Table of Contents

LIST OF ANNEXURES ........................................................................................................ 13

Annexure-A: ToRs ........................................................................................................... 13
Annexure-B: letter for the lease of land for limestone mining ........................................ 13
Annexure-C: NEQS Rules 2001 ...................................................................................... 13
Annexure-D: Schedule-II of IEE/EIA Regulations 2000 .................................................. 13
Annexure-E: CNIC & Other relevant documents ............................................................. 13
Annexure-F: checklist & socioeconomic survey form ....................................................... 13
Annexure-G: Layout map of the project ........................................................................... 13
Annexure-H: Feasibility Report ....................................................................................... 13
Annexure-I: Economic & Financial Analysis ................................................................... 13
Annexure-J: Detail of land & utilization of exact land for limestone and clay with total area, plant area, disturbed area and workable area ...................................................... 13
Annexure-K: SOPs of safe handling and storage of Explosive material .......................... 13
Annexure-L: SOPs for safe blasting ................................................................................ 13
Annexure-M: Detail of water requirement & tube well ..................................................... 13
Annexure-N: Hydrological Study Report ....................................................................... 13
Annexure-P: Undertaking by Lucky Cement .................................................................... 13
Annexure-Q: Lab Reports .............................................................................................. 13
Annexure-R: Wind Direction data from Meteorological Department ............................. 13
Annexure-S: Environmental cost in Total project cost Document ................................... 13
Annexure-T: Stakeholders Performa/Remarks Sheets ...................................................... 13
Filled Checklist .................................................................................................................. 13
Glossary .............................................................................................................................. 13

EXECUTIVE SUMMARY .................................................................................................. 14

Introduction ....................................................................................................................... 14
Location of the mining area ............................................................................................. 14
Geographical location of the area .................................................................................... 14
Project Proponent ............................................................................................................. 15
Environmental Consultant .............................................................................................. 15
Brief outline of the proposal ............................................................................................ 16
Study area: ....................................................................................................................... 17
CHAPTER 2

INTRODUCTION
Overview of the Lucky Cement Limited .................................................. 24
Overview of Mining & Mining Sector ......................................................... 25
Project Benefits ....................................................................................... 28
Purpose of the Study/report ................................................................... 29
Scope of the study .................................................................................... 30
  Identification of the project: .................................................................... 30
  Proponent Detail .................................................................................... 31

Details of Consultant .............................................................................. 31

NATURE, SIZE AND LOCATION OF THE PROPOSED PROJECT .................... 32
  Location of the mining area ................................................................... 33
  Geographical location of the area: .......................................................... 33

IEE/EIA REGULATORY FRAMEWORK ..................................................... 33

OBJECTIVE OF THE ENVIRONMENTAL IMPACT ASSESSMENT .............. 34

EIA Process .............................................................................................. 34
  Screening .............................................................................................. 34
  Scoping: .............................................................................................. 34
  Methodology for EIA Report: ............................................................... 35
  Structure of the Report: ...................................................................... 36

CHAPTER 2 .............................................................................................. 39

Methodology ............................................................................................. 39

Methodology ............................................................................................. 39
PROJECT DESCRIPTION

Approach Adopted to Conduct the Study .................................................. 39
Review of Layout Plan ............................................................................. 39
Environmental Baseline Survey of the Project ...................................... 40
Analysis of Data ...................................................................................... 41
Screening of Potential Environmental Impacts and Mitigation Measures .................................................................................. 43
Preparation of environmental monitoring program and institutional requirement .................................................. 43
Reporting .................................................................................................. 43
Submission and Review of Draft ............................................................. 44
Final Report ............................................................................................. 44

CHAPTER-3 .............................................................................................. 45

PROJECT DESCRIPTION .............................................................................. 45

Project need and Advantage ................................................................. 45
Advantages of Mining: ............................................................................ 46
Project Site and Regulatory Compliance Status ................................ 47

Type and category of the project: .......................................................... 47

Project Overview .................................................................................... 47
Objectives of the project ........................................................................ 48

CONSIDERATION OF THE ALTERNATIVES .............................................. 49

Site selection Criteria ........................................................................... 49
General Geology of the area ................................................................. 49
Limestone Deposits ................................................................................. 50
Limestone .............................................................................................. 51
Clay ........................................................................................................ 52

Location of the mining area ................................................................. 52
Geographical location of the area: ........................................................ 53
Existing Land Use: .................................................................................. 54
Road Access: ........................................................................................ 55
Vegetation features of the project: ....................................................... 55
Cost and magnitude of the Project ........................................................ 57
Schedule of Implementation .................................................................. 57

Project Description ................................................................................ 57

Study area: ............................................................................................. 58
Salient Features of the Project ............................................................... 58
ANALYSIS OF ALTERNATIVES (TECHNOLOGY & SITE)

CHAPTER 4

Environmental Consultants Pak Green Enviro-Engineering (Pvt.) Ltd.

Proposed Mining Project of M/s Lucky Cement Limited

Environmental Impact Assessment (EIA)

Process of Mining ................................................................. 60
Steps in Blasting ................................................................. 62
Step 1: Drilling ................................................................. 62
Step 2: Blasting ................................................................. 62
Blasting feature ................................................................. 63
Nearest educational institute ............................................ 64

Surface Infrastructure .......................................................... 65
Races, railways power lines and access routes to and within the plant .... 65
Solid waste management facilities ...................................... 67
Water supply & treatment for proposed mining project ............... 68
Air Pollution and control ................................................... 72
Land Disturbance ............................................................... 72
Impacts on flora and fauna ................................................ 73
Noise pollution ................................................................. 73
Workshops, administration and other buildings ....................... 73
Housing, recreation and other employee facilities .................... 74

