/extinguish the fire at initial stage.

Electrocution

Fatal Accident due to carelessness during working hours may lead to electrocution.

Natural and Manmade Calamities which can lead to Emergency

(a) Earthquake

The state Haryana falls in the Seismic Zone IV, III & II and therefore vulnerable to earthquake. No major earthquake has occurred in Haryana in the recent past but certainly major tremors have been felt frequently. Unfortunately, District Jhajjar falls in Seismic Zone IV , which is considered as a High Damage Risk Zone and may trigger into a technological disaster, including collapse of old structures &buildings leading to further fire and explosions. Earthquake cannot usually be forecasted and therefore precautions immediately prior to such event are not usually possible. All the buildings have been constructed as per IS 1893 Part 4:2005 Criteria for Earthquake Resistant Design of Structures (Industrial Structures Including Stack-Like Structures) and IS 13920:1993 Ductile Detailing of Reinforced Concrete Structures Subjected to Seismic Forces to minimize the risk of Seismic loads. Apart from some of the counter-measures to be taken in foreseeable cases, emergency recovery plan has been considered by the emergency management team as per the situation and site conditions as follows:

| Step | Activity | Action By |
|---------------|--|------------------|
| Preparedness | Identify and constitute Emergency Response Team | Plant Key Person |
| | Identify ECC, if the identified ones are damaged | |
| | Control centers to be equipped with | |
| | Communication facilities | |
| | Emergency vehicles/ equipment | |
| | List of emergency contacts and suppliers | |
| | Medical facilities | |
| Action during | Do not panic. Raise alarm | Individual(s) |

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| Step | Activity | Action By |
|---|--|--|
| effective period | Avoid standing near to windows, external walls Stand near the columns or duck under sturdy furniture. Assemble at emergency assembly point as there may be | |
| Action after effective Period (Establish Emergency Control Center. Site Main Controller to direct all activities) | Take head count Activate emergency plan as situation demands Assess situation and initiate shut down of plants (if required) Initiate search and rescue (if required) Provide first aid to victims. Remove casualties Key persons to report to site Assess damage Undertake | Site Incident Controller Site Main Controller Coordinators – Fire and Security, Safety, Material, Medical, and Plant Key Person |

(b) Storm and Lightning

The contingency action during storm will be based on the weather nowcast warnings obtained from regional meteorological stations and the local meteorological department. The state experiences gusty winds, dust storms and thunderstorms during the month fromMarch to June. As per the wind Hazard Map, given by (NDMA, Haryana) the state falls in the High damage risk zone with the wind velocity of 47m/sec. However all the buildings are constructed as per IS 875 Part 3 : 1987 Code of Practice for Design Loads (Other Than Earthquake) For Buildings and Structures for resistant against wind and IS 2309 : 1989 Protection of Buildings and allied structures against lightning, BS 6659 : 1992 Protection of Structures against Lightning, NFPA 780 Standard for the Installation of Lightning Protection Systems 2004 Edition and IEC 1024-1-1 International Standard for Protection of Structures against Lightning for protection against storm and lighting. Apart from the major precautions taken, as a part of construction standards, several other important precautions need to be taken care of keeping in view the vulnerability of the area:

Prior to Storm

- 80 Establish regular contact with the local meteorological department
- 80 Establish distances from storm in order to execute preparatory actions in a shorter time
- Appraise the factory operations installations and consider the consequences that the emergency might have on operations and personnel
- Check the availability of tools, batteries, non-perishable foods and other materials that might be required
- Review all operations carefully to ensure that systems in jeopardy are taken care of or shut down
- >>>> Ensure the readiness of first aiders, emergency vehicles, medical Centre, medicines etc.
- Metallic sheets, loose materials, empty drums and other light objects will be properly secured
- ∞ Flush the drainage systems

During Storm

- ∞ Remain calm
- >>> Do not go outdoors
- >>> Do not seal the office completely as the suction created by the difference in atmospheric pressure inside and outside can rip open a window or door by breaking window glass panes

After the Storm

- >>> Do not touch electric lines
- >>>> Stay away from the disaster area
- Take special precautions in driving vehicles since the under-pavement could cave in due to the weight of automobile

(c) Flood

Floods have been a recurrent phenomenon in Haryana from time immemorial. Many part of the state of Haryana are prone to flooding. The devastating floods hit Haryana many times. This natural phenomenon occurs in Haryana due to its physiographic situation which results in depression or saucer shape zones around the Delhi-Rohtak-Hisar-Sirsa axis. Sometimes heavy precipitation and poor drainage system becomes a major contributing factor in causing flood as occurred in case of Rohtak flood, 1995. The state receives an average rainfall of about 650 mm. The average annual rainfall varies from less than 300mm in the western and south western parts of Sirsa, Hisar and Bhiwani districts along the Rajasthan border to over 1100mm in the north-eastern Shivalik hilly tracts of Panchkula and Yamuna Nagar districts along Himachal Pradesh border. Under Haryana flood manual, there are 102 vulnerable points in which Jhajjar is also one of all the points. Thus require special attention and flood action plan during monsoon. The flood action plan is given below:

- Declaration of emergency
- o To ensure that there is no blockage of drain at any where
- Safe assemble of plant employees and vehicles available inside the plant
- Head counting of all employees.
- Continuous cleaning at water out lets
- Shifting of legal and important documents at other safe places.
- Shut down of computers and shifting at heighted place or other dry place.
- JCB and other heavy machinery to be kept ready to break any blockages of water flow.
- Ensure availability of diesel engine Pump in sufficient qty. to clear out accumulated water in diff. area.
- Safe shutdown of plant
- Power back up from DG for emergency equipments operation.
- Maintain enough stock of diesel, emergency lights, foods and PPEs
- To update the situation time to time to Site Main Controller.

• The plant people will ensure that there will be no over flow of any material from storage tanks.

Post flood activities:

- Dewatering of accumulated water from blocked area.
- Cleaning of roads, plant buildings and offices.
- Checking of electrical equipments and instruments
- Maintenance or repairing of damage equipments
- Startup of plant as per Safe operating procedure

(d) Air Raid

Air raid warning would be obtained from the District Emergency Authority or Defense Authorities, during which total blackout of the entire complex should be considered. Some of the contingency actions to be considered during an air raid are as follows:

- » The Aviation Lights installed on highest point inside the factory should be switched off
- 🔊 All the lighting on the Streets should be put off
- »> All the plant lighting should be put off
- 80 Brown curtains shall be provided for all windows inside the building
- >>> Other emergency actions should be followed in addition as per the general procedure

(e) Food and Water Poisoning

The man- made hazard such as food and water poisoning to the workers, due to canteen food or other means, is another scenario which can lead to major emergency. In this case Medical Officer should be informed immediately by the senior most person available at site and then to incident Controller(IC) and Site Main Controller (SMC). In such situation doctors should act and if situation demands additional help such as ambulances, doctors and medicine should be arranged from nearby factories and hospitals. For such situations SMC may decide whether siren is required to blow or not and arrange to inform key persons in the factory and if required set up Emergency Control Centre (ECC) at Hospital. Functional Head (FH) of HR should rush to ECC and assist SMC for informing nearby hospitals, doctors and govt. authorities in consultation with the doctor. Plan to deal with food and water poisoning can be divided in following stages:

| Step | Activity | Action By |
|-------------------------|---|---------------------------|
| Planning and | Maintain adequate inventory/ supply of medicines, | Medical |
| Preparedness | saline water etc. and identify resources to obtain during emergency | Coordinator |
| | Impart awareness training regarding food/ water poisoning | |
| Action during effective | Identify the contaminant source | Site Main Controller, |
| Period (Establish | Seize contaminated material and keep out of | Medical |
| Emergency | circulation | coordinator and QC person |
| Control Center. Site | Take preventive measures for avoiding recurrence | |
| Main Controller to | | |

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| Step | Activity | Action By |
|------------------------|---|--------------------------|
| direct all activities) | Inform all concerned | |
| | Arrange to analyze samples | |
| | Arrange alternate supplies | |
| | Arrange medical assistance to the victims | |
| | Mobilize assistance from outside (if necessary) | |
| Action after effective | Conduct detailed epidemiological investigation to | Site Main Controller |
| period | identify the cause of contamination | Medical coordinator, and |
| | Take appropriate preventive measures to avoid | FH (HR) |
| | recurrence | |
| | Follow up on causalities | |

High Risk Categories and Preventive Measures

High Risk Categories and Preventive Measures are given in Table - 7.2.

Table - 7.2

High Risk Categories and Preventive Measures

| High Risk Categories | Prevention |
|--|---|
| Contractors | Contractor Safety Management |
| Young/Temporary Employees | Special Safety Induction Training |
| Direct Causes | |
| Traffic and Mobile Plant | Driver Training |
| Falls from Heights, Objects falling from Heights | Safety Procedures for Work at Heights, Overhead |
| | Protection |
| Caught in Starting/Moving Equipment | Plant Isolation Procedures |

7.5.3 Measures for Control of Occupational Health Hazards

- >>> Dust Exposure level of shop floor workers will be appropriately monitored.
- » Check of the effectiveness of preventive and control measures will be regular basis.
- An adequate supply of potable drinking water will be provided. Water supplied to areas of Plant food preparation or for the purpose of personal hygiene (washing or bathing) will be according to drinking water quality standards.
- 80 Where there is potential for exposure to harmful dusts by ingestion, arrangements will be made for clean eating areas, where workers are not exposed to the hazardous or noxious substances.
- » Periodic Audiometry test will be performed on workers exposed to high noise levels.
- ∞ Pulmonary function test will be done for worker working in dust emission area.
- Provisions will be made to provide OHS orientation training to all new employees to ensure that they are apprised of the basic site rules of work at / on the site and of personal protection and preventing injury to fellow employees.
- Ambulances and First aid treatment facilities will be made available for any emergency situation.

7.5.4 Disaster Management Plan

Definition

A major emergency in a work is one, which has the potential to cause serious injury or loss of life. It may cause extensive damage to property and serious disruption both inside and outside the work. It would normally require the assistance of emergency services to handle it effectively.

Scope

The aim of hazard control and disaster management is concerned with preventing accidents through good design, operation, maintenance and inspection, by which it is possible to reduce the risk of an accident, but it is not possible to eliminate it. Since, absolute safety is not achievable; an essential part of major hazard control must also include mitigating the effects of a major accident. An important element of mitigation is emergency planning, i.e. recognizing accidents as soon as possible, assessing the consequences of such accidents and deciding on the emergency procedures, both on-site and off-site, that would need to be implemented in the event of an emergency.

Objective

The overall objectives of the emergency plan will be:

- a) To protect plant personnel and general public.
- b) To prevent and minimize damage to property and to the environment.
- c) To help persons at site in a systematic manner meeting a disaster situation.
- d) To restore the affected areas back to normal as soon as possible.
- e) To review accident after it has occurred and to evaluate company's efforts in order to improve emergency management response in the future.

Elimination will require prompt action by operations and works emergency staff using, for example, fire-fighting equipment, water sprays etc. Minimizing the effects may include rescue, first aid, evacuation, rehabilitation and giving information promptly to people living nearby.

To deal with the below emergencies, the Emergency Plan is prepared.

Emergencies

(a) Stores

Possible Emergency: Possibility of catching fire in stores materials Preventive Measures

- Suitable fire extinguishers, fire hydrant system and fire buckets will be provided for fighting the fire during emergency.
- Stores staff will be imparted the training for first aid firefighting to prevent/extinguish the fire at initial stage.
- If required, arrange necessary materials like tools and tackles for rescue operation as advised by the personnel and administration In charge.
- Assist personnel and administration in charge in his operations
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(b) Oil Storage Tank - HSD Underground Tank

Possible Emergency: Possibility of catching fire at the oil storage tanks and fuel oil handling system and Oil spillage from storage tanks.

Preventive Measures

- Area will be declared as fire hazards area as "No Smoking and No Naked Flame Zone".
- Suitable fire extinguishers and fire hydrant system will be provided at the tank enclosure area and inside the pump room.
- Regular scheduled inspections of storage tank and the enclosed area will be carried out by the custodian with regard to proper earthling, presence of any combustible material or growth of wild vegetation, no breaches in the wire fencing, damage in the dyke wall etc.
- No naked flames will be allowed in and around fuel oil storage areas, if required for gas cutting/welding job for maintenance of the plant or machinery; a PTW will be taken for hot work with all proper safety precautions.
- Unloading of petroleum in bulk will not be allowed between sunset and sunrise. Tanker engine will be switched off before unloading and the tanker will be earthed.
- Dyke walls will be provided to prevent over flow/spillage of oil, Oil separation pit will be provided to prevent oil missing with the water drains.

Additional measures to deal with such hazards:

- Inform all concerned as per the Flow Chart of Information.
- Time Office and Engineer's Office to inform by available means of communication.
- All the supervisory staff along with the workers working nearby them should evacuate the site of emergency to a safe distance.
- Inform Local Fire Brigade for readiness.
- Take all appropriate steps to control/stop leakage of oil/fire/explosion.
- Inform Local Fire Brigade to proceed to site if the situation is felt to be out of control.
- Upon all compliance Site Emergency Response Committee will assess the environment and place of work and judge whether it is safe to resume work.
- Permit the people and machineries back to the work area.

All requirements and conditions of the Explosives License applied under the Petroleum Act, 1934 and Petroleum Rules, 2002 (with latest amendments) are implemented in the HSD storage area.

(c) Packing Plant

Possible Emergency: Possibility of catching fire in the bag go down. Preventive Measures

- Declared as "No Smoking or Fire" area.
- Suitable fire extinguishers and fire hydrant systems will be provided for fire fighting in emergency situation.

- Permit to work for hot work will be taken for any welding/gas cutting in that area.
- Adequate drainage to immediately drain out the water used in fire fighting will be provided to avoid water damage.
- The sheds will be properly ventilated.

(d) Silos

Possible Emergency: Collapse of silos

Hazards: Dust emission, material spillage and injury to person and damage to other property

Preventive Measures

- Structural soundness of silos
- To avoid over filing of silos (not to fill the silos up to the brim, not to keep silos too empty to avoid structural damages)
- o Install lighting arrestor at top of the silos bucket elevator

(e) Electrical Transformer

Possible Emergency: Catching fire in transformers

Preventive Measures

- o Predictive interlocks will be provided which will automatically give an alarm/trip the system.
- In case oil pressure inside the transformer tank increases, buchholtzrelay provided will sound an alarm and if necessary, will trip the transformer and thus avoid oil explosion.
- A diaphragm will be provided at the bottom of explosion vent to vent out high oil pressure whenever pressure is increased beyond limit.
- Fire extinguishers and sand buckets will be provided in the transformer room for firefighting due to explosion or during an emergency.