TRANSPORTATION OF THE MINERALS .............................. 74

POWER DEMAND ................................................................ 74

MAN POWER REQUIREMENT ................................................ 74

Health, Safety & Hygiene ...................................................... 75
First Aid facility ................................................................. 75
Safety Trainings ................................................................. 75
Use of Drugs and Narcotics ................................................ 75
Security: ............................................................................ 75
Personal Protective Equipment (PPEs) .................................... 75
Risk Assessment and Disaster Management Plan ...................... 75
Occupational Exposure Mitigation Planning ......................... 75

RESTORATION / REHABILITATION PLAN ............................ 76
Restoration & Rehabilitation Plan ....................................... 76

Government approvals required by the project: ......................... 80

CHAPTER 4 ............................................................................. 81

ANALYSIS OF ALTERNATIVES (TECHNOLOGY & SITE) ......... 81
Introduction ......................................................................... 81
Technology selection ........................................................................................................... 81
BLASTING IN SURFACE MINES ......................................................................................... 82
Controlled blasting is a technique of blasting for the purpose to reduce the amount of over
and to control ...... the ground vibrations. Following are the different types of controlled blasting
techniques: ......................................................................................................................... 83
Secondary Blasting .............................................................................................................. 83
Non-Explosives Rock Breaking .......................................................................................... 83
Characteristics of Explosives ............................................................................................. 84
SITE ALTERNATIVES ........................................................................................................ 85
SITE A: Manakpur Village in District Chakwal ................................................................. 85
Aerial Map .......................................................................................................................... 85
Conclusion for Alternative Site A ....................................................................................... 86
SITE B: Sardayi Village in District Chakwal ................................................................. 90
Conclusion for Alternative Site B ....................................................................................... 91
Another site C near Mouza Dhoke Babral District Khushab ............................................. 92
Alternative Site D near Khatak Abad District Mianwali .................................................. 96
Conclusion for Alternative Site D ....................................................................................... 97
Selected Site: Buchal Kalan Village in District Chakwal .................................................. 97
Activity Alternative .......................................................................................................... 102
Schedule Alternative ....................................................................................................... 102
Economic and Environmental Analysis among Sites ..................................................... 102
Discussion ......................................................................................................................... 103
Discussion ......................................................................................................................... 104
Discussion ......................................................................................................................... 105
Discussion ......................................................................................................................... 108
Discussion ......................................................................................................................... 109
Discussion ......................................................................................................................... 110
Discussion ......................................................................................................................... 111
CHAPTER 5 ........................................................................................................................ 114
ENVIRONMENT LEGISLATIVE REQUIREMENT & FRAMEWORK ................................... 114
General .............................................................................................................................. 114
NATIONAL/PROVINCIAL, POLICIES, LAW, REGULATIONS AND GUIDELINES .......... 114
PEPA-1997 (Amended 2012): ......................................................................................... 114
Salient features of PEPA-1997 (Amended 2012): ......................................................... 115
Guidelines for Environmental Assessment-1997: .......................................................... 115
Regulations for Environmental Assessment-Regulation-2000: .......................................... 116
APPROVAL FROM PUNJAB ENVIRONMENTAL PROTECTION AGENCY ......................... 116
PAKISTAN ENVIRONMENT IMPACT ASSESSMENT PROCEDURE .......................... 116
THE NATIONAL ENVIRONMENTAL QUALITY STANDARDS (NEQS) .......................... 117
SELF-MONITORING & REPORTING RULES (SMART) .................................................. 117
FRAMEWORK OF ENVIRONMENT AND WILDLIFE INSTITUTION IN PAKISTAN .......... 117
National Conservation Strategy-Pakistan: ........................................................................... 118
Guidelines for Public Consultation: .................................................................................... 119
NATIONAL ENVIRONMENTAL POLICY ACT 2005 ...................................................... 119
PAKISTAN LABOR POLICY, 2010 .................................................................................... 119
CUTTING OF TREES ACT, 1975 ....................................................................................... 119
PUNJAB WILDLIFE ACT, 1974 ......................................................................................... 119
PUNJAB PLANTATION AND MAINTENANCE OF TREES ACT, 1974 ........................ 120
ANTIQUITIES ACT, 1975 ................................................................................................... 120
PAKISTAN PENAL CODE, 1860 ......................................................................................... 120
CANAL AND DRAINAGE ACT, 1873 .............................................................................. 120
PAKISTAN CLEAN AIR PROGRAM .................................................................................. 120
GUIDELINES FOR PUBLIC CONSULTATION ................................................................. 121
NATIONAL MINING POLICY, 2013 ................................................................................ 121
THE MINES ACT 1923 ....................................................................................................... 123
INDUSTRIAL POLICY ......................................................................................................... 124
GUIDELINES FOR SENSITIVE AND CRITICAL AREAS ............................................ 125
INTERNATIONAL GUIDELINES, PROTOCOLS AND AGREEMENTS .............................. 125
CONVENTION ON BIOLOGICAL DIVERSITY, 1994 ..................................................... 126
THE RIO DECLARATION .................................................................................................... 126
International Union for Conservation of Nature and Natural Resources (IUCN) Red List ........ 126
CHAPTER 6 ......................................................................................................................... 128
DESCRIPTION OF ENVIRONMENT ................................................................................... 128
Proposed mining site location: .......................................................................................... 128
BRIEF DESCRIPTION OF THE DISTRICT ...................................................................... 129
Physical Environment/ Resources ..................................................................................... 129
ORES AND MINERALS ....................................................................................................... 129
Industrial uses of Minerals........................................................................................................130
NATURAL RESOURCES .............................................................................................................131
3.1 AGRICULTURE ..................................................................................................................131
Main Fruits ................................................................................................................................131
c) Main Vegetables ..................................................................................................................132
FORESTS ....................................................................................................................................132
Production of Timber and Fire-wood .......................................................................................132
LIVESTOCK POPULATION ..........................................................................................................132
Poultry Population ....................................................................................................................133
Availability of Hides / Skins and Slaughter House Wastes .......................................................133
Production of Wool...................................................................................................................133
INFRA-STRUCTURAL FACILITIES ........................................................................................133
COMMUNICATION NET-WORK ...............................................................................................133
GENERAL QUALITY AND AVAILABILITY OF SUB-SOIL WATER ....................................134
EFFLUENT DISPOSAL FACILITIES .........................................................................................134
POWER SUPPLY ......................................................................................................................134
NATURAL GAS AVAILABILITY ...............................................................................................134
TELE-COMMUNICATION FACILITIES ....................................................................................134
SOCIAL INFRA-STRUCTURAL FACILITIES .........................................................................134
INDUSTRIAL ESTATE ..................................................................................................................134
SIZES AND AVAILABILITY OF PLOTS ....................................................................................135
DRY PORT .....................................................................................................................................135
Declaration of Negative Areas ...................................................................................................135
Declaration of specified Positive Areas ....................................................................................136
EXISTING PATTERN OF INDUSTRIAL DEVELOPMENT .......................................................136
DESCRIPTION OF EXISTING INDUSTRIES ..........................................................................136
FUTURE INDUSTRIAL POTENTIAL ...........................................................................................137
AGRICULTURE ..........................................................................................................................138
LIVESTOCK ...............................................................................................................................138
MINERALS ..................................................................................................................................138
INDUSTRY ....................................................................................................................................139
MAN POWER ..............................................................................................................................139
TOTAL POPULATION OF THE DISTRICT ..................................................................................139
BASE LINE STUDY AND ENVIRONMENTAL DESCRIPTION OF THE PROPOSED STUDY AREA AT
BUCHAL KALAN .................................................................................................................. 139