(f) Transformer Yard and HT/LT Sub-Station

Possible Emergency: Possibility of fire and explosion

Preventive Measures

All transformers will be separated by brick wall up to the height of transformer.

Soak pits of suitable capacity will be provided to collect the leaked transformer oil in case of fire and explosion.

- o Periodic maintenance of all electrical machinery apparatus will be done
- Soundness of insulation, proper ventilation and earthing arrangements will be checked regularly by department
- o In case of fire in HT transformer, first of all switch off 33/132 kV Incomer breaker
- o In case of LT transformer fire/explosion, switch off the transformer feeder from HT line
- o Emergency control room will be Informed for fire brigade and other actions

(g) Electrical Cable Tunnels

Possible Emergency: Catching fire in electrical cables inside the tunnels

Preventive Measures

Suitable fire extinguishers will be provided for fire provided for fire fighting. Overall good housekeeping will be maintained to avoid any fire risk. Exhaust fan provided to avoid any suffocation.

(h) Conveyor Belts

Possible Emergency: Catching of fire in conveyors

The main causes for conveyer fire are

- ∞ Gas cutting/welding
- ∞ Frictional heat

Preventive Measures:

- Suitable fire extinguishers will be provided for each transfer towers for firefighting during emergency
- Full cord system will be provided throughout. Its length to stop it in any emergency
- o Preventive checks on frictional parts like drum and lagging of drum will be done
- Suitable fire equipment will be kept at hand during gas cutting/welding

(i) Failure of Lifting Tools and Tackles and Pressure Vessels

Possible Emergency: Injury to person and damage to equipment *Preventive Measures*:

- All lifting tools and tackles and pressure vessels will be tested/examined by competent person
- authorized by chief inspector of factories, Govt. of Haryana as per statutory requirement and at defined frequency
- o Safe working pressure range will be maintained in the Air receiver tank/pressure vessels
- Safe Working Load will not be violated while using cranes, hoists, ropes, chains and other lifting tools and tackles, only authorized personnel will be allowed to handle the same
- Regular and periodic maintenance will be done.

(j) Oil Tanker

Possible Emergency: Toppling of Oil Tankers

Preventive Measures:

- o Speed limit signboards will be displayed, no vehicle will be allowed to move beyond 20 km/hr
- In case oil is toppled Plant Inventory department will be informed
- Sand will be sprayed on the oil to prevent further spread of oil and oil soaked sand is will be collected to fill in the land and cover with soil

(k) Working at Height

Possible Emergency: Fall from Height

Preventive Measures:

While working at height preventive measures will be taken as per procedure working at height.

- In Case of Emergency:
- o Information is immediately given to Emergency Control Room/ OHC

- o Information is immediately given to the Job Execution In-charge
- If a person falls from height and hanging try to immediately provide him any additional support and arrange for rescue operation by proper available tools ASAP (rope, ladder, And man basket with crane etc.) Stop the job immediately
- o Rescue team member will rush at site with rescue kit
- Emergency team to act as per Emergency organization structure
- o Rescuers to access the probable risk for rescuing the victim
- Rescuer has to use double fall protection as precaution (One rope grab falls arrestor/Winch fall arrestor and another is descender)
- Rescuer to use PN 56 model full body safety harness for rescue operation
- Victim will be rescued by trained rescuer only

(I) Stock Pile and Surge Pile

Possible Emergency: Engulfment in Stockpile (Gypsum) Preventive Measures:

- Take permission before climbing on stock pile
- o Pedestrian to maintain a safe distance from stock pile
- o Person to work under close supervision

In case of Emergency:

- o Inform immediately to Emergency Control Room/ OHC
- o Inform immediately to the Job Execution In-charge
- If a person buried under stockpiles
- o Stop the job immediately and related equipment by pushing emergency button if applicable
- o Cordon off the affected area
- Take out the material with the help of section in-charge
- o Rescue the affected persons and send to hospital

(m) Fire/Explosion

Possible Emergency: Fire/Explosion in any project and offices area

Preventive Measures:

In the event of fire wherever available; the local fire alarm signal will be activated. The fire alarm can be initiated by activation of one of the following systems:

- o Break glass Alarm Systems
- $\circ~$ Fire Detection Systems, i.e. Smoke Doctors.

7.5.4.1 Onsite Emergency Plan

The onsite emergency management of Wonder Cement Limited, Jhajjar is given here:

Disaster Control Management System

Disaster Management group plays an important role in combating emergency in a systematic manner. In addition; the implementation of an Emergency Response Plan relies on a number of response functions, which deal with different aspects of emergency, with the most important ones being:

- Communication and Co-ordination
- 80 Fire and Rescue (Emergency Mitigation) Emergency Control Team at Incident Site
- Medical Services
- ະ Security
- >>> Administration (Logistics and Welfare)
- 80 Co-ordination with external agencies

Emergency Control Centre (ECC)

An Emergency Control Centre (ECC) will be established from where emergency operations will be directed and co-ordinated. Centre will be activated as soon as on-site emergency is declared. The ECC will consist of one room, located in an area that offers minimal risk being directly exposed to possible accidents. During an emergency, the Emergency Management Staff, including the main controller will gather in the ECC. Therefore, the ECC will be equipped with adequate communication systems in the form of telephones and other equipments to allow unhampered organization and other nearby facility personnel.

Typical constitution of an emergency response committee is given below. Other members may be included based on the site requirements

- >>> Project Manager (Emergency Controller)
- » Nominated in-charge (one who acts in absence of the Unit In-charge)
- >>> Personnel and Administration In-charge
- ∞ EHS In-charge
- ல Plant and Machinery In-charge
- >>>> Section Area In-charges
- ∞ Time office In-charge
- ∞ Stores In-charge

The ECC will provide shelter to its occupants against the most common accidents; in addition, the ECC's communication system will be protected from possible shutdown. The ECC will have its own emergency lighting arrangement and electric communication systems operation. The ECC will always be ready for operation and provided with the equipment and supplies necessary during the emergency such as:

- >>>> Site layout showing assembly points and exit routes
- $\boldsymbol{\imath}$ Road maps leading to the site.
- » List of telephone Nos. of key personnel and other external agencies

- ∞ List of safety equipment (Dust Mask, Safety Helmet, Safety Harness etc) as applicable to the site and their storage locations.
- » List and location of firefighting equipments.
- ∞ Emergency power.
- ∞ Emergency hand lamps.
- ∞ Hand operated alarm / siren.
- >>> Public announcement system.

Emergency Communication

A standard emergency communication procedure in case of emergency shall be developed and communicated to all concerned in the site. The procedure shall give clear guidelines on how to communicate in the following cases.

- To alert workers in case of emergency
- To evacuate or take other action
- To report emergencies
- The emergency communication system shall be through Siren, Public Address System or any other system suitable to the site conditions.
- The alarms shall be distinctive and recognized by all personnel working in the site as a signal to evacuate the work area or perform actions identified in the Emergency Response Plan.

However, in spite of these precautions, it is required to foresee situation of major accident and plan for taking timely action to minimize the effects of such incident on the safety and health of persons working in the proposed project as well as those situated around the premises.

Internal telephone systems will be provided at work places. Shift In charge at site and other in charge also given on call handset (Walkie Talkie) for immediate communication to all concerned. The shift in charge /Site in charge will immediately inform department Head / in-charge, security and dispensary (if required). The department head / in-charge will inform Vice president and factory manager who according to severity of emergency will inform about the emergency to Senior President.

In case of devastating fire / major accident or hazard, immediate information will be given as per need to following through telephone operators who will be available round the clock over phone.

Onsite Emergency Planning for Grinding Unit

Following onsite measures will be taken to avoid/minimize the risk of accidents and other hazards in grinding unit are:

(i) Alarm and Communication Systems

Communication is crucial factor in handling an emergency. It is the practice at many plants that any employee can raise an emergency alarm, so allowing the earliest possible action to be taken to control the situation. Alarm systems vary and will depend on the size of the plant. There should be an adequate number of points from an audible warning, or indirectly, viz. a signal or message to a permanently manned location. The alarm should alert the people to implement appropriate emergency procedures. In areas where a high level of noise; it may be necessary to install more than one audible alarm transmitter or flashing lights. Automatic alarms may be appropriate on some sites.

There should be a reliable system for informing the emergency services as soon as the alarm is raised on site. The details of the communication arrangements should be agreed locally; in some cases, it may be advisable to have a direct line to the fire bridge. Predetermined code works to indicate the scale and type of the emergency may be valuable.

(ii) Fire-fighting System

In view of vulnerability to fire, effective measures will be taken to minimize fire hazard. Fire protection is envisaged through hydrant and sprinkler system, designed as per the recommendation of Tariff Advisory Committee of Insurance Association of India. The following areas in the power station are mainly susceptible to fire:

- ∞ Cable galleries
- ∞ Electrical switchgear/ MCC room
- >>>> Raw Material handling areas: Conveyors, transfer points, tunnels and storage yard.
- >>>> Transformers and turbine oil tank

For containment of fire and preventing it from spreading in cable galleries, section wise fire barriers with self - closing fire resistant doors will be provided. The ventilation systems, if any, provided in cable galleries will be interlocked with the fire alarm system, so that in event of a fire, the ventilation system will be automatically switched off. In order to avoid spreading of fire all cable entries opening in cable galleries, tunnels, channels, floors, barriers etc will be sealed with non-inflammable/Fire resistant sealing materials.

For detection and protection of the plant against fire hazard, any one or a combination of the following systems will protect susceptible areas:

- ℷ Hydrant system
- >>> Automatic high velocity spray system
- >>> Medium velocity spray system
- ∞ Portable fire extinguishers
- ∞ Fire alarm systems

A fire hydrant point will be provided throughout the premises. Automatic high velocity spray system will be provided for protection of transformers and cable galleries. Manual medium velocity spray system will be provided for protection of fuel oil and turbine oil storage tanks and coal conveyor galleries.

Water for hydrant, spray and sprinkler system will be supplied from the firewater pumps located in firewater pump house adjacent to Raw Water Reservoir. Adequate number of portable and mobile chemical fire extinguishers will be provided at strategic locations throughout the plant.

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Fire detection and alarm system will be provided at strategic locations throughout the plant. Fire detection and alarm system will be provided to detect fire/ smoke in vulnerable areas of the plant through smoke /heat detectors. Table - 7.3 and Table - 7.4 enlist case and Site-Specific Fire extinguishers respectively.

Table - 7.3

List of Extinguishers to be used as case specific

| S. No. | Location Name | Type of Extinguisher to be used |
|--------|---------------|--|
| 1. | Fuel Oil | Water spray, foam, dry powder or carbon dioxide |
| | | Do Not Use: water jet as an extinguisher, as this will spread the fire |
| 2. | HSD | Foam, Carbon dioxide, Dry Chemical Powder. Water may be used to cool |
| | | fire-exposed containers |
| 3. | Fly Ash | Non-Flammable |
| 4. | Gypsum | Non-Flammable |
| 5. | Metal dust | Certified class D Extinguishing agent |

| Table - 7.4 |
|---|
| List of Extinguishers to be used as Site specific |

| S. No. | Name of site | Type of Extinguisher | Numbers |
|--------|---|----------------------------|---------|
| 1. | Main Office (PandA, Civil. Mech, Elect) | ABC Powder type | 5 |
| 2. | QA/ QC Lab | ABC Powder type | 2 |
| 3. | Main DG | ABC Powder type | 1 |
| 4. | Bag Godown | ABC Powder type | 7 |
| 5. | Diesel Storage | Foam type | 1 |
| 6. | Store | DCP- Pressure Storage type | 2 |
| 7. | Main gate | DCP- Pressure Storage type | 4 |
| 8. | Electrical Panels | Carbon Di-Oxide Type | 6 |
| 9. | Switch Yard | Carbon Di-Oxide Type | 4 |
| 10. | Canteen | Carbon Di-Oxide Type | 1 |

(iii) Escape Routes and Evacuation Procedure

The escape route from each and every plant should be clearly marked. The escape route is the shortest route to reach out of the plant area to open area, which leads to assembly point. This route should be indicated on the layout plan attached to the On-site Emergency Plan.

As the major hazard is only due to fire, which has more or less localized impact no mass evacuation, procedures are required. Evacuation would involve only the people working very close to the fire area.

(iv) Counting of Personnel

All personnel working in the plant should be counted. Time office person should collect the details of personnel arriving at the assembly point. These should be checked with the attendances of regular workers, contract workers present in the site on the day of emergency. The accident control should be informed and arrangement should be made for searching missing person in the emergency affected area. The employees' address, contact number of next to kin should be maintained in the time office so that during emergency relatives of those affected due to emergency may be informed accordingly.

Information in respect of emergency should be given to the media and other agency.

(v) First Aid

A first aid center with adequate facilities will be provided. It will be maintained round the clock by a compounder cum dresser and a doctor. An auxiliary first aid squad will be identified, the members of which will be spread in each shift in different departments. In the event of an emergency this squad will augment medical services. An Ambulance which is available with plant will also be used at site to carry affected people to hospital. Assistance of these hospitals will be taken in case of any necessity.

(vi) Safety

The safety wing led by a Safety officer will meet the requirement of emergencies round the clock. The required safety appliances will be distributed at different locations of the plant to meet any eventualities. Poster/placards reflecting safety awareness will be placed at different locations in the plant area.

(vii) Emergency Drills

The emergency response plans and emergency preparedness level would be tested through the following drills:

- a. Table-top exercise (TTE)
- b. Functional exercise (FE)
- c. Full-scale exercise (FSE)

All elements/procedures of the On-Site Emergency Plan would be first tested through TTE and perfected to the extent possible. The Plan then would be modified/ updated. Functional Exercises basically to ensure proper functioning of various equipment such as the fire-fighting equipment and the fire hydrant system. The Full-Scale Drill would be conducted to know the level of preparedness of all teams. Initially, TTE and FE would be conducted periodically.

The following drills are conducted periodically:

- a. Plant Emergency Drill for fire
- b. Fire Drills at offices and admin building
- c. Plant Emergency Drills (fire scenario involving evacuation)
- (x) Personal Protective Equipments (PPEs)

Personal protective equipments play a vital role in overcoming major disastrous situation saving life during onsite emergency. List of recommended Personal Protective equipment (PPE) is given below in Table - 7.5.

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Table - 7.5

| Objective | Workplace Hazards | Suggested PPE |
|---------------------------|--|--|
| Eye and face protection | Flying particles, molten metal, liquid chemicals, gases or vapors, light radiation | Safety glasses with side-shields, protective shades, etc. |
| Head protection | Falling objects, inadequate height clearance, and overhead power cords | Plastic helmets with top and side impact protection |
| Hearing protection | Noise, ultra-sound | Hearing protectors (ear plugs or ear muffs) |
| Foot protection | Failing or rolling objects, points objects. Corrosive or hot liquids | Safety shoes and boots for protection against moving and failing objects, liquids and chemicals |
| Hand protection | Hazardous materials, cuts or lacerations, vibrations, extreme temperatures | Gloves made of rubber or synthetic material (Neoprene), leather, steel, insulation materials, etc. |
| Respiratory protection | Dust, fogs, fumes, mists, gases, smokes, vapors | Facemasks with appropriate filters for dust removal and air purification (chemical, mists, vapors and gases). Single or multi-gas personal monitors, if available |
| | Oxygen deficiency | Portable or supplied air (fixed lines). Onsite rescue equipment |
| Body / leg protection | Extreme temperatures, hazardous materials, biological agents, cutting and laceration | Insulating clothing, body suits, aprons etc. of appropriate materials |
| Fly Ash | Fly ash handling and storage | Wear dust-proof goggles and rubber or PVC gloves. When using large quantities or where heavy contamination is likely, wear: coveralls. At high dust levels, wear: a Full-face Class P3 (Particulate) or an Air-line respirator where an inhalation risk exists, wear: a Class P1 (Particulate) respirator. |

Summary of Recommended Personal Protective Equipment according to hazard onsite

Apart from this, all the employees are provided with helmets and safety shoes. It is statutory on the part of the company employees to wear the appropriate safety gear given while attending duty in the factory.

| S. No. | Details of PPE | Storage location |
|--------|--|------------------|
| 1. | Full Body Safety Harness, life-line and Fall arrester. | Main Stores |
| 2. | Gum Boot | Main Stores |
| 3. | Ear Plug | Main Stores |
| 4. | Welding Shield with Black Glass 3 1/4"X 4 1/4" | Main Stores |
| 5. | Hand Gloves Cotton 14" | Main Stores |
| 6. | Hand Gloves Leather | Main Stores |
| 7. | Hand Gloves Rubber Acid and Alkali Proof 14" | Main Stores |
| 8. | Goggle White | Main Stores |

Details of Personal Protective Equipments:

Proposed Clinker Grinding Unit with Cement Production Capacity of 5.0 MTPA (2.5 MTPA: Phase - I & 2.5 MTPA: Phase - II) and D.G. Set (6.5 MW) At Village: Jhanswa, Sub-Tehsil: Salhawas, Tehsil: Matanhail, District: Jhajjar (Haryana)

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| 9. | Safety Helmet FRP (White, Yellow, Green, Blue and Red) | Main Stores |
|-----|--|-------------|
| 10. | Dust Mask Confirming to IS 9473 1980 | Main Stores |
| 11. | Hand Screen for Welding with Handle | Main Stores |
| 12. | Barricading Tape 4" (300 Mtr. Rolles) | Main Stores |
| 13. | Safety Shoes with steel and Fiber Toe | Main Stores |

7.5.4.2 Off-Site Emergency Planning

The off-site emergency plan is an integral part of any hazard control system. It is based on those accidents identified by the works management, which could affect people and the environment outside the works. Thus, the off-site plan follows logically from the analysis that took place to provide the basis for the on-site plan and the two plans therefore complement each other. The roles of the various parties that may be involved in the implementation of an off-site plan are described below. The responsibility for the off-site plan will be likely to rest either with the works management or with the local authority.

Either way, the plan must identify an emergency coordinating officer who would take overall command of the off-site activities. Consideration of evacuation may include the following factors:

- In the case of a major fire but without explosion risk (e.g. an oil storage tank), only houses close to the fire are likely to need evacuation
- » If fire is escalating very fast it is necessary to evacuate people nearby as soon as possible.
- » In acute emergency people are advised to stay indoors and shield themselves from the fire.

Organization

Organizational details of command structure, warning systems, implementation procedures, emergency control centres include name and appointments of incident controller, site main controller, their deputies and other key personnel involved during emergency.

Communications

Identification of personnel involved, communication centre, call signs, network, list of telephone numbers.

Special Emergency Equipment

Details of availability and location of heavy lifting gear, specified fire-fighting equipment, fireboats etc.

Voluntary Organizations

Details of Voluntary organizations, telephone numbers nearby hospitals, Emergency helpline, resources etc are to be available with chief authorities.

Non-government Organizations (NGO)

NGO's could provide a valuable source of expertise and information to support emergency response efforts. Members of NGOs could assist response personnel by performing specified tasks, as planned during the emergency planning process.

>>> Evacuation of personnel from the affected area

- 80 Arrangements at rallying posts and parking yards
- ∞ Rehabilitation of evacuated persons

Chemical information

Details of the hazardous substances (MSDS information) and a summary of the risks associated with them are to be made available at respective site.

Meteorological information

There is to be arrangements for obtaining details of weather conditions prevailing at before the time of accident and weather forecasts updates.

Humanitarian Arrangements

Transport, evacuation centres, emergency feeding, treatment of injured, first aid, ambulances, temporary mortuaries.

Public Information

- >>> Dealing with the media-press office
- >>> Informing relatives, etc.

Assessment

- & Collecting information on the causes of the emergency
- » Reviewing the efficiency and effectiveness of all aspects of the emergency plan.

Role of local authority

Local Authorities like Panchayat, Sabha, Samiti, municipalities can help in combating emergency situation after assessing the impact scenario in rescue phase.

Role of police

Concerned police will be available for controlling and guidance at the accident site, organizing evacuation and removing of any seriously injured people to hospitals.

- 80 Co-ordination with the transport authorities, civil defence and home guards
- >>> Co-ordination with army, navy, air force and state fire services
- >>> Arrange for post mortem of dead bodies
- 80 Establish communication centre with easy contact with ECC

Role of Fire Brigade

The fire brigade is to be organized to put out fires and provide assistance as required during emergency.

Media

- The media is to have ready and continuous access to designated officials with relevant information, as well as to other sources in order to provide essential and accurate information to public throughout the emergency and to avoid commotion and confusion.
- Efforts are made to check the clarity and reliability of information as it becomes available, and before it is communicated to public.

- Public health authorities are consulted when issuing statements to the media concerning health aspects of chemical accidents.
- Members of the media are to facilitate response efforts by providing means for informing the public with credible information about accidents involving hazardous substances.

Role of health care authorities

- Hospitals and doctors must be ready to treat all types of injuries to causalities during emergency
- 80 Co-ordinate the activities of Primary Health Centres and Municipal Dispensaries to ensure required quantities of drugs and equipments
- Securing assistance of medical and paramedical personnel from nearby hospitals/institutions
- & Temporary mortuary and identification of dead bodies.

7.6 Conclusion

It is concluded that there will be no major risk involved due to proposed project. Proper precautionary measures along with periodic mock and emergency drills will be undertaken to minimize risks. All the personnel will be provided with Personal Protective Equipment (PPEs) will help to minimize the health hazards and accidental casualties. So, it is safe to say that there will be no major risk involved due to the proposed project.



CHAPTER - 8 PROJECT BENEFITS

8.1 INTRODUCTION

M/s. Wonder Cement Limited (WCL) believes holistic socio-economic development of the local community is the need of the hour. It truly believes that a company's prosperity is linked with that of its neighbouring communities. All the development related and community support activities are driven at all cement manufacturing and grinding units and have continuous on-going social interventions.

8.2 PROMOTION OF SOCIAL AND ECONOMIC STATUS

The beneficial aspects of the projects on the socio-economic environment of the area are in the areas of employment, service, trade, commerce, public utility, literacy, social awareness, health care facilities, recreation etc.

WCL will contribute substantially to the overall economy and social development of the area through Corporate Environmental Responsibility (CER) activities.

The operation zone of the CER activities for the proposed project will be extended to the nearby villages of project site. The company will propose plans to supplement the existing governmental programs among the local population. Environmental awareness will be created among people by organizing awareness camps. Developmental activities will be carried out keeping sustainable development in mind.

OUR VISION

"As Apart from focusing on business dynamics, the company lends unconditional support to its surroundings as part of its corporate social responsibility. The R.K. Group functions through the Shri Kanwarlal Patni Foundation providing funds and assistance to adjoining communities in terms of medical aid, educational development and other CSR programmes"

Based on the needs assessment and issues raised during PH, the CER programmes will be customized and implemented while partnering with government agencies, NGOs, local Panchayats for implementation. 'Village Development Committees' will be formed to engage with the community; plan, monitor and coordinate the CER activities. Major areas undertaken by WCL under CER activities have been shown below in **Figure 8.1**.

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Figure 8.1: Major areas under CER activities

8.3 PROPOSED ACTION PLAN FOR CER ACTIVITIES

Projects will be implemented based on community priorities and with significant local contributions. Important areas identified through socio-economic survey will be considered under CER activities. This approach will strengthen the groups and empower the members.

As per OM dated 01st May, 2018, company has proposed to spend a total of Rs. 13.45 Cr (Phase-I: Rs.7.7 Crores, Phase– II: Rs. 5.75 Crores) towards CER activities based on the proposed project cost of Rs. 830 Cr [Phase-1: Rs. 480Crores and Phase-II: Rs. 350 Crores].

The action plan has been prepared based on socio-economic survey and need-based assessment of the locals and issues raised during PH. Detailed action plan for the activities along with the budgetary allocation is given below:

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| | BUDGET FOR CER (Rs Lakh) | | | | | | |
|-----|--|------|------------------|------------------|------------------|------------------|----------|
| S. | 5. | | 02 nd | 03 rd | 04 th | 05 th | Tatal |
| No. | SECTOR | Year | Year | Year | Year | Year | Iotai |
| 1. | EDUCATION | | | | | | |
| а | Renovation of Govt. school buildings | 8 | 5 | 10 | 6 | 2 | 31 |
| b | Construction of boundary wall in govt. school | 3 | 3 | 5 | 4 | 4 | 19 |
| с | Construction of computers center in Govt school | 4 | 4 | 3 | 3 | 3 | 17 |
| d | Construction of playground in school | 5 | 6 | 7 | 6 | 5 | 29 |
| е | Work as per requirement of community | 3 | 8 | 8 | 10 | 8 | 37 |
| 2. | WOMEN EMPOWERMENT | I | 1 | I | | I | |
| | Providing woolen garment making machines to women of | | | | | | |
| а | surrounding villages after completion of sewing training imparted by WCL. | 5 | 5 | 2 | 7 | 5 | 24 |
| b | Renovation of Aanganwadi building in nearby villages | 6 | 5 | 4 | 5 | 6 | 26 |
| | Providing sewing machines to women of surrounding | | | | | | |
| с | villages after completion of sewing training imparted by WCL. | 3 | 4 | 5 | 3 | 5 | 20 |
| d | Establishment of training Centre for manufacturing handicraft items | 6 | 3 | 4 | 5 | 5 | 23 |
| e | Work as per requirement of community | 5 | 5 | 5 | 5 | 5 | 25 |
| 3. | DRINKING WATER | , | , | , | | , | |
| a | Providing & laving of drinking water pipeline in villages | 4 | 4 | 4 | 4 | 4 | 20 |
| b | Construction of water tank for animals in villages | 5 | 2 | 5 | 2 | 5 | 19 |
| c | Construction of water tank in villages | 3 | 3 | 2 | 3 | 2 | 13 |
| d | Installation of RO unit and water cooler in Govt. schools | 3 | - | 5 | 2 | 5 | 15 |
| e | Construction of Rain Water Harvesting Structure in Nearby village & school | 3 | 5 | - | 6 | 2 | 16 |
| f | Work as per requirement of community | 5 | 5 | 5 | 5 | 5 | 25 |
| 4. | INFRASTRUCTURE | - | | - | - | | |
| a | Construction of drainage system in village streets | 8 | 12 | 12 | 13 | 13 | 58 |
| b | Construction/Widening of Village roads of Jhanswa | 14 | 20 | 15 | 14 | 14 | 77 |
| с | Installation of solar street lights in nearby villages | 6 | 15 | 10 | 8 | 12 | 51 |
| d | Work as per requirement of community | 5 | 10 | 8 | 5 | 8 | 36 |
| 5. | HEALTH | - | 1 | | - | | <u> </u> |
| а | Construction of Govt. Health Center in nearby village | 20 | - | 15 | 15 | 15 | 65 |
| b | Providing Equipment & machinery in nearby village Govt. Hospitals | 20 | 15 | 10 | 13 | 11 | 69 |
| с | Work as per requirement of community | 10 | 10 | 10 | 10 | 10 | 50 |
| | Sub total | 154 | 154 | 154 | 154 | 154 | 770 |

Table - 8.1 Corporate Environment Responsibility Action Plan (Phase - I)