Physical Environment/ Resources ...................................................................................... 139
  Physical resources .............................................................................................................. 139
  Geology and Topography: .................................................................................................. 139

Meteorology of the District Chakwal .................................................................................. 140

Temperature of District Chakwal ......................................................................................... 141

Wind direction ..................................................................................................................... 143

Ambient air quality: .......................................................................................................... 143

Methodology: ....................................................................................................................... 143

Survey Planning..................................................................................................................... 143

Identification of Monitoring Locations .................................................................................. 144

Monitoring Plan .................................................................................................................... 144

Basic Environmental conditions ......................................................................................... 144

Status of operation: ............................................................................................................. 144

Ambient air Gases: ............................................................................................................. 144

  Sulphur Dioxide ................................................................................................................... 144

  Nitrogen Dioxide ................................................................................................................ 145

  Carbon Monoxide (CO) .................................................................................................... 146

  Particulate matter (PM10) .................................................................................................. 147

Water Quality ....................................................................................................................... 149

  Springs water .................................................................................................................... 149

  Underground water: .......................................................................................................... 153

  Surface water quality: ....................................................................................................... 155

  Soil .................................................................................................................................... 156

  Climate: .............................................................................................................................. 157

  Noise................................................................................................................................. 157

Ecological Resources .......................................................................................................... 158

  Fisheries: ......................................................................................................................... 158

  Biodiversity: ..................................................................................................................... 158

  Flora: ................................................................................................................................. 158

  Fauna: ............................................................................................................................... 160

  Rare or endangered species: ............................................................................................. 160

PROPOSED STUDY SITE SOCIO-ECONOMIC STATUS: ....................................................... 160
Environmental Consultants Pak Green Enviro-Engineering (Pvt.) Ltd. Proposed Mining Project of M/s Lucky Cement Limited Environmental Impact Assessment (EIA)

Language ................................................................................................................. 161
Education .................................................................................................................. 161
Health ....................................................................................................................... 162
Culture ....................................................................................................................... 163
Recreational Resources and Development: ............................................................ 163
Aesthetic Values: ...................................................................................................... 163
Archaeological and Historical Treasures: .............................................................. 164

CHAPTER 7 ................................................................................................................ 165
SCREENING OF ENVIRONMENTAL IMPACTS & MITIGATION MEASURES .......... 165
Methodology for impact evaluation: ....................................................................... 165
Project Impact Evaluation Matrix ........................................................................... 165
IMPACT ANALYSIS AND PREDICTION ............................................................. 167
Meetings: ................................................................................................................. 167
Consultations .......................................................................................................... 167

Environmental Parameters: .................................................................................... 168
Environmental impacts due to Project Location ...................................................... 168
Impacts ...................................................................................................................... 168
Mitigation measures ................................................................................................. 168
Environmental impacts due to the project design ................................................... 169
Impacts ...................................................................................................................... 169
Mitigation measures and recommendations ............................................................ 169

Environmental impacts during the construction phase ........................................... 170
Environmental impacts during operation phase/Mining activity. ............................ 170
Potential Positive Impacts ....................................................................................... 170
Employment Opportunity ....................................................................................... 170
Increase in business ................................................................................................. 170
Better living standard of the area ............................................................................ 171
Land Value ............................................................................................................... 171
Road infrastructure ................................................................................................. 171
Residential Colony .................................................................................................. 171
Safe environment for the workers ........................................................................ 171
Social Services ....................................................................................................... 172
Negative Impacts .................................................................................................... 172
Acquisition of the land for lease ................................................................. 172
Topographic/Soil ....................................................................................... 173
Water Resources: ...................................................................................... 175
Contamination of Soil and Water .............................................................. 176
Air Quality Potential Impact: ................................................................. 179
Impact on Biological Environment ......................................................... 182
Natural Vegetation ................................................................................... 182
Wildlife ...................................................................................................... 183
Noise & Vibration .................................................................................. 185
Impact on Social and Cultural Environment ........................................... 187
Community Health and Safety ............................................................... 188
Conclusion: ............................................................................................... 189
Project Benefits: ....................................................................................... 189
Environmental Monitoring Program and Institutional Requirements .......... 190
Potential Environmental Enhancement measures ...................................... 190
Mitigation and Impact Assessment Criteria ............................................. 191
Impact assessment criteria: ................................................................. 191
Mitigation assessment criteria: ............................................................. 191
General principles .................................................................................. 192
Purpose of Mitigation measures ............................................................ 192
Ways of achieving mitigation measures ................................................. 193
CHAPTER 8 .................................................................................................. 194
ENVIRONMENTAL MANAGEMENT & MONITORING PROGRAM ................. 194