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Table- 8.2 Corporate Environment Responsibility Action Plan (Phase - II)

| | BUDGET FOR CER (Rs Lakh) | | | | | | |
|-----|--|-----------------|------------------|--------------------------|-----------------------|-----------------------|-------|
| S. | SECTOR | 1 st | 02 nd | 0 3 rd | 04 th Year | 05 th Year | Total |
| No. | SECTOR | Year | Year | Year | 04 rear | oy real | rotar |
| 1. | 1. EDUCATION | | | | | | |
| а | Renovation of Govt. school buildings | 6 | 5 | 10 | 5 | 2 | 28 |
| b | Construction of boundary wall in govt. school | 3 | 3 | 5 | 4 | 4 | 19 |
| С | Construction of computers center in Govt school | 2 | 4 | 3 | 3 | 3 | 15 |
| d | Construction of playground in school | 2 | 4 | 7 | 6 | 4 | 23 |
| е | Work as per requirement of community | 3 | 5 | 5 | 5 | 5 | 23 |
| 2. | WOMEN EMPOWERMENT | | | | | | |
| | Providing woolen garment making machines to women of | | | | | | |
| а | surrounding villages after completion of sewing training imparted by WCL. | 3 | 4 | 2 | 4 | 4 | 17 |
| b | Renovation of Aanganwadi building in nearby villages | 6 | 5 | 4 | 5 | 5 | 25 |
| | Providing sewing machines to women of surrounding | | | | | | |
| с | villages after completion of sewing training imparted by | 3 | 3 | 3 | 3 | 3 | 15 |
| | WCL. | | | | | | |
| Ь | Establishment of training center for manufacturing | 4 | з | з | з | з | 16 |
| u | handicraft items | т |) | , |) |) | 10 |
| e | Work as per requirement of community | 5 | 5 | 5 | 3 | 5 | 23 |
| 3. | DRINKING WATER | | | | | | |
| а | Providing & laying of drinking water pipeline in villages | 3 | 3 | 4 | 4 | 4 | 18 |
| b | Construction of water tank for animals in villages | 5 | 2 | 3 | 2 | 3 | 15 |
| С | Construction of water tank in villages | 2 | 3 | 2 | 3 | 2 | 12 |
| d | Installation of RO unit and water cooler in Govt. schools | 3 | - | 5 | 2 | 5 | 15 |
| е | Construction of Rain Water Harvesting Structure in Nearby village & school | 3 | 5 | - | 4 | 2 | 14 |
| f | Work as per requirement of community | 5 | 5 | 3 | 5 | 3 | 21 |
| 4. | INFRASTRUCTURE | | | | | | |
| а | Construction of drainage system in village streets | 7 | 9 | 9 | 9 | 12 | 46 |
| b | Construction/Widening of roads in nearby villages | 9 | 11 | 11 | 9 | 11 | 50 |
| С | Installation of solar street lights in nearby villages | 5 | 10 | 5 | 8 | 9 | 39 |
| d | Work as per requirement of community | 5 | 10 | 8 | 5 | 5 | 33 |
| 5. | HEALTH | | | | | | |
| а | Construction of Govt. Health Center in nearby village | 10 | - | 8 | 7 | 7 | 32 |
| b | Providing Equipment & machinery in nearby village Govt. Hospitals | 10 | 8 | 5 | 8 | 6 | 37 |
| с | Work as per requirement of community | 10 | 8 | 5 | 8 | 8 | 39 |
| | TOTAL | 115 | 115 | 115 | 115 | 115 | 575 |

The above proposed expenditure can be shifted year to year to other heads based on need.

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8.4 CONCLUSION

M/s Wonder Cement Ltd. will generate a fair amount of direct and indirect employment in the study region. The local economy will receive a boost due to employee spending and services generated by the company. The overall effect will improve the buying power of employees and locals, thus a higher standard of living viz. better education, improved health and sanitation facilities, housing etc. This will be envisaged as a major positive benefit, which will ultimately lead to the sustainable development of the region.



CHAPTER - 9 ENVIRONMENTAL COST BENEFIT ANALYSIS

9.1 ENVIRONMENTAL COST BENEFIT ANALYSIS

As per EIA Notification dated 14th Sept., 2006, as amended from time to time; the Chapter on "Environmental Cost Benefit Analysis" is applicable only, if the same is recommended at the Scoping stage.

As per the ToR prescribed by SEIAA, Haryana *vide* letter no. SEIAA/HR/2019/141 dated 05th July, 2019 for the proposed project, the Environmental Cost Benefit Analysis is not required.



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CHAPTER - 10 ENVIRONMENT MANGEMENT PLAN

10.1 INTRODUCTION

The environmental management plan consists of a set of mitigation, management, monitoring and institutional measures to be taken during implementation and operation of a plant to eliminate adverse environmental impacts or reduce them to acceptable levels. The present environmental management plan addresses the components of environment affected during the different activities forming part of the processes of the plant.

Based on the evaluation of impacts and baseline conditions, an Environmental Management Plan (EMP) has been delineated to mitigate the adverse impacts on environment of the area due to the proposed project.

The EMP is herein outlined after taking into account the various Acts, Rules and Regulations / Standards concerned with the environmental management.

Aims of EMP:

- 80 Overall conservation of the environment
- ® Minimization of waste generation and pollution
- 80 Judicious use of natural resources and water
- 🔊 Safety, welfare and good health of the work force
- 80 Ensure effective operation of all control measures
- 80 Vigilance towards probable disasters and accidents
- >>> Monitoring of cumulative and long-term impacts

Environmental Management Plan is detailed under the following heads:

- 🔊 Air Quality Management
- ல Noise Management
- ல Waste Water Management
- 🔊 Solid & Hazardous Waste Management
- 🔊 Energy Conservation
- 80 Greenbelt Development & Plantation Programme
- ல Occupational Health & Safety Measures.

10.2 FORMATION OF ENVIRONMENTAL MANAGEMENT CELL (EMC)

In order to maintain the environmental quality within the standards, regular monitoring of various environmental components is necessary. M/s. Wonder Cement Ltd. will constitute a full-fledged Environmental Management Cell (EMC) for environmental monitoring and management. The EMC team will take care of pollution monitoring aspects and implementation of control measures.

A group of qualified and efficient engineers with technicians will be deputed for maintenance, up keeping and monitoring of the pollution control equipments, to keep them in working at the best of their efficiencies.

10.2.1 Structure of EMC

Structure of Environment Management Cell at Wonder Cement Ltd. is given in Figure 10.1.



Figure 10.1: Structure of EMC at Wonder Cement Ltd.

10.2.2 Responsibilities of EMC

The responsibilities of the EMC include the following:

- >>>> Environmental monitoring
- » Timely Calibration of pollution control equipments and facilities.
- >>>> Specification and regulation of maintenance schedules for pollution control equipments
- 80 Ensuring that standards are maintained
- 80 Developing the greenbelt development/ plantation
- >>>> Ensuring optimum water usage
- 80 Carrying out the Environmental Management Plan
- Organizing meetings of the Environmental Management Committee and preparation of report and submission of such reports to management.

10.3 AIR QUALITY MANAGEMENT

The major air pollutants in a Clinker Grinding unit are the particulate matters from main stack and fugitive emissions due to material handling.

10.3.1 Stack Emissions & Control Technologies

To keep the PM emissions from stack below 30 mg/Nm³, major source of air pollution (i.e. Cement mill) will be provided with Bag House.

10.3.2 Fugitive Emissions, Sources & Control Technologies

10.3.2.1 Fugitive Emissions

Fugitive emissions are the air pollutants released in the air. Fugitive dust may be defined as "any solid particulate matter that becomes airborne by natural or man-made activities, excluding particulate matter emitted from an exhaust stack.

Factors that influence emissions

Factors affecting emissions include the following:

- >>> Moisture content of the material
- ∞ Type of material processed
- ∞ Type of equipment
- ∞ Operating practices employed.

10.3.2.2 Sources of Fugitive Emissions in Grinding Unit & Mitigation Measures

A. Storage of Raw Materials & Finished Product

Dust may be generated here due to carryover by wind. However, to avoid this, cement, clinker & fly Ash will be stored in silos & gypsum in covered shed. Details regarding storage facilities for raw material & product are given in **Table - 10.1.**

Table - 10.1

Proposed Storage Facilities

| Tupo of Matorial | Tupo of Storago | Capacity (Tonnes) | | |
|------------------|-----------------|-------------------|------------|--|
| Type of Material | Type of Storage | Phase - I | Phase - II | |
| Cement | RCC Silo | 3 x 7500 | - | |
| Clinker | RCC Silo | 40000 | - | |
| Fly ash | RCC Silo | 3000 | 3000 | |
| Gypsum | Covered Yard | 4500 | - | |

B. Transportation

Transportation of clinker to the clinker silo will be done through covered conveyor belt in a very controlled manner while that of the fly ash to fly ash silo will be done pneumatically from tankers. This helps in reducing the fugitive emissions.

Movement of heavy trucks/vehicles on the non-metallic road generates substantial quantity of dust emission. This is due to the presence of dust over the road, which is carried away by wind. To control the generation of dust, all the roads inside the plant premises are concreted. Regular sweeping of all the roads and floors will be done by vacuum sweeping machine. Sprinkling of water through tankers will be done on bare lands and roads.

C. Material Transfer

Dust will be generated from all the transfer points of belt conveyors. This will be controlled by providing bag filters at all transfer points. M/s. Wonder Cement Ltd. will install efficient Bag

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Filters at various material transfer points to control fugitive dust emissions. The details of the proposed Bag Filters are given below:

| S. No. | Location (Bag filter application) | Estimated Volume, m ³ /Hr. | Qty. |
|--------|--|---------------------------------------|------|
| 1. | Clinker unloading | 40000 | 2 |
| 2. | Clinker top | 30000 | 1 |
| 3. | Clinker transport point a. Clinker Extraction b. Belt Conv. Discharge | 2 X 6000 2 X 8500 | 4 |
| 4. | Clinker hopper top a. Hopper Top b. Hopper Extraction | 15000 8500 | 2 |
| 5. | Gypsum crusher | 15,000 | 1 |
| 6. | Fly ash silo top | 30000 | 1 |
| 7. | Fly ash transport & feeding a. Surge bin & Bucket Elevator boot b. Fly ash Bin Extraction & Transfer point | 5000 5000 | 2 |
| 8. | Cement transport equipment air sides & bucket elevator boot | 10000 | 1 |
| 9. | Cement silo top a. Cement Silo 1, 2 & 3 b. Cement Silo Bucket Elevator c. Cement Silo Bin Vent | 3 x10000 4000 2x5500 | 5 |
| 10. | Packing plant a. Bucket Elevator Feed b. Packer c. Auxiliary Equipment's | 3 x 10000 3 x 40000 3 x 25000 | 9 |

Table - 10.2 Proposed Bag Filter Details

10.3.2.3 Measures to Control Emissions

Measures that will be implemented in the Clinker Grinding unit to reduce the dust emission are as below:

Measures as per CPCB guidelines

- Installation of bag house with cement mill
- Enclosures will be provided for unloading operations
- Bag filters will be installed at all transfer points to reduce fugitive dust emissions.
- All the Roads inside the plant premises will be concreted.
- Regular sweeping of all the roads & floors will be done.
- Dust collected from air pollution control equipment will be totally recycled in the process.
- Fly ash will be pumped directly from the bulkers to silos pneumatically in closed loop such that fugitive emissions do not occur.
- Dry fly ash will be transported in closed system.

• The packing machine will be equipped with dust extraction arrangement.

> Maintenance of Bag House/Bag Filters

Maintenance of the Bag houses/ *Bag Filters* includes replacement of bags, checking the performance of the Bag House/*Bag Filters*, maintenance of ID fans etc.

The information on performance of Bag Houses in relation to the process/ production condition will be collected to optimize the efficiency of Bag Houses.

All the bag filters and bag houses in the plant will be designed for higher loads and gas flow, which can meet the proposed production.

> Compliance as per CPCB guidelines

For achieving effective prevention and control of potential fugitive emission sources in cement manufacturing plants, specific requirements along with guidelines have been given by CPCB, which will be followed specifically in the plant operation. Regular inspection will be carried out for all fugitive control system and records will be maintained as per CPCB guidelines.

1. Unloading Section

| S. No. | Guidelines | Control Measures to be provided |
|--------|---|---|
| 1. | The enclosures for the unloading sides should be flexible | Enclosures will be provided for all unloading |
| | curtain type material covering up to height of dumpers | operations, except moist materials like gypsum. |
| | discharge from the roof. | |
| 2. | A dust suppression system should be provided to spray | All the raw materials will be unloaded in covered |
| | water. The amount of water sprayed should preferably | areas and there will be no generation of Fugitive |
| | be optimized by employing proper design of spray | emission during unloading. Bag filters will be |
| | system. Suitable systems may be adopted to reduce the | installed at unloading sections. |
| | problems like choking, jamming of the moving parts. | |

2. Material Handling Section (Including Transfer Points)

| S. No. | Guidelines | Control Measures to be provided |
|--------|---|---|
| 1. | The enclosures from all sides with the provision for | Transfer point locations will be fully enclosed |
| | access doors, which shall be kept, closed during | during the operations. Regular sweeping of |
| | operation. Spillages should be periodically removed. | floors will be done. |
| 2. | Either water spray system should be provided for | Air borne dust at all transfers operations / points |
| | suppressing the air borne dust or dry extraction cum | will be controlled either by spraying water or by |
| | bag filter with adequate extraction volume. | extracting it to bag filter. |
| 3. | Spray sufficient quantity of water to moist the top layer | All the materials will be handled in covered areas. |
| | to avoid wind blowing of fines. | |

3. Clinker Storage Section

| S. No. | Guidelines | Control Measures to be provided | |
|--------|--|--|--|
| 1. | Bag filter may be provided before venting out the gases. | Bag filters will be provided at all material transfer points and bag house with cement mill. | |
| 2. | The enclosures should have a venting arrangement | Clinker will be stored in silo which will have a | |

| S. No. | Guidelines | Control Measures to be provided | |
|--------|--|--|--|
| | located at transfer point where clinker is dropped to the stockpile. The extraction /venting should be sufficient enough. Clinker stockpile access door should be covered by mechanical gate or by flexible rubber curtain. The access doors shall be kept closed at all possible times. | venting arrangement along with a bag filter. | |
| 3. | Extracted dust should be captured in bag filter and the collected dust should be avoided to feed back to the clinker stockpile, if layout permits. It may be recycled at last possible destination i.e., cement mill section through suitable arrangement, if possible. | Dust collected in bag filters / Bag house will be recycled in the process. | |
| 4. | Generally open storage of clinker should be avoided. Only in with following control measures. | a case of emergency clinker should be stored in open | |
| а | After earmarking the open storage area of clinker, a board should be erected to display the area earmarked. | Clinker will be stored in silos. | |
| b | During the period when the openly stored clinker is inactive, it should be covered fully by HDPE or tarpaulin type sheets to prevent wind blowing of fugitive dust. | Clinker will be stored only in silo which have a venting arrangement along with a bag filter, not in open area. | |
| с | Install three sided enclosures, which extend to average height of the stockpile, where ever feasible. | Not applicable since clinker will be stored in silos. | |
| d | Flexible type wind breaking enclosure should be provided covering the clinker retrieval area as wind barrier to prevent dust carry over by wind. The enclosure could be of light weight material like moulded plastic material or similar, which could be dismantled/assembled and shifted from one place to other. | Not required for closed storage of clinker. | |
| e | Travel areas path used by the front-end pay loader shall be paved with concrete. It should be regularly swept by high efficiency vacuum sweeper to minimize the material build – up. | Travel path of pay loaders will be paved and frequently swept. | |
| f | The possibilities especially in new cement project may be explored for the following: An enclosure fitted with bag filter could be located at the most central place adjacent to the clinker storage area. The pay loader moves to the fixed loading area from one end of the enclosure and the truck/trailer enters the enclosure from other end. | Clinker will be stored in silo provided with a bag filter at transfer points. It will be transferred through covered conveyor belts. | |