Purpose and Objectives of the EMP: ....................................................... 194

Institutional Responsibilities ..................................................................... 194
• Supervisor of project ............................................................................ 194

Training Schedules .................................................................................. 194
• Training of mining staff ....................................................................... 194

Responsibility of EMP ........................................................................... 195

Environmental Technical Assistance and Training Plan ......................... 195

Monitoring Plan ...................................................................................... 196
Methodology adopted for the environmental monitoring: ....................... 196

Ambient Air Quality Monitoring ............................................................ 196
Environmental Consultants

Weather Station................................................................................................................. 199
Water sampling ..................................................................................................................... 199
Methodology for Wastewater and Drinking Water ............................................................... 201
Summary of Impacts and their mitigation measures ............................................................... 204
Equipment Maintenance Detail ............................................................................................ 205
Environmental Budget ......................................................................................................... 205
Need for Disaster Management and Emergency Response System................................. 219
Communication System for Declaring Disaster and Emergency Situation ....................... 219
Identification of Risks/Possible Threats ............................................................................... 220
Risk Management ................................................................................................................ 220
Definition of Risk .................................................................................................................. 220
Elements of Occupational Health and Safety Management System (OHMS) ..................... 220
Post Disaster Rehabilitation ................................................................................................. 221

CHAPTER 9 ............................................................................................................................. 222
STAKEHOLDERS PARTICIPATION ......................................................................................... 222
Methodology of consultation: ............................................................................................... 222
Stakeholder identification: ..................................................................................................... 222
Provincial Level: ..................................................................................................................... 223
District Level: ........................................................................................................................ 223
Village Level: ........................................................................................................................ 223
Proponent ............................................................................................................................... 223
Responsible Authority .......................................................................................................... 224
Other departments and agencies ........................................................................................... 224
Environmental Practitioners and Experts ........................................................................... 224
Affected & Wider Community ............................................................................................... 224
List of Respondents of different villages ............................................................................... 225
Sample size .......................................................................................................................... 226
Statistical Analysis ............................................................................................................... 226
Results & Discussion ............................................................................................................ 226

CHAPTER 10 ............................................................................................................................ 234
CONCLUSION AND RECOMMENDATIONS ........................................................................ 234
Conclusions .......................................................................................................................... 234
Main environmental issues are as under: ............................................................................. 235
Pak Green Enviro-Engineering (Pvt.) Ltd.  Proposed Mining Project of M/s Lucky Cement Limited

Environmental Consultants  Environmental Impact Assessment (EIA)

Recommendations ........................................................................................................................................... 235
REFERENCES ................................................................................................................................................. 237
Annexures
LIST OF ANNEXURES

Annexure-A: ToRs
Annexure-B: letter for the lease of land for limestone mining
Annexure-C: NEQS Rules 2001
Annexure-D: Schedule-II of IEE/EIA Regulations 2000
Annexure-E: CNIC & Other relevant documents
Annexure-F: checklist & socioeconomic survey form
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Annexure-M: Detail of water requirement & tube well
Annexure-N: Hydrological Study Report
Annexure-P: Undertaking by Lucky Cement
Annexure-Q: Lab Reports
Annexure-R: Wind Direction data from Meteorological Department
Annexure-S: Environmental cost in Total project cost Document
Annexure-T: Stakeholders Performa/Remarks Sheets
Filled Checklist
Glossary
EXECUTIVE SUMMARY

Introduction

It is the intention of proponent of M/s Lucky Cement Limited to set up a proposed Portland cement plant at Buchal Kalan District Chakwal. Mining for specifically limestone and clay need to be required for the subject plant.

Project proponent wants to obtain the Environmental approval for limestone and clay mining by submitting the Environmental Impact Assessment EIA report to Environment department for the compliance of section 12, PEPA, 1997 (Amended 2012). The proposed total area for the mining activity for both limestone and clay is 6331.43 Acres.

The project falls in the Category C (Mining and mineral processing) of Schedule II according to PEPA Regulation 2000 due to its cost of about 830 million. ToRs of the study under clause 5 (f) of policy and procedure for the filing, review and approval of environmental assessment are annexed as Annexure-A.

After obtaining the environmental approval for the mining activity for both minerals the proponent will submit full scale EIA of proposed Cement Plant Project to EPA Punjab for the compliance of section 12 of PEPA 1997 (Amended 2012). Project proponent has obtained grant of lease for limestone mining from Department of Mines & Minerals Punjab vide letter no. D (M&M)/LSM-APP-CKL-1-Limestone (18) dated 13-08-15 (letter attached in Annexure-B) while for the grant of lease for clay mining it has been applied to Department of Mines & Minerals Punjab. Proponent will also get other approvals from other relevant departments.

Location of the mining area

The subject proposed mining site is located at Buchal Kalan village Tehsil Kalar Kahar District Chakwal.

Geographical location of the area:

The project is located at Buchal Kalan village Tehsil Kalar Kahar District Chakwal. Project co-ordinates are as follow:

North…………………………….. Buchal Village + Bulah + Gufanawala Village at 5-6 km
West…………………………….. Local Road
Pak Green Enviro-Engineering (Pvt.) Ltd.

Proposed Mining Project of M/s Lucky Cement Limited

Environmental Consultants

Environmental Impact Assessment (EIA)

East…………………………….. Makhyal Village at 2-3 Km
South………………………….. Lafi village at 7-8 km
SE………………………………. Sarkalan village 7-8 km

Land Coordinates:

N 32.66430  E 072.62503

Aerial Map

Project Proponent
Mr. Muhammad Anwar Tariq (Dy. General Manager HR/IR) is authorized to perform as proponent during the proceedings of environmental approval (Authority letter is attached with the initial documents submitted in EPD)

Environmental Consultant
Pak Green Enviro-Engineering (Pvt.) Ltd, as independent consultants, has been appointed by the proponent to conduct Environmental Impact Assessment (EIA).

Company office address is Suite # 314, Eden Center, 43 Jail Road, Lahore and contact numbers are Tel: +92-3004462976, +92-3044452189, +092- 04237500464

For detail company profile see the Chapter # 1 “Introduction”

Brief outline of the proposal
The subject project will deal with mining activity for non-metallic minerals such as limestone and clay. These two minerals are available in abundance in the vicinity of the proposed cement plant site. Limestone deposits will be mined through surface mining under controlled blasting along with precautionary measures while clay will be acquired from nearby area within the plant site. Before commencement of the subject project of mining it is necessary to obtain the NOC from concerned departments. So, EIA study has been carried out for the mining project prior to start mining activity in the area and to obtain the Environmental Approval from the Concerned Environment Department.

The subject project involves the mining of two excessive limestone and clay deposits which are located in close proximity to the proposed Portland Cement Plant site. The proposed total area for the mining activity for both limestone and clay is 6331.43 Acres. Limestone deposits are available within the distance of 1-2 KM from the plant site while clay deposit is found within 1-3 km. Both sites (limestone and clay) overlap each other. While other minerals gypsum and laterite (iron ore) are not found in the project area and will be brought from kohat and Mianwali District. The plant is proposed to be established on a fairly level ground.

About 6500 tons/day Limestone deposits and 1500 tons/day clay deposits will be required for the production of 5000 tons/day of cement. Other minerals or ores as Iron Ore 200 tons/day and Gypsum 250 tons/day will also be used in the production of cement.

Mining for Limestone deposits will be done over an area of 400 SFT on daily basis through surface mining by controlled blasting at the depth of 100 ft for limestone while clay will be
extracted through extraction process by excavators and other machinery at the depth of 60 ft for Clay. Clay will be acquired from the nearby area within the distance of 1-3 km from the plant site and adjacent to the limestone site.

The study included review of available relevant documents, field visit, discussions with stakeholders, identify and predict the impacts on the environment associated with the subject project, suggest mitigation measures to control these impacts and follow up to implement the suggested necessary mitigation measures to make the project environment friendly and safe.

For conducting the Monitoring of the environmental parameters, M/s Pak Green Enviro-Engineering (Pvt.) Ltd. Pak Green Laboratories (EPA Certified) monitored the underground water, surface water, spring water, ambient air, and Noise level at project area and at other alternative sites. Lab analysis results are incorporated within this report and attached as Annex-Q.

Study area:
The present EIA study area for mining activity within 4-5 km radius will be considered adequate from the mining site for keeping in view meteorological, physical, and biological factors and the nature of emissions from the plant.

Water
Water requirement for the proposed mining project will be fulfilled by underground water by tube well and will be used during mining activity for the purpose of sprinkling on road, for domestic and for drilling. About 4000 m3/day of water shall be used in the plant which will be arranged through deep hole drilling.

Power requirement
Lucky Cement Limited will be established its own power plant. The power will then be distributed to various load centers through transformers. The power distribution for machines is on a 3-phase, 3-wire system and for lightening on a 3-phase, 4-wire system. The Energy will be used for drilling and blasting fulfilled by proposed power plant.

Major Impacts
In order to identify all the activities associated with the project during mining activity with potential to cause adverse environmental impacts and harm a thorough review has been conducted. The subject project lies in hilly & barren area. In case of impact arises from the project activity then possible necessary measures will be adopted to control them. Overall the
project has positive impacts on the local population and country as a whole but also has some negative impacts which will be controlled through proper safety measures, mitigation measures and SOPs for mining activity. Moreover, clearing of the vegetation will be done for the mining activity but also restoration & reclamation will be done by the native species of plants. If proper implementation of EMP and suggested mitigation measures will be adopted by M/s Lucky Cement limited, then any further or residual impacts can be minimized.