4. Storage of Gypsum and Fly ash

| S. No. | Guidelines | Control Measures to be provided | | |
|--------|---|---|--|--|
| 1. | The enclosure walls shall cover minimum two sides up | The storage of Gypsum will be under covered | | |
| | to roof level. | shed. Fly ash will be stored in silo. | | |
| 2. | Fly ash shall be pumped directly from the tankers to | Transfer of Fly ash from the tankers to silos will be | | |
| | silos pneumatically in closed loop or mechanically such | done pneumatically in closed loop; having bag | | |
| | that fugitive emissions do not occur. | filter of sufficient capacity to avoid fugitive | | |
| | | emissions. | | |

Proposed Clinker Grinding Unit with Cement Production Capacity of 5.0 MTPA (2.5 MTPA: Phase - I & 2.5 MTPA: Phase - II) and D.G. Set (6.5 MW) At Village: Jhanswa, Sub-Tehsil: Salhawas, Tehsil: Matanhail, District: Jhajjar (Haryana)

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| S. No. | Guidelines | Control Measures to be provided | | |
|--------|--|--|--|--|
| 3. | The silo vent shall be provided with a bag filter type system to vent out the air borne fines. | Dry Fly ash will be stored in silos provided with bag filter system to the vent out air borne fines. | | |
| 4. | If possible, the dry fly ash should be sent to closed silos. Otherwise, fly ash should be transported through closed belt conveyors to avoid wind carryover of fly ash. | Fly ash will be sent to closed silos by pneumatically enclosed loop. | | |

5. Cement Packing Section

| S. No. | Guidelines | Control Measures to be provided | | |
|--------|---|---|--|--|
| 1. | The packing machines should be equipped with dust extraction arrangement such that the packing operation is performed under negative pressure. The dust may be captured in bag filters. | Dust extraction arrangement for packing machines will be provided. | | |
| 2. | Adequate ventilation for the packing hall should be provided for venting out suspended particulate thereby ensuring dust free work environment. | Adequate ventilation for the packing hall will be provided for venting out suspended particulate. | | |
| 3. | The spilled cement from the packing machine should be collected properly and sent for recycling. The spilled cement on the shop floor should be swept by vacuum sweeping machines periodically. Proper engineering controls to prevent the fugitive emissions may include arrangements like providing guiding plate, scrapper brush for removing adhered dust on cement bag etc. | Spillage of cement on floor will be minimized and cleared daily to prevent fugitive emissions. | | |
| 4. | The vibratory screen provided for screening/ recycling spilled cement should be provided with a dust extraction arrangement to prevent fugitive emission from that section. | Emissions from the recycling screen will be prevented by installing appropriate dust extraction system. | | |

6. Silo Section

| S. No. | Guidelines | Control Measures to be provided | | |
|--------|--|---|--|--|
| 1. | The bag filter should be operated and maintained | The silo vent has been provided with a bag filter | | |
| | properly, especially the cleaning of bags to avoid | type system to vent out the air borne fines. | | |
| | pressurization of silos thereby causing fugitive emissions | Maintenance of the Bag filters will be done or | | |
| | from leakages etc. | regular basis which includes replacement of bags | | |
| | | performance check of the Bag filter, | | |
| | | maintenance of ID fans etc. | | |

7. Roads

| S. No. | Guidelines | Control Measures to be provided | |
|--------|--|---|--|
| 1. | The paved roads should be maintained as paved at all | All roads on which vehicle movement of raw | |
| | times and necessary repairs to be done immediately | materials or products will take place will be | |
| | after damages to the road if any. | concreted. | |
| 2. | Limit the speed of vehicle to 10 Km/h for heavy vehicles | Speed of vehicles will be limited, in addition to | |
| | with in the project premises to prevent the road dust | the signage boards will also be provided across | |
| | emissions. | all the premises. | |

Proposed Clinker Grinding Unit with Cement Production Capacity of 5.0 MTPA (2.5 MTPA: Phase - I & 2.5 MTPA: Phase - II) and D.G. Set (6.5 MW) At Village: Jhanswa, Sub-Tehsil: Salhawas, Tehsil: Matanhail, District: Jhajjar (Haryana)

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| S. No. | Guidelines | Control Measures to be provided | |
|--------|--|--|--|
| 3. | Preventive measures include covering of trucks and | Preventive measures will be employed to | |
| | paving of access areas to unpaved areas. | minimize dust build up on roads. | |
| 4. | Mitigative controls include vacuum sweeping, water | Regular sweeping of roads will be carried out to | |
| | flushing. | minimize emissions. | |

10.4 NOISE MANAGEMENT

Exposure of high noise level to workers for long duration may lead to certain occupational diseases. To mitigate the high noise level, following measures will be adopted.

- 80 Properly insulated enclosures with equipment generating excessive noise
- 80 Improved silencers within the equipment generating high noise
- >>> Installation of compressors and turbine in closed building
- Proper maintenance, oiling and greasing of machines at regular intervals to reduce generation of noise.
- Personal Protective Equipment (PPEs) like earplugs and earmuffs to the workers exposed to high noise level.
- >>> Development of Greenbelt of appropriate width inside the plant premises and at the plant boundary.
- » Regular monitoring of noise level and corrective measures accordingly.

10.5 WATER MANAGEMENT

10.5.1 Water Requirement

Total water requirement after proposed project will be 550 KLD (300 KLD for Phase - I and 250 KLD for Phase - II) and the same will be sourced from Ground water.

Status of Approval: Application for ground water withdrawal has been submitted to CGWA and the copy of the submission receipt is enclosed as **Annexure - 1** with this EIA/EMP Report.

Approx. 12 KLD domestic waste water will be generated; which will be treated in STP and the treated water will be utilized for greenbelt development / plantation and dust suppression.

10.5.2 Waste Water Management

- ∞ No waste water will be discharged from the Clinker Grinding Unit.
- Blow down water from cooling towers and boiler will be used in greenbelt development / plantation and dust suppression.
- Domestic waste water from plant will be treated in STP and treated water will be utilized for greenbelt development/plantation and dust suppression.
- ∞ Rain Water Harvesting will be practiced within the plant premises.

10.5.3 Water Conservation Measures

The following measures will be adopted to minimize use of water-

- 80 Reuse of domestic waste water after treatment for greenbelt development / plantation
- >>> Periodic preventive maintenance of water distribution systems
- 80 Rain water harvesting at plant site
- ∞ Training and awareness on water conservation measures.

10.5.3.1 Rain Water Harvesting

The demand of water for industrial purposes, agricultural purposes, domestic purposes and other miscellaneous purposes is increasing considerably around Wonder Cement Ltd. There are surface water sources in the area but in the deficiency of that surface water sources, it is equally important and urgent to ensure the full proof supply of required quantity of water throughout the year without any disturbance to industrial activity as well as without causing any negative water scarcity impact on the neighbouring villages. To achieve this target maximum quantity of Rain Water has to be harvested and reserved (charged) in the available sub-surface cavities or collected and infiltration must be facilitated through the management practice.

Rain Water Harvesting at Project is given in Table - 10.3.

| Table | - 10 |).3 |
|-------|------|-----|
|-------|------|-----|

Proposed Rainwater harvesting in Plant area

| S. No. | Method applied for Rain Water Harvesting | Quantity of rain water to be harvested (Cum) |
|---|--|---|
| Α. | PLANT AREA | |
| 1. | Roof Top Rainwater Runoff | 16280 |
| 2. | Black topped roads and cemented area | 12103 |
| 3. | Open Land | 40297 |
| Total Rainwater Recharge Potential in the Plant area(Cum/annum) | | 68680 |

Source: Hydro-geological Study Report

10.6 WASTE MANAGEMENT

10.6.1 Solid Waste Management

No solid waste will be generated in cement manufacturing process. Solid waste generation from the project and their end use is given in table below:

Table- 10.4 Solid Waste Generation and their End Use

| S. No. | Type of Waste | End Use / Disposal | |
|--------|---|--|--|
| 1. | Dust collected from air pollution control equipment | Totally recycled in process | |
| 2. | Sludge from Sewage Treatment Plant | Manure for greenbelt development/Plantation. | |

10.6.2 Hazardous Waste Management

No hazardous waste will be generated except the used oil which will be collected in drums, temporarily stored at earmarked place stored as per Hazardous & Other Waste (Management &

Trans-boundary Movement) Rules, 2016 and sold to the authorized CPCB recyclers. Details are given in table below:

Table- 10.5

Hazardous Waste Generation

| S. No. | Type of Waste | Waste Category | KL per Year | Treatment/Disposal |
|--------|---------------------|----------------|-------------|----------------------------------|
| 1. | Used Oil and Grease | 5.1 | 5.0 | Sold to CPCB authorized recycler |

10.7 CONCEPT OF WASTE MINIMIZATION, 3R's (REUSE, RECYCLE and RECOVER TECHNIQUES), ENERGY and NATURAL RESOURCE CONSERVATION MEASURES

10.7.1 Waste Minimization - 3R's

10.7.1.1 Reuse

- » Waste generated from construction activity will be utilized in levelling of land.
- » STP Sludge will be used as manure for greenbelt development / plantation.

10.7.1.2 Recycle

- ∞ Treated water from STP will be reused for greenbelt development / plantation and dust suppression.
- » The dust collected from pollution control equipment will be recycled in the process.

10.7.1.3 Recovery

The sludge generated from the STP will be used as manure for Greenbelt development / Plantation.

10.8 ENERGY & NATURAL RESOURCE CONSERVATION MEASURES

10.8.1 Energy Conservation

Energy management may broadly be said to have two aspects – energy conservation and energy efficiency. Energy conservation includes behavioural or process control measures which avoid wastage of resources, while offering provisions to harness or reuse waste energy. On the other hand, energy efficiency implies obtaining greater production output using the same energy input through application of technology.

The following measures have been proposed by Wonder Cement Ltd. for further reduction in specific energy consumption:

- 80 Installation of energy efficient lightings (like LED).
- ∞ Use of energy saving light fittings
- ல Installing low watt tube lights
- >>> Procurement of energy efficient machineries
- » Minimizing idle running of vehicle, machines and electrical appliances
- 80 Optimizing loads and periodic preventive maintenance and lubrication
- 80 Prevention of leakages of compressed air
- 80 Training, awareness and motivational programmes

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- >>> Maximum utilization of renewable energy resources
- >>> Installation of Solar water heating systems

10.8.2 Natural Resource Conservation

- 80 Fly ash will be blended with clinker to produce PPC. It conserves limestone reserves.
- ∞ Optimum use of ground water.
- » Recycle and reuse of domestic wastewater to conserve the fresh water.
- » Zero effluent discharge from industrial and domestic activities.
- ∞ Rain water harvesting system will be installed to conserve water and to replenish ground water resources of the area for long term sustenance of the industry.

10.9 GREENBELT DEVELOPMENT & PLANTATION PROGRAMME

Out of the total plant area i.e. 21.78 ha, 7.18 ha (33% of the total project area) will be developed under greenbelt/plantation. The company has social obligation to recreate the environmental status by providing thick canopy cover to suppress fugitive emission and provide aesthetic beauty. Trees form important part of the biosphere in the Eco-system. The ecological belt maintains the natural balance of the area.

A greenbelt of tree plantation around the plant site will help to arrest the particulate matter in the area and hence attenuate the pollution to a great extent.

The following characteristics will be taken into consideration while selecting plant species for greenbelt development and tree plantation.

- I. They should be fast growing and tall trees.
- II. They should be perennial and evergreen.
- III. They should have thick canopy cover.
- IV. The planting should be in appropriate alternate rows around the site to prevent lateral pollution dispersion.
- V. The trees should maintain regional ecological balance and conform to soil and hydrological conditions. Indigenous species should be preferred.

10.9.1 Greenbelt / Plantation at Plant Site

Due care will be taken to ensure that a greenbelt is developed around the plant area. Areas having low density vegetation will be systematically and scientifically afforested. The plantation scheme broadly covers the following areas:

- 80 Greenbelt formation around the plant site
- ® Afforestation of barren and non-industrial areas.

Apart from the green belt and aesthetic plantations for fugitive emissions and noise control, all other massive plantation efforts will be executed with the assistance and co-operation of the local community. The plantations of any of the above or their combinations will be decided in consultation with the local community and District Forest Department.

10.9.2 Objective

Greenbelt is a set of rows of trees planted such a way that they form an effective barrier between the plant and the surroundings. The main purpose of green belt development is to contribute to the following factors:

- >>> To attenuate noise levels generated from the plant;
- 80 To improve the aesthetics of the plant area;
- » To trap the vehicular emissions and fugitive dust emissions;
- ⁸⁰ To maintain ecological homeostasis;
- » To prevent soil erosion and to protect the natural vegetation; and
- ∞ To utilize the treated effluents.

Provision of wide green belt around the plant will be done to reduce any adverse impacts on the surrounding population due to emissions from the proposed activity. Plantation of grass, flowers, bushes and trees will be taken-up to reduce generation of dust from bare earth and to enhance the aesthetic/scenic value.

10.9.3 Plantation Programme

M/s. Wonder Cement Ltd. has proposed to develop 7.18 ha (i.e. 33% of the total project area) land under greenbelt / plantation. Native plant species will be given priority by WCL in consultation with local horticulturist.

The following greenbelt development plan which is in conformance with the "CPCB guidelines for development of greenbelt" (Probes/75/1999-2000) is proposed:

Greenbelt Along Plant Boundary

A green belt of adequate width along the plant boundary will be developed. The same will be developed with suitable selected species in consultation with the Forest Department authorities. This belt will act as a natural sink for gaseous pollutants and particulate matter, as well as a noise barrier.

Additional Greenbelt

It is proposed to have additional green belt in and around the areas that generates fugitive dust, crushing, loading and unloading facilities, corridor of belt conveyor route etc. It is expected that plants with 10m, 20m and 30m height can reduce dust pollution by 50%, 70% and 80% respectively. A combination of these, with appropriately selected species would be planted depending on the requirements and the extent of the problem.