**Summary of Major Environmental Impacts**

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Impacts</th>
</tr>
</thead>
</table>
| **Land Use & Soil** | During mining activity following impacts may arise:  
- Particulate Matters (PM) pollution, degrading of aesthetic beauty of the land due to drilling, blasting and extraction/excavation.  
- Clearing of the vegetation  
- Undulated patches  
- Scarring of the landscape and aesthetic beauty.  
- Clearing of native plants will disturb the complexity of the ecosystem of the proposed area.  
- Dust emissions will generate during the quarrying of clay and limestone.  
- Flue gases will be generated due to the involvement of generators and other machinery. |
| **Particulate Matter and fugitive dust Emissions** |  
- Quarry for clay and limestone deposits will cause major impacts on air quality.  
- The operation of the quarry cause dust emissions, in the quarry area, limestone quarrying involved blasting that will be source of dust and different gases.  
- The area which is mined is stripped of vegetation and left barren this can be significant source of fugitive dust in the vicinity.  
- The transportation of the quarried material to the crusher also may cause dust.  
- Air Pollution as the quarry roads are un-metaled and the trucks are not covered may cause dust.  
- Dust due to proposed mining/extraction activity.  
- Dust raised on dirt tracks by project-related vehicles.  
- Dust from drilling of deep holes.  
- Dust due to drilling and blasting of the rocks.  
- Combustion products from vehicles used for project-related activities. |
<p>| <strong>Gaseous emissions</strong> | Air pollution due to site visiting vehicles/ transported trucks, hauled trucks , machinery &amp; generator (if any) |</p>
<table>
<thead>
<tr>
<th>Noise &amp; Vibration</th>
<th>The major sources of the noise at proposed mining site are blasting, drilling, extraction/excavation activity, vehicular and project related machinery. The other source of noise will be operation of the proposed cement plant project.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Blasting operation at the quarry site is the main source of vibrations.</td>
</tr>
<tr>
<td></td>
<td>A significant impact will be interpreted by the drilling, blasting and excavation on workers, nearby community, fauna of the area.</td>
</tr>
<tr>
<td></td>
<td>Vibration due to the blasting and other heavy machinery may cause structural problems to the building and vary with the building age constructional material used and vibrational level.</td>
</tr>
<tr>
<td></td>
<td>High noise level may cause hearing loss, deafness, high blood pressure, headache, depression and mentally disturbance.</td>
</tr>
<tr>
<td></td>
<td>Noise level will not exceed 75 dB(A) at the distance of 2-3 km radius, activity site is located at a safe distance from the nearest human settlement.</td>
</tr>
<tr>
<td></td>
<td>Fauna of the study area will also disturb due to the blasting and extensive vehicular noise.</td>
</tr>
<tr>
<td></td>
<td>Very little is known to the specific response of animals to vibration but based on human response some disturbance might be expected between 1 and 10mm/S ppv (peak particle velocity).</td>
</tr>
<tr>
<td></td>
<td>The maximum threshold level for the vibration is between 50 and 100 mm/S ppv have been suggested by Grimshaw (1971) as critical threshold level.</td>
</tr>
<tr>
<td>Solid Waste</td>
<td>Solid waste generation may cause Land &amp; soil contamination, aesthetic degradation, foul smell etc.</td>
</tr>
<tr>
<td></td>
<td>Solid waste may generate from the mining activity, domestic and project process sources.</td>
</tr>
<tr>
<td></td>
<td>Solid waste may generate from the mining activity as loose rocks, stones, mines residues etc.</td>
</tr>
<tr>
<td>Soil Contamination</td>
<td>Soil may be contaminated due to oil and other chemicals storage, transportation.</td>
</tr>
<tr>
<td></td>
<td>Soil contamination due to waste water generated from municipal sources.</td>
</tr>
<tr>
<td>Waste water</td>
<td>Minor generation of waste water from mining activity.</td>
</tr>
<tr>
<td></td>
<td>Waste water will be generated from domestic sources.</td>
</tr>
<tr>
<td></td>
<td>Waste water may cause Spread of diseases &amp; underground water contamination.</td>
</tr>
<tr>
<td>Odor</td>
<td>Nil</td>
</tr>
<tr>
<td>Health and safety issues</td>
<td>Health &amp; safety issues of workers and nearby community.</td>
</tr>
<tr>
<td></td>
<td>Health and safety issues will be arose during mining activity, by release of flue gases and heat, handling of explosive material, machinery and improper practices of work.</td>
</tr>
<tr>
<td>Socioeconomic</td>
<td>Socioeconomic impacts may arise due to:</td>
</tr>
<tr>
<td></td>
<td>Resettlement issues.</td>
</tr>
</tbody>
</table>
### Change in cultural language
- Change in social behavior and economic gains
- Social performance of the individuals in the area
- Change in culture by the influx of nomadic people
- Gender inequality

Overall, Positive impact due to generation of Employment opportunity & improvement of living standards

### Recommendations for Mitigation measures

<table>
<thead>
<tr>
<th>Pollutants</th>
<th>Recommendations</th>
</tr>
</thead>
</table>
| Land Use & Soil             | - To restore the natural landscape of the area Restoration and reclamation plan should be developed.  
                               - Plant nursery, garden will be developed to rehabilitate the native plants of the area.  
                               - Mining site should be fenced properly to avoid any damage.  
                               - Technique of controlled and time specific blasting should be ensured for “safe habitat of the animals”.  
                               - Project proponent should make any possible efforts to limit the impact on flora and fauna. |
| Particulate Matter and fugitive dust Emissions | - Sprinkling of water must be done to control the dust or PM  
                               - Vehicle emissions inspection should be done on regular basis  
                               - Sprinkling should be done on the unpaved area to avoid dust pollution/particulate matter.  
                               - PPEs should be provided to workers in case of particulate matter/dust  
                               - Vehicles/trucks should be serviced regularly  
                               - The proposed site should be located at least minimum nearby settlement is at the distance of 400-500 meters.  
                               - In the quarry area, concerted efforts should be made to keep the fugitive dust levels to a minimum  
                               - Vehicle speed should be reduced on track passing through or close to settlements.  
                               - Imposing speed limits and encouraging more efficient journey management may reduce the dust emissions produced by vehicular traffic.  
                               - Ambient Air quality monitoring was conducted by EPA certified lab and results are incorporated within this report  
                               - Monitoring should be conducted as per EPA NEQS Rules 2001 |
| Gaseous emissions           | - scrubbing system should be installed at the stack of generators if required  
                               - All project vehicles should be checked regularly to ensure that engines are in sound working condition and are not emitting smoke.  
                               - PPEs should be provided to workers |
### Noise & Vibration

- Machinery and generators should be maintained properly
- Monitoring should be conducted as per EPA NEQS Rules 2001
- PPEs as Ear plugs/muffs should be provided to workers in case of high noise during working hours
- Appropriate mining technique should be adopted. The controlled blasting method ensures the noise less than 75 dB (A) at day time at the radius of 2 km distance.
- Proper maintenance and tuning of the vehicles should be done.
- Sound proof room should be built for generator (if any) to control the noise.
- Trainings for safe driving practices & HSE trainings of the employees and workers is recommended.
- Noise level monitoring was conducted at different location and results are incorporated within the report
- Monitoring should be conducted as per EPA NEQS Rules 2001