Development Plan

For the purpose of pollution attenuation, the green belt shall be developed in three tiers as stated below:

First Tier – consists of shrub species having good levels of air pollution tolerance limits which is referred to as Tolerance zone.

Broken or interrupted: Trees shall be planted in between the shrub species at regular intervals in the first tier. The branching pattern and canopy formation of these species is not uniform (e.g. Palm varieties).

Drooping canopy: Trees shall be planted in between the shrubs in the first tier. The branches and leaves of these species droop downwards e.g. *Polyalthia longifloia*.

Second Tier - consists of trees having fast growth potential with conical canopy identified as Dispersion Zone.

Rotund type: The shape of the crown is more or less rounded; branches and leaves are closely arranged eg. *Ficus sp.* These tree species are suitable for the second and third tiers.

Flat topped canopy: The branches of the crown are uniformly shaped flat-topped crown and the spread of the crown is wide to cover a large area e.g. Cassia fistula. These tree species are suitable for the second and third tiers.

Third Tier - Trees having hairy leaves with thick and round canopy referred to as the Absorption Zone.

Cylindrical type: The branches and leaves form a close network and give the longitudinal spread eg. *Dalbergia sp.* These tree species are appropriate in between the trees in the third tier.

Chimney type: The branches give the appearance of long chimney. These tree species are apt for the outer rows of the third tier.

Conical type: The growth of main stem and horizontal branches appear in the form of a cone. eg. *Casuarina sp.* These tree species are suitable in the peripheral rows of the third tier.

| Year | Area (ha) | No. of Plants per Ha | Total Nos. of Plant | Species to be planted |
|-----------------------|-----------|----------------------|---------------------|--|
| 01 st Year | 1.0 | 1500 | 1500 | Local species viz., Neem, |
| 02 nd Year | 2.0 | 1500 | 3000 | Arjun, Bakain, Pilkhan, Papri, |
| 03 rd Year | 2.0 | 1500 | 3000 | Gulmohar, Amaltas, Jacranda, |
| 04 th Year | 1.0 | 1500 | 1500 | planted and also other |
| 05 th Year | 1.18 | 1500 | 1800 | Species will be selected with |
| Total | 7.18 | - | 10800 | due consultation with forest department. |

Table 10.6: Proposed Action Plan for Greenbelt development / Plantation

10.10

OCCUPATIONAL HEALTH AND SAFETY MEASURES

To control and minimize the risks at workplace, WCL will implement Health, Safety and Environment Policy with the following objectives:

- ∞ To prevent hazards
- $\, \boldsymbol{ \Join } \,$ To provide safe and healthy environment to all the employees.

The company, therefore, will be adopted the policy set below for the purpose of creating and maintaining safe and healthy environment.

10.10.1 Health, Safety and Environment Protection

- Health, Safety and Environmental Protection (HSE) is a part of Wonder Cement Ltd. commitment to conduct the activities in harmony with society and nature. The company expects all its employees to implement the HSE Policy.
- Integration process of H&S must start at the inception of a project since H&S consideration must be addressed at the design stage, which also helps in optimizing the support process.
- 80 WCL will have integrated Health, Safety and Environment Protection into the business strategies to add value to the enterprise, to manage risk and to enhance the reputation.
- The health and safety of the employees, neighbours, customers and consumers, and the protection of the environment will be company's priorities consistently pursued throughout.
- Each employee is made to comply with the HSE guidelines and the laws applicable to her or his area of operational responsibility.

10.10.2 Occupational Health and Safety Hazards

Following Occupational Health and safety Hazards will be there in the proposed Grinding Unit:

- භ Dust
- စာ Noise
- ℗ Electrical Hazards
- ∞ Fire and Explosion
- ∞ Other Hazards

(1) Dust

A) Risks involved

Following risks are involved:

- ✓ Presence of crystalline silica may cause silicosis and lung cancer
- ✓ Cement and other dust may cause lung disease
- B) Management Measures

Implementation of adequate dust control systems and good housekeeping will be done.

Exposure Levels as per Norms

| Description | Personal Exposure, time weighted average 8 hr. RSPM in µg/m³ | | |
|---|--|----------------|--|
| Description | Norms | Exposure Level | |
| Cement Dust (Fugitive Emission - Personal) | 5000 | 500-1000 | |

(2) Noise

C)

A) Risks involved

Following risks are involved:

- ✓ Hearing Impairment, Hypertension, Increase Pulse rate
- ✓ Annoyance, Tinnitus, Sleep Disturbances

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B) Management Measures

- ✓ Proper maintenance of machineries
- ✓ Installation of compressors in closed buildings
- ✓ Regular monitoring of noise level
- ✓ Display of noise level with permission level
- ✓ Display instruction to use of PPEs at high noise level area
- ✓ Periodic health check-up for Audiometry for the person working in high noise area
- C) Exposure Levels as per Norms

| S. No. | Area | CPCB Norms, dB(A) | Exposure Level, dB(A) |
|--------|--------------|--------------------------|-----------------------|
| 1. | Cement Mill | 90 dB (A) as per Factory | 75 - 80 |
| 2. | Packing Area | Act 1978 | 70 - 75 |

(3) Electrical Hazards

A) Risks involved

Following risks are involved:

- ✓ Electric Shock, Electric Burns, Fires and Explosions
- ✓ Persons Falling from Height, Dropping of Tools and Object
- B) Causes of Hazards
 - ✓ Insulation Failure, Equipment Failure, Poor Maintenance.
 - ✓ Wrong Work Methods, Substandard Material and workmanship
 - ✓ Unauthorized personal & Lack of Training and Knowledge, etc.
 - C) Management Measures

Following protection measures will be taken:

- ✓ Proper Earthing will be done as per IS 3043
- ✓ Low Voltage Supply will be ensured
- ✓ Isolating Transformers
- ✓ Double Insulated Tools
- ✓ Over Load Protection
- ✓ Protection Against Leakages (G.F.C.I.)
- ✓ Flame- Proof Equipment
- ✓ Lightning Protection
- ✓ Protection against Static Electricity and safe use of ladders and scaffolds

(5) Fire and Explosion

A) Risks involved

Following risks are involved:

Fire catching in store, bag godown, conveyors, cable tunnel, oil storage area, transformers and HT/LT substation etc.

- B) Management Measures
- Suitable fire extinguisher, fire hydrant system and fire buckets. Dry power type in oil and fire buckets are kept near transformer, cable, general store and office area. Hydrant line in coal,

clinker storage area and at all location in plant area. Fire tender is kept ready at plant main gate.

- Oil and Flammable Gases storage area fenced and declared as Fire Hazardous Area-No Smoking Area"
- Permit and safety instruction to use welding / gas cutting in the area of oil, gas, coal and bag godown.
- 80 Predictive interlock in transformers to give alarm and trip the system
- Adequate height of brick walls for separation of all transformers, soak pits for storage of oil leakages from transformers

(6) Other Hazards

- A) Risks involved
 - Following risks are involved:
 - >>>> Silo and Building Collapse
 - 80 Slips and Fall from working at height
 - 80 Failure of lifting tools, tackles and pressure vessel,
 - >>> Occupational injuries
 - ∞ Hit by moving, flying or falling object

B) Management Measures

Following protection measures will be taken:

- 80 Structural soundness of silos and buildings
- >>> Installation of light arrestors at all tall buildings
- » Permit to work at height with work instruction to use safety belts etc.
- 🔊 Testing of all lifting tools, tackles and pressure vessel
- 80 Safe working pressure is maintained in air receiver
- >>>> Safe working load for cranes and ropes etc.
- 80 Good housekeeping& Speed limit of 20km/hr in plant area
- 80 Display of emergency number at all suitable location
- >>>> Fire tender, ambulance and emergency staff ready at the plant main gate at all the time
- \mathfrak{W} First aid kits are kept at the sites and training provided
- ${\boldsymbol{\imath}}$ Use of mobile while driving, alcohol, smoking etc. are ban in plant area
- Proper illumination in office (250 to 300 LUX), plant area (100 to 150 LUX and road area
 (20 to 30 LUX)

10.10.3 Occupational Health Surveillance

In Grinding Unit, the occupational health surveillance of the employee will be done on a regular basis and records of the same will be maintained as per the Factories Act. The occupational health surveillance programme includes lung function; X-Ray and audiometric analysis on regular basis to observe any contraction due to exposure to dust and noise and corrective measures will be taken accordingly.

Vocational training programmes will also be conducted. Under vocational training the workers will be given training related to all safety and health aspects pertaining to their vocation and thereafter every quarter special training courses/ awareness programme for Malaria eradication, HIV and health effects on exposure to dust, heat, noise, chemicals will be organized for employed person.

A. Pre-Placement and Periodical Health Status

Pre / Post-employment check-up will be carried out by ourced agency and following test will be conducted:

- ∞ BMI (Body Mass Index)
- 🔊 Chest x ray PA view
- » Vision testing (Far & Near vision, colour vision and any other ocular defect)
- ରେ ଅପ
- 80 Haemogram (examination of the blood)
- 80 Blood Pressure & Blood Sugar Fasting
- ະ Serum Cholesterol
- 80 Renal Function Test (Blood Urea, Serum Creatinine)
- ∞ Liver Function Test (S. Bilirubin, Alk. Phosphatase, SGOT and SGPT)
- >>> Urine (Routine and Microscopic)
- ∞ Complete physical examination
- Post-employment occupational health check-up such as lung function, audiometry, CBC, Blood Sugar, Lipid Profile etc.
- Medical records of each employee will be maintained separately and will be updated as per finding during monitoring.
- >>>> Medical records of the employee at the end of his / her term will be updated.

B. Frequency of Medical Examination

Yearly and half yearly for workers working at highly dusty / hazardous area.

C. Personal Protective Devices and Measures

- >>>> Industrial Safety helmets
- ∞ Face shield
- 80 Zero power Safety goggles and Gas Cutting Goggles
- 80 Welders equipment for eye and face protection i.e. welding shield
- ல Ear muffs and Ear Plugs
- ⁸⁰ Full body Safety harness
- Leather hand gloves, Electrical hand gloves, Chemical hand gloves and Cut resistance hand gloves
- ∞ Safety net, Barricading net
- 80 Industrial safety shoes with steel toe
- 80 Retractable and fall arrestors
- ∞ Leather apron
- ∞ Reflective Jackets
- ∞ Protective clothing, etc.
- 🔊 Safety belt / line man's safety belt
- >>>> Rope grab fall arrestor.

D. Anticipated Occupational & Safety Hazardous

- 🔊 Heat Stress and Stroke
- ∞ Physical activity
- ∞ Dehydration
- ∞ Cardiovascular disease
- ະ Skin disorders
- ະ Dust Exposure
- හ Noise
- >>> Burns and shocks due to electricity

10.10.4 Implementation of OHS standards as per OSHAS/USEPA

The overall objective of the company is to provide a system that is capable of delivering healthy and safe workplace. Following measures have been adopted for implementation of OHS standards.

- 80 Well-equipped Occupational Health Centre with adequate paramedical staff
- 80 Routine and special investigation related to occupational health
- 80 Health surveillance and maintenance of health record
- ℵ Rules and procedure for effective implementation of Safety Health and Environment policy and made to know all employees
- >>> Round the clock Ambulance facility
- >>> Sufficient number of First aid boxes
- 🔊 Implementation of OHSAS 18001 for Occupational Health and Safety Management System
- 🔊 Implementation of ISO 14001 for Environment Management System
- >>> Formulation of OHS implementation team/ cell
- **®** Risk assessment of each and every activity
- 80 Implementation of OHS management program
- >>> Displaying the safety and health policy and instructions at various locations
- 80 Display of safe operating procedure (SOP) at various locations
- ∞ Job safety analysis
- 80 Carry out daily plant safety inspection by internal safety department
- 80 Investigation of fatal, serious accidents and near miss accident
- 80 Investigation of reports of occupational diseases
- Monthly safety meeting of all employees & workers to discuss last month accident if any, reason and corrective measures taken.

- © Organize campaigns, competitions, contests etc. to promote safety
- Organize safety training, seminars for safe working and safe vehicle and traffic movement within the plant premises and regular training for safe driving outside the plant premises
- Prepare annual reports of accidents and occupational diseases. Preparation and updating of
 Onsite Emergency Plan and Liaison with external agencies and authorities
- Ensure use of PPEs according to the job like helmet, safety shoes, goggle, dust mask, ear plug and hand gloves etc.
- Establishment of Occupational Health Centre for pre and periodic medical examination of workers and staff to detect any onset of occupational disease and corrective manures
- 🔊 Display Material Safety Data Sheets (MSDS) for use of every hazardous substance
- Implement the recommendations of HAZOP (A hazard and operability study) for examination of problems in existing process / operation that may represent risks to personnel or equipment
- Periodic Safety Audits both internal and external, review and implementation of recommendations.

10.10.5 Safety Committee

A safety committee will be constituted, which will be manned by equal participation from management and workers with the following functions:

- a) Accident prevention and control including ensuring the use of safety appliances.
- b) Publicity, propaganda, education and training.
- c) Assisting and cooperating with the management in achieving the aims and objectives outlined in the "Health and Safety Policy" of the occupier.
- d) Carrying out health and safety surveys for identifying unsafe working condition/practices, which causes accident.

10.10.6 Medical Facilities

The grinding unit will be provided with occupational health centre with first aid round the clock. Qualified doctor and ambulance will be there at site to render the medical assistance. Tie up arrangements will be there with nearest hospital and nursing home for the plant. First aid boxes will be kept in identified locations for emergency.

Apart from these, specialists will visit WCL Plant to render consultation. Camps for immunization, family planning, blood donation and free medical check-up programs will be organized on regular basis for employees as well as neighbouring communities.

10.10.7 Ambulance Services

The hospital will be provided with an ambulance to bring the patients to hospital in case of emergency.

10.10.8 First Aid Boxes

First aid boxes will be provided at prominent places with following items:

- 80 Small size sterilized dressing
- >>> Medium size sterilized dressing
- ∞ Large size sterilized dressing
- ⊗ Burnol Ointment
- >>> Packets of sterilized cotton wool
- 80 Bottle (120 ml) of cetramide solution (1%) of suitable antiseptic solution
- >>> Mercurochrome solution (in 2% water)
- ະ Scissors
- ∞ Adhesive plaster (2 cm x 1 m)
- 80 Sterilized eye pads in separate sealed packets
- ∞ Aspirin tablets
- ∞ Potassium Permanganate crystals

First aid boxes will be kept in every department for emergency. First aid training will be organized for the employees.