### Soil Contamination

- SOPs should be developed for the storage of oil and other hazardous substance handling and transportations
- Soil contamination should be controlled by adopting mitigation measures such as storage of oil, fuels etc. under paved area, by maintaining leakage record of construction vehicles, and by regular inspection (admitted by proponent).
- Tarpaulin sheets should be placed under generators and other leaching substances
- Injection into the sub soil is illegal and it should not be done site.
- Treated water should be used for plantation
- Fuel Storage License from concerned department/authority is recommended in case of large/prescribed quantity
| **Solid Waste** | • A solid waste management division should be formulated to deal with the proper disposal of solid waste, supervised by HSE Manager, SW Manager, and other related personnel.  
• Solid waste generated from the mining activity as loose rocks, stones, mines residues etc. that cannot be used for cement production should be utilized in restoration of the quarry area and during the construction of check dams whereas solid waste from the domestic sources should be disposed off properly  
• Constructional waste should be utilized for road filling or maintenance purposes  
• It is recommended to ensure Proper SWMS. |
| **Waste water** | • Domestic Waste water generated from the mining activity should be used as sprinkling on the quarry area, on road or for restoration of the land.  
• Monitoring should be conducted as per EPA NEQS Rules 2001 |
| **odor** | Nil |
| **Health and safety issues** | • Training of workers should be conducted regarding health safety & Environment.  
• Use of PPEs should be implemented at workplace.  
• First aid measures/medical facility should be provided to project related employees.  
• Safe drinking water must be provided to workers, staff, poor people of the area.  
• Water consumption records should be maintained  
• Safety signs & boards should be placed at during mining activity.  
• Mining site should be fenced properly to avoid any damage to nearby settlements  
• smoking or any drugs should be prohibited during working hours or performing work  
• Do not place any flammable or hazardous substance near the explosive material  
• At the time of mining, fencing will be ensured for the area under the exploration  
• At the time of extraction activity proper SOPs will be followed like pre-announcement in the loud speaker and others |
| **Socioeconomic** | • Community wellbeing should be considered and anticipated measures are recommended to preserve the local culture and ecosystem  
• Local people should be preferred for the employment |
- The project proponent will initiate an educational awareness program with the coordinator of the local people.
- The project proponent will assist the local impacted community for the improvement of health services
- Subject project will uplift the economic status of the nearest human settlements.

Proposed Environmental Monitoring
To overse the environmental performance of the project through its lifecycle enforcing the NEQS an Environmental Monitoring Program has been conducted which ensures effective surveillance of the environmental parameters at various stages of the project development and compliances with NEQS and legal obligations. It has been showed that all the parameters are within the range of prescribed limits of NEQS. (Lab analysis results by EPA Certified lab are incorporated within this report)

Particulate Matter/Dust
Monitoring for particulate matter should be conducted as per EPA NEQS Rules 2001 and report should be submitted to EPA Punjab. (NEQS Rules 2001 and NEQS are annexed as Annexure-C)

Flue Gases
Monitoring for vehicular / stack emissions should be conducted as per EPA NEQS Rules 2001 and report should be submitted to EPA Punjab.

Noise
Monitoring for noise level should be conducted as per EPA NEQS Rules 2001 and report should be submitted to EPA Punjab.

Water quality
Monitoring for waste water & drinking water quality should be conducted as per EPA NEQS Rules 2001 and report should be submitted to EPA Punjab and report should be submitted to EPA Punjab. Record should be maintained regarding the underground water pump and consumption.

Recommendation: Environmental Monitoring data log book should be maintained by the project proponent.
CHAPTER 1

INTRODUCTION

This section of the report provide an overview of the rational of the project, objective of the project, why it is to be installed, purpose of the study, an approach adopted to conduct single stage Environmental Impact Assessment (EIA) for the Proposed Mining Project of M/s Lucky Cement Limited in Buchal Kalan Village District Chakwal.

The subject project is mining for limestone and clay deposits over a total area of 6331.43 Acres for proposed Portland Cement Plant. EIA study is being carried out for the mining project prior to start mining activity in the area. The subject project involves the mining of two excessive limestone and clay deposits which are located in close proximity to the plant site.

Project proponent intends to obtain approval for the mining activity by submitting the Environmental Impact Assessment EIA report to concerned Environment department.

Overview of the Lucky Cement Limited

Lucky Cement Limited (LCL) is one of the largest producers and leading exporters of quality cement in Pakistan, with a production capacity of 7.75 million tons per annum. The company is listed on Karachi, Lahore, Islamabad and London Stock Exchanges.

Over the years, the Company has grown substantially and is expanding its business operations with production facilities at strategic locations in Karachi to cater to the Southern regions, Pezu and Khyber Pakhtunkhwa to furnish the Northern areas of the country. Lucky Cement is Pakistan’s first company to export sizeable quantities of loose cement being the only cement manufacturer to have its own loading and storage terminal at Karachi Port.

Lucky Cement Limited has embarked on the journey of global expansion by setting up cement grinding facility in Basra, Iraq and a cement manufacturing plant in Democratic Republic of Congo (DRC). Furthermore, the company has diversified into power generation by investing in a 660 MW coal-based power project in Karachi. Also the acquisition of ICI Pakistan is another noteworthy move towards the expansion of Lucky Cement’s industry portfolio.

Lucky Cement is an ISO 9001:2008 and 14001:2004 certified company and also possesses
many other international certifications including Bureau of Indian Standards, Sri Lankan Standard Institute, Standards Organization of Nigeria, Kenya Bureau of Standards and South African Bureau of Standards.