10.10.9 Plan & Fund allocation for Occupational Health Hazards

Plan and fund allocation to ensure the occupational health & safety of all contracts and subcontract workers is given in **Table - 10.7**.

Table - 10.7

OHS Expenses (Rs. In Lacs) Health Expenses Capex Revenue (per year) Grand Total (This includes cost of Medicines, first aid Material, repair of equipment, Visiting Specialist Fees, running & maintenance expenses of Medical Centre and Periodical medical examination expenses)

Fund allocation for Occupational Health Hazards

10.11 CORPORATE ENVIRONMENT POLICY

Corporate Environment Policy of M/s. Wonder Cement Limited has been enclosed as **Annexure - 7** along with this EIA/EMP Report.

10.12 BUDGETORY PROVISION FOR ENVIRONMENT MANAGEMENT

The budget proposed for the project and that for the environmental protection measures is given as below:

Capital Cost for the Proposed Project: Rs. 830 Crores (Phase – I: Rs.480 Crores & Phase- II: Rs. 350 Crores)

80 Cost for Environmental Protection Measures:

- ✓ Capital Cost: Capital Cost: Rs. 28 Crores (Rs. 14 Crores for each Phase)
- ✓ Recurring Cost: Recurring Cost: Rs. 4.0 Crores/annum (Rs. 2.0 Crores for each Phase)

EMP Cost Break-up is given in Table - 10.8 below:

Table - 10.8

Cost Break up of EMP

(Rs. In Crores)

| | | Ph | ase- I | Phase - II | | |
|--------|--|--------------|---------------------------|--------------|---------------------------|--|
| S. No. | Particulars | Capital cost | Recurring cost / annum | Capital cost | Recurring cost / annum | |
| 1. | Air pollution control | 7 | 1.0 | 7 | 1.0 | |
| 2. | Conveyor, storage and covering | 1.8 | 0.2 | 1.8 | 0.2 | |
| 3. | Water pollution control | 1.2 | 0.1 | 1.2 | 0.1 | |
| 4. | Noise pollution control | 0.4 | 0.05 | 0.4 | 0.05 | |
| 5. | Environment monitoring | 1.7 | 0.15 | 1.7 | 0.15 | |
| 6. | Occupational health | 0.10 | 0.25 | 0.10 | 0.25 | |
| 7. | Greenbelt and plantation | 0.60 | 0.1 | 0.60 | 0.1 | |
| 8. | Rainwater Harvesting | 0.50 | 0.10 | 0.50 | 0.10 | |
| 9. | Others (Housekeeping and Vacuum Sweeping Machine) | 0.70 | 0.05 | 0.70 | 0.05 | |
| | Total | 14 | 2 | 14 | 2 | |

10.13 IMPLEMENTATION PLAN OF CREP RECOMMENDATIONS

Following recommendations as mentioned in CREP guidelines of CPCB will be implemented:

1. Cement Plants which are not complying with notified standards shall do the following to meet the Standards.

Compliance: PM level at the stack will be maintained at< 30 mg/Nm³

2. Cement plants located in critically polluted or urban area will meet 100 mg/Nm³limits of Particulate matter by December, 2004.

Compliance: PM level at the stack will be maintained at < 30 mg/Nm³

 The new Cement Kiln to be accorded NOC / Environmental clearance will meet the Emission level of 50 mg/Nm³

Compliance: PM level at the stack will be maintained at < 30 mg/Nm³

4. CPCB will evolve load based standards by, 2003

Compliance:

5. CPCB and NCBM will evolve SO₂andNO_x Standards by June, 2004.

Compliance: Not Applicable

6. Cement Industry will control fugitive dust emission from all the Raw material and product storage and Transfer Points.

Compliance: CPCB guideline for control of fugitive emission will be implemented.

 CPCB, NCBM, BIS and Oil Refinery will jointly prepare a policy on use of Petroleum coke as a fuel in cement kiln by July, 2003.
 Compliance: Not Applicable 8. Industry will install continuous monitoring system by December, 2003 on the feed - back on continuous monitoring equipment's performance.

Compliance: Opacity meter will be installed at cement mill stacks for monitoring of PM level.

- Tripping in ESP to be minimized by July, 2003 as per recommendation of NFT.
 Compliance: Not Applicable
- 10. Industries will submit the target date to enhance the utilization of waste material by April, 2003.

Compliance: Not Applicable

- NCBM will carry out a study on hazardous waste utilization in cement kiln by December, 2003.
 Compliance: Not Applicable
- Cement industry will carry out feasibility study and submit target date to CPCB for cogeneration of power by July, 2003.
 Compliance: Not applicable

10.14 CONCLUSION

As discussed, it is safe to say that the proposed project will not be likely to cause any significant impact on the ecology of the area, as adequate preventive measures will be adopted to contain various pollutants within the permissible limits. Greenbelt development around the area would also be taken up as an effective pollution mitigative technique, as well as to control the pollutants released from the premises of Wonder Cement Limited.



CHAPTER - 11 SUMMARY & CONCLUSION

11.1 INTRODUCTION

M/s. Wonder Cement Limited is a unit of M/s R. K. Marble Group. Wonder Cement Limited is a cutting edge cement manufacturing company having a total cement production capacity of 12.0 MTPA (Line 1, Line 2 & Line 3). The state of the art manufacturing plant was established in technical collaboration with ThyssenKrupp and Pfeiffer Ltd. of Germany, the world leaders in cement technology, and it produces cement at par with international standards. Special effort was taken to ensure that the plant upholds the latest environmental norms and with the help of a bag house, ESP and a number of nuisance bag filters, the plant remains clean & dust free.

M/s. Wonder Cement Limited has two Grinding units- one in Dhule district, Maharashtra having a capacity of 2 MTPA and another grinding unit at Badnawar, Madhya Pradesh having a cement production capacity of 2 MTPA is under construction.

M/s. Wonder Cement Ltd. is proposing Stand-alone Clinker Grinding Unit with Cement Production Capacity 5.0 MTPA (2.5 MTPA: Phase - I & 2.5 MTPA: Phase - II) and D.G. Set (6.5 MW) at Village: Jhanswa, Sub-Tehsil: Salhawas, Tehsil: Matanhail, District: Jhajjar (Haryana).

As per EIA Notification dated 14th Sept., 2006, as amended from time to time; the project falls under Category "B", Project or Activity '3(b)' Cement Plants.

Application (Form-1/ToR and Pre-Feasibility Report) for obtaining Environmental Clearance for this proposed project was submitted to SEIAA, Haryana on 28th March, 2019.

The project was considered in front of State Expert Appraisal Committee (SEAC), Haryana for its First Technical Presentation (for ToR approval) on 30th April, 2019.

ToR Letter was issued by SEIAA, Haryana *vide* letter no. SEIAA/HR/2019/141 dated 05th July, 2019. Public Hearing for the Proposed Grinding Unit was conducted on 28th August, 2019.

11.2 JUSTIFICATION FOR THE PROJECT

The proposed project will be installed at a proposed site falling under the Village: Jhanswa, Sub-Tehsil: Salhawas, Tehsil: Matanhail, District: Jhajjar (Haryana). The site for this project was finalized considering the ideal location for the industries. Following factors were considered while selecting the site:

- 80 Availability of raw material i.e. fly ash
- >>> Power availability in this part of the State is good
- » Nearest to road & rail for transportation of raw material and finished product.

11.3 DETAILS ABOUT THE PROJECT

11.3.1 Brief Description of the Project

Brief description about the Project is given in Table - 11.1.

Table - 11.1

Brief Description of the Project

| S. No. | PARTICULARS | DETAILS |
|--------|---|--|
| Α. | Nature of the Project | Proposed Project |
| в. | Size of the Project | ✓ Cement - 5.0 MTPA (Phase-I: 2.5 & Phase-II: 2.5) ✓ D. G. Set - 6.5 MW |
| С. | Location Details | |
| 1. | Village | Jhanswa |
| 2. | Sub-Tehsil | Salhawas |
| 3. | Tehsil | Matanhail |
| 4. | District | Jhajjar |
| 5. | State | Haryana |
| D. | Geographical Extent of the Project Site | |
| 1. | Latitude | 28° 28' 16.15" N to 28° 28' 58.16" N |
| 2. | Longitude | 76° 24' 18.12" E to 76° 24' 40.75" E |
| 3. | Toposheet No. | 53 D/6, 53 D/7 & 53 D/10 |
| Ε. | Area Details | |
| 1. | Total Plant area | 21.78 ha |
| 2. | Greenbelt / Plantation area | 7.18 ha (33% of the total project area) |
| - | kimate aerial distance and direction from the nearest project | |
| г. | boundary) | |
| 1. | Nearest Town / City | Jhanswa (0.5 km in ENE direction) |
| 2. | Nearest National / State Highway | SH-22 (7.0 km in South direction) |
| 3. | Nearest Railway station | Jharli Railway Station (4.0 km in NNW direction) |
| 4. | Nearest Airport | Indira Gandhi International Airport, New Delhi (68 km in ENE direction) |
| 5. | National Parks, Wildlife Sanctuaries, Biosphere Reserves, Reserve within 10 km radius | Nahar Wildlife Sanctuary (6.0 km in South Direction) |
| 6. | Reserve Forests (RF) / Protected Forests (PF) etc. within 10 km radius | Bir Sarkar Reserve Forest (5.5 km in SSE direction) Nahar Reserve Forest (6.5 Km in South direction) |
| 7. | Water Bodies within 10 km radius | Jawahar Lal Nehru Feeder (Canal) (8.0 km in East direction) |
| 8. | Seismic Zone | Zone - IV [as per IS 1893 (Part-I) :2002] |
| G. | Cost Details | |
| | | Rs. 830 Crores |
| 1. | I otal Cost of the Project | (Phase - 1: Rs. 480 Crores & Phase - II: Rs. 350 Crores) |
| 2. | Cost for Environmental Protection Measures | Capital Cost – Rs. 28 Crores (Rs. 14 Crores for each Phase) Recurring Cost – Rs. 4.0 Crores (Rs. 2.0 Crores/annum for each Phase) |

Source: Pre-feasibility Report

11.3.2 Major Requirements for Proposed Project

11.3.2.1 Raw Material Requirement

Major raw material required for Cement production in Grinding Unit Clinker, Fly ash, Gypsum (Mineral and Chemical). Details regarding quantity of raw materials required, their source along with distance and mode of transportation are given in Table - 11.2

| Table | - 11.2 |
|-------|--------|
|-------|--------|

Raw Material Requirement

| | | Quantity (MTPA) | | | | | Distance / Made of | |
|--------|--------------------|-----------------|-------|------------|-------|---|---------------------|--|
| S. No. | Material | Phase - I | | Phase - II | | Source | Transportation | |
| | | PPC | OPC | PPC | OPC | | mansportation | |
| 1. | Clinker | 0.75 | 1.187 | 0.75 | 1.187 | Existing Cement Plant in Nimbahera, Dist. Chittorgarh, Rajasthan / Outsourced | 550 km; Road / Rail | |
| 2. | Fly ash | 0.437 | 0 | 0.437 | 0 | Thermal Power Plants, IGSTPP and CLP, Jharli, Jhajjar | 20 km; Road | |
| 3(a). | Mineral Gypsum | 0.063 0.063 | | 0.063 0 | 0.063 | RSMML, Nagaur/ Bikaner (Raj.) | 365 km; Road & Rail | |
| 3(b). | Chemical Gypsum | | | | | Dye & dye Intermediate plants in Surat Vapi Gujarat | 750 km; Road & Rail | |

Source: Pre-feasibility Report

11.3.2.2 Fuel Requirement

Details regarding quantity of fuel required, their source along with distance & mode of transportation for proposed project are given in Table - 11.3.

| Table - 11.3 |
|------------------------------------|
| Fuel Requirement for Grinding Unit |

| S. No. | Name | Quantity | Source | Distance & Mode of Transportation | Calorific value (Kcal./kg) | % Ash | % Sulphur |
|--------|--------------|--------------|-------------------|--------------------------------------|-------------------------------|-------|-----------|
| 1. | Diesel (HSD) | 300 Litre/Hr | IOC depot Jhajjar | 10 km | 10000 | - | 0.05% |

11.3.2.3 Other Basic Requirement

Other basic requirements for the proposed project are given in Table - 11.4.

Table - 11.4Basic Requirements for the Project

| S. No. | Particular | Requirement | | | Source |
|--------|-------------------------|-------------|----------|-------|--|
| | | Phase-I | Phase-II | Total | Source |
| 1. | Water (KLD) | 300 | 250 | 550 | Ground Water |
| 2. | Power (MW) | 13 | 12 | 25 | Haryana State Grid and D. G. Set (for emergency purpose) |
| 3. | Manpower (No of person) | 178 | 52 | 230 | Unskilled/ semi-skilled manpower from local area and skilled from outside/local. |

Source: Pre-feasibility Report

11.4 PROCESS DESCRIPTION

11.4.1 Cement Manufacturing Process

The cement manufacturing process largely comprises of the following steps:

- ல Clinker storage and handling
- 80 Fly Ash storage and handling
- ல Gypsum storage and handling
- 80 Clinker grinding, Cement production and storage
- ல Cement packing and dispatch

11. 5 DESCRIPTIONS OF ENVIRONMENT

11.5.1 Presentation of Results (Air, Noise, Water & Soil)

Baseline study of the study area was conducted during Summer Season (March to May, 2019). Ambient air quality monitoring has been carried out at 8 stations in the study area on 24 hourly basis. The concentration of $PM_{2.5}$ ranges between 28.2 to 46.5 µg/m³, PM_{10} ranges between 62.7 to 88.4 µg/m³, SO₂ ranges between 5.8 to 14.2 µg/m³ and NO₂ ranges between 13.6 to 25.1 µg/m³. CO concentration was observed between 0.52 to 0.96. PAH concentration was observed as BDL. Ambient noise levels were measured at 8 locations around the proposed plant site. Noise levels vary from 51.3 to 54.0 Leq dB (A) during day time and from 40.7 to 44.2 Leq dB (A) during night time.

The surface water analysis for the one sampling stations shows that pH is 7.14, Total hardness is 109 mg/l, Total dissolved solids vary from 132 mg/l, Biochemical oxygen demand 3.4 mg/l and Chemical oxygen demand 11.1 mg/l.

The ground water analysis for all the 8 sampling stations shows that pH varies from 7.28 to 7.93, Total hardness varies from 135 to 409 mg/l, Total dissolved solids vary from 278 to 781 mg/l. Soil monitoring was carried out at 8 locations and the analysis results show that soil is slightly alkaline in nature, pH value ranging from 7.19 to 8.08 with organic matter from 0.55% to 0.79%. Soil texture is silt loam. Total nitrogen ranges from 124.84 to 162.89kg/ha, indicates that nitrogen is in better to sufficient amount in this soil; Phosphorous is present in the range of 31.86 to 58.16 kg/ha which is lesser than the required average amount, whereas the Potassium is found to be ranging from 180.9 to 254.9 Kg/ha which is present in medium to sufficient amount in soil.

11.5.2 Biological Environment

Flora: Most common species found in the area are Babool (*Acacia nilotica*), Neem (*Azadirachta indica*), Aak (*Calotropis procera*), Amaltas (*Cassia fistula*), Shisham (*Dalbergia latifolia*), Dhatura (*Datura innoxia*), Aam (*Mangifera indica*), Ashok (*Polyalthia longifolia*) and Jamun (*Syzygium cumini*) etc.

Fauna: Commonly found species in the study area are Five Striped Palm Squirrel (Funambulus pennant), Common Myna (Acridotheres tristis), Jackal (Canis aureus), Chinkara (Gazella bennettii),

Bank Myna (Acridotheres ginginianus), Indian Peafowl (Pavo cristatus), Common Indian krait (Bungarus caeruleus) and Plain Tiger (Danaus chrysippus) etc.

11.5.3 Socio-Economic Environment

The population as per 2011 Census records is 116951 (for 10 km radius). Scheduled Caste fraction of the population of the study area is 23567 (20.15 %) and there is no Scheduled Tribe population in the region. Literacy rate of the area is 77.57%. Population of the workers engaged in occupation is 38.5%. Of these 27.6% are main workers and 10.8% are marginal workers. Remaining 61.45% of the total population is considered as non-workers.

11.6 ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

Anticipated environmental impacts due to operation of the proposed project along with mitigation measures are given below:

| Discipline | Anticipated Impact | Mitigation Measures |
|------------------------|--|--|
| Construction Phase | | |
| Air | Increase in dust and NO _x concentration due to levelling activity and Heavy vehicular movement | * Sprinkling of water in the construction area and on unpaved roads * Proper maintenance of vehicles. * Use of vehicles meeting PUC norms |
| Noise | Increase in noise level due to Construction Equipment | * Equipment will be kept in good condition to keep the noise level within 90 dB (A) * To provide necessary protective equipment e.g. ear plugs, earmuffs |
| Water | Increase in suspended solids due to soil run-off during heavy precipitation due to Loose soil at construction site | * Adequate drainage system for runoff water during construction phase |
| Operation Phase | | |
| Air | Increase in concentration of Particulate Matter Emissions | Installation & maintenance of pollution control equipment like Bag House / Bag Filters Storage of clinker, fly ash and cement in silos Storage of gypsum in covered shed. All the roads inside the plant premises will be concreted Vacuum Sweeping for better housekeeping Water sprinkling to reduce the PM emission level CPCB and CREP guidelines will be followed |
| Noise | Increase in noise level within the plant area | * Equipment designed to conform to occupational noise levels prescribed by regulatory agencies * Earmuffs/ Earplugs will be provided to persons working in high noise zone * Properly insulated enclosures will be provided to equipment making excessive noise * Installation of Turbine & Compressor in closed |

| Discipline | Anticipated Impact | Mitigation Measures |
|-------------------------------|---|--|
| | | building * Greenbelt development/ plantation will help in attenuating noise |
| Water | Generation of waste water | Domestic waste water from plant canteen and toilets will be treated in STP and treated water will be utilized for greenbelt development/plantation. Blow down water will be used in Greenbelt and dust suppression |
| Soil | Degradation of soil quality due to settling of air borne dust | * Use of efficient pollution control systems * Used oil generated from the plant will be stored in designated place to prevent contamination in soil. * All the raw material will be covered * All the raw material movement roads will be concreted to minimize fugitive dust emission |
| Biological Environment | | |
| a. Terrestrial Ecology | Positive as greenbelt of appropriate width has been developed and maintained by M/s. Wonder Cement Ltd. in the area | - |
| b. Aquatic Ecology | No impact as no effluent will be discharged outside the plant premises | - |
| Socio-economic Environment | Overall development of the area in respect of the infrastructure development, educational growth, health facilities etc. | - |

11.7 ENVIRONMENTAL MONITORING PROGRAMME

Details of the environmental monitoring schedule / frequency, which will be undertaken for various environmental components, as per conditions of EC / CTE / CTO are given in Table - 11.5.

| | r osci rojecci monitori lig | | | | | |
|--------|------------------------------|---|--|--|--|--|
| S. No. | Description | Frequency of Monitoring | | | | |
| 1. | Meteorological Data | Hourly | | | | |
| 2. | Ambient Air Quality | Twice a Week & Continuous Online Monitoring | | | | |
| 3. | Stack Monitoring | Monthly & Continuous Online Monitoring | | | | |
| 4. | Water Quality | As per CGWA NOC | | | | |
| 5. | Water Level | Monthly as per CGWA NOC | | | | |
| 6. | Noise Level Monitoring | Monthly & as per EC / CTO | | | | |
| 7. | Medical Check-up of Employee | Yearly | | | | |

Table - 11.5 Post Project Monitoring

11.8 ADDITIONAL STUDIES

Additional Studies conducted as per ToR points issued by SEIAA, Haryana *vide* letter no. SEIAA/HR/2019/141 dated 05th July, 2019 are Hydro-geological Study & Rain water Harvesting Plan and Risk Assessment & Disaster Management Plan.

11.9 PROJECT BENEFITS

The proposed project will help in combating the growing demand of cement in the market & hence will help in the economic growth of the country. M/s. Wonder Cement Limited will be actively involved in the CER activities in the nearby villages of the project site. Infrastructure development in the nearby villages, creating educational facilities, empowering women through self-help groups, gainful employment for rural, health awareness programmes, assistance in social forestry programmes in the area, are some of the activities further to be undertaken under CER planning phase manner for the development and upliftment of the society. As per OM dated o1st May, 2018, company has proposed to spend a total of Rs. 13.45 Cr (Phase-I: Rs. 7.70 Crores, Phase - II: Rs. 5.75 Crores) towards CER activities based on the proposed project cost of Rs. 830 Cr [Phase-1: Rs. 480 Crores and Phase-II: Rs. 350 under CER activities in phased manner under various sectors.

11.10 ENVIRONMENT MANAGEMENT PLAN

The major source of pollution in Grinding unit is particulate matter. Air pollution is the major concern to be looked upon for the project activity. No major water, noise and soil pollution is envisaged from the project activity. Various mitigation measures have been proposed to take care of the environment in respect of air, water, noise, soil and the green cover of the project site and nearby villages.

| Particulars | | Details |
|------------------------|------------|---|
| Air Quality Management | ß | Installation of Bag house with cement mill. |
| | લ્લ | Enclosures will be provided for unloading operations. |
| | C 3 | Bag filters will be installed at all transfer points to reduce fugitive dust emissions. |
| | C 3 | All the Roads inside the plant premises will be concreted. |
| | લ્લ | Regular sweeping of all the roads & floors will be done. |
| | છ | Dust collected from air pollution control equipment will be totally recycled in the |
| | | process. |
| | 63 | Fly ash will be pumped directly from the tankers to silos pneumatically in closed |
| | | loop such that fugitive emissions do not occur. |
| | C3 | Dry fly ash will be transported into closed system. |
| | છ | The packing machine will be equipped with dust extraction arrangement. |
| Water Management | ß | No waste water will be discharged from the Clinker Grinding Unit. |
| | C3 | Blow down water from cooling towers will be used in Greenbelt/ Plantation and |
| | | Dust Suppression. |
| | 63 | Domestic waste water from plant will be treated in STP and treated water will be |
| | | utilized for greenbelt/ Plantation and Dust Suppression. |
| | 63 | Rain Water Harvesting will be practiced within the plant premises. |

Proposed Clinker Grinding Unit with Cement Production Capacity of 5.0 MTPA (2.5 MTPA: Phase - I & 2.5 MTPA: Phase - II) and D.G. Set (6.5 MW) At Village: Jhanswa, Sub-Tehsil: Salhawas, Tehsil: Matanhail, District: Jhajjar (Haryana)

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| Particulars | | Details |
|--------------------------|----|--|
| Noise Management | છ | Properly insulated enclosures with equipment generating excessive noise |
| | છ | Improved silencers within the equipment generating high noise |
| | છ | Isolation of continuously vibrating structures/ machines by proper and secured mountings |
| | છ | Installation of compressors in closed building |
| | છ | Proper maintenance, oiling and greasing of machines at regular intervals to reduce generation of noise. |
| | છ | Personal Protective Equipment (PPEs) like earplugs and earmuffs to the workers exposed to high noise level. |
| | છ | Development of greenbelt of appropriate width inside the plant premises and at the plant boundary. |
| | છ | Regular monitoring of noise level and corrective measures accordingly. |
| Solid & Hazardous Waste | છ | No solid waste will be generated from the cement manufacturing process. |
| Management | છ | Dust collected from various air pollution control equipment will be recycled in the |
| | | process. |
| | છ | STP Sludge will be utilized as manure for greenbelt development / plantation within the plant premises. |
| | છ | Used oil generated from plant machinery / gear boxes and D.G. set as hazardous waste will be sold to the CPCB authorized recycler. |
| Green Belt Development / | c3 | Out of the total proposed plant area i.e. 21.78 ha, 7.18 ha (33%) of the total plant |
| Plantation | | area will be developed under greenbelt / plantation. |
| | છ | Native species i.e. Neem, Arjun, Bakain, Pilkhan, Papri, Gulmohar, Amaltas, Jacranda, Aam, Jamun etc. will be planted. |

11.11 OCCUPATIONAL HEALTH AND SAFETY

To control and minimize the risks at workplace, M/s. Wonder Cement Limited will implement Health, Safety and Environment Policy with the following objectives:

- ∞ To prevent hazards
- >>> To provide safe and healthy environment to all the employees.

The company, therefore, will adopt policy for the purpose of creating and maintaining safe and healthy environment.

11.12 CONCLUSION

It is safe to say that the proposed project is an environmental friendly project, as adequate preventive measures will be adopted to maintain the various pollutants within permissible limits. Greenbelt development around the area would also be taken up as an effective pollution mitigation technique.



CHAPTER - 12 DISCLOSURE OF THE CONSULTANT ENGAGED

12.1 DISCLOSURE OF THE CONSULTANT ENGAGED

J.M. EnviroNet Pvt. Ltd. (JMEPL) has prepared this Final EIA / EMP Report along with preparation of Land Use / Land Cover Maps of the core and buffer zone.

Brief description of the company is given as under:

J.M. EnviroNet Pvt. Ltd. was established in the year 1993. 'JM' in the name of the Company is derived from the name of 'Lord Shiva' - the Temple of 'Jharkhand Mahadev' (JM). The Temple is located at Queens Road, Vaishali Nagar, Jaipur.

The Registered office of JMEPL is at 7-CH-10, Jawahar Nagar, Jaipur. Its Delhi-NCR Corporate office is at 202-A, ABW Tower, M.G. Road, IFFCO Chowk, Sector-25, Gurugram-122001 (Haryana).

J.M. EnviroNet Pvt. Ltd. is accredited with ISO-9001: 2008 for EIA Division. EIA Division is also approved by National Accreditation Board for Education and Training (NABET) formerly NRBPT (Quality Council of India) vide Certificate no. NABET/EIA/1619/RA 0069.

J.M. EnviroNet Pvt. Ltd. is listed at serial no. "88" of the List of Accredited EIA Consultant Organization displayed on MoEFCC website (http://www.qcin.org/nabet/EIA/documents/Accredited%20consultants.pdf), updated as on 05th September, 2019.

JMEPL is offering Environmental Consultancy Services in various sectors viz. Industrial Projects / Chemical Industries / Cement Plants / Thermal Power Plants / Mining Projects/ Coal Washery Project/ Real Estate Projects / Distilleries / Steel Plants/Chemical Fertilizers/Mineral Beneficiation etc.

In the Mining sector, JMEPL is covering mines of minerals viz. Limestone, Bauxite, Chromite, Coal, Zinc, Copper, Gypsum, Soapstone, Iron and Manganese ore, Clay, Silica Sand, Feldspar, Quartz etc. JMEPL has a highly qualified team of Subject Experts. As senior executives / Heads of the EIA Division, we have Former General Managers of the Reputed Cement Companies, Ex-Head EIA Division of big Business Group, STP and ETP Designing Experts, Senior Mining and Geology Experts with vast experience in their respective fields.

JM Group's business is spread over 22 States viz.: Andhra Pradesh, Kerala, Gujarat, Maharashtra, Orissa, Tamil Nadu, Goa, Jammu and Kashmir, Himachal Pradesh, Punjab, Haryana, Delhi, Rajasthan, Uttar Pradesh, Madhya Pradesh, Chhattisgarh, Assam, West Bengal, Karnataka, Jharkhand, Bihar and Uttarakhand. JMEPL outsources its laboratory services from J.M. EnviroLab Pvt. Ltd., an Environmental Laboratory at Gurugram (Haryana) approved under EPA (Environment Protection Act) from the Ministry of Environment and Forests, Govt. of India, New Delhi and by the National Accreditation Board for Testing and Calibration Laboratories, Government of India (NABL).

This MoEFCC and NABL approved Environmental Laboratory of JM Group is also providing Analytical Laboratory Services of various elements and environmental parameters.

Annual monitoring as per MoEFCC/CPCB/SPCB guidelines, Risk Assessment and Disaster Management Plan, consultancy for Rain Water Harvesting Plan, detailed Hydro-geological Study, preparation of Environmental Statement Reports (Environmental Clearance Compliance Conditions) etc. are amongst the various other consultancy services offered by the Company.

Additional study i.e. Hydro-geological Report along with Rain Water Harvesting Plan has been prepared by Associate Engineers & Consultants, 4/8, Malviya Nagar, Jaipur (Rajasthan) - 302017.

Wildlife Conservation Plan has been Prepared by M/s. Vardhan EnviroNet Pvt. Ltd., D-142, Sushant Lok-III SEC. 57 GURGAON (HARYANA).