**Overview of Mining & Mining Sector**

Pakistan’s economy can be characterized as semi-industrialized. The country’s industrial sector constitutes 24.3% of the country’s gross domestic product. Pakistan has a total labor force of 55.88 million (as of 2009). The largest industries of the country are textile, cement, agriculture, fertilizer, steel, tobacco, edible oil, pharmaceuticals, construction materials, shrimp, sugar, food processing, chemicals and machinery. Pakistan’s industrial sector experienced tremendous growth between 2004 and 2006 despite the shortage of electricity. However, it is worth noting that net foreign investment in industries of Pakistan constitutes only 2.5% of the country’s GDP.

Pakistan is endowed with extensive geological potential. The country possesses extensive reserves of mineral deposits such as coal copper, gold, limestone etc. Our mineral resources are enormous and emerging as a promising country for exploration of mineral deposits. Based on available information, country's more than 6, 00, 000 sqkms of outcrop area demonstrates varied geological potential for metallic / non-metallic mineral deposits. Currently about 52 minerals are under exploitation but on a small scale. The major production is of coal, rock salt, and other industrial and construction minerals. At this time, the value addition in the mineral sector is mainly concentrated in five principal minerals, namely, limestone, coal, gypsum, sulphur, crude oil, and natural gas.

**Top Fifteen Minerals of Pakistan**

1. Aluminium  
2. Iron Ore  
3. Copper  
4. Chromite Ore  
5. Zinc / Lead  
6. Coal  
7. Gypsum / Anhydrite  
8. Phosphates  
9. Rock Salt  
10. Solar Salt
11. Magnesite
12. Limestone for lime
13. Kaolin (China Clay)
15. Gemstones

The Pakistan Mineral Development Corporation is the responsible authority for the support and development of the mining industry.

It is estimated that Pakistan has around 5000 operational mines of different sizes, employing nearly 300,000 workers. The abundantly found metallic minerals in Pakistan include copper, gold, bauxite, lead, zinc, iron and chromite. In addition, large reported reserves of non-metallic minerals comprising salt, gypsum, clays, barite, phosphate, dolomite and limestone. Of the 92 known minerals in the country, 58 are commercially exploited.

The mineral and mining sector, which ranks third in Pakistan after the industrial and agricultural sectors, earns more than 101 million rupees annually. Mining has emerged as the largest recipient of Foreign Direct Investment (FDI) in the country.

A well-accepted principle is that the wealth of a nation comes from the earth. In the world of mining, a corollary to this is that “If it can’t be grown, it must be mined.” Surface mining techniques are the principal means used to extract minerals from the earth.

The yearly rock production yielding metals, non-metals and coal in the world totals 16.6 billion tons. Of this, the production from surface mines is about 70% or 11.5 billion tons. Crushed rock, sand and gravel, the fundamental materials required for construction - are largely produced using surface mining techniques.

Their yearly production rate totals 23.5 billion tons. To this must be added the materials needed for the production of cement, another 2.3 billion tons. Finally, the amount of waste that must be moved in the process of extracting the valuable materials is estimated at 30 billion tons. Summing, one finds that the total amount of material extracted per year using surface mining techniques is of the order of 67.3 billion tons.

Today, the population of the world stands at about 6.5 billion people. In simple terms, this means that every year approximately 10 tons of material is extracted using surface mining techniques for every person in the world.
According to the UN estimates that in 20 years (2038) the world’s population will have reached about 8.5 billion people.

As indicated, large quantities of raw materials are produced in various types of surface operations. Where the product is rock, the operations are known as quarries. Where metallic ore or non-metallic minerals are involved, they are called open pit mine.

A quarry is a factory that converts solid bedrock into crushed stone. Quarries can be either of the common pit type or, in mountainous terrain, the hillside type. Quarries are often run by operators who sell their products to nearby contractors and road administrators. Because the products are generally of relatively low value, they are transport cost sensitive. Two major differences between open pit mining and quarries are the geological conditions and the demands placed on the characteristics of the blasted material. For quarries, a majority of the rock products eventually delivered to the customers has only undergone crushing and screening in order to obtain the desired size fractions. An open pit metal mine, on the other hand, attempts to deliver the ore as pure as possible via crushers to a concentrator consisting of mills, separators, flotation and/or biochemical systems, etc.

Fig. Diagrammatic representation of the overall mine-mill fragmentation system and the mine and mill subsystems
Fig: Simplified view of the five different stages of fragmentation, each with a different energy, product profile.

Project Benefits

The Project has been developed in response to a number of driving forces, including:

- Economic development
- Contribute to construction industry, cement industry etc.
- Poverty reduction
- Contribute in the development of infrastructure
- Improve living standard of the area
- Contribute into national GDP
- Project will create jobs for the indigenous/local persons.
- To provide better opportunities for the nearby vicinity including skilled and unskilled workers.

**Purpose of the Study/report**

The purpose of the report is to obtain the Environmental Approval for limestone and clay mining from the concerned Environment Department for proper execution of the project.

The EIA report has been prepared keeping in view the following Regulations and Guidelines:

- Punjab Environmental Protection Act 1997 (Amended 2012)
- Pakistan Environmental Protection Agency (Pak-EPA) Regulation, 2000 for review of IEE and EIA
- Pakistan EIA procedures
- Guidelines for public participation.
- Guidelines for sensitive and critical areas.
- Detailed sectoral guidelines
- National Mining Policy 2013
- Mining Act 1923

The purpose of the EIA study is to identify the possible and beneficial environmental impacts of the proposed project and propose the practical mitigation measures to be implemented to minimize the negative impacts of the subject proposed mining project. The specific stages of EIA study are:

- Review of available documents
- Site survey
- Overview of different project alternatives
- Collection of baseline data related to physical, ecological, and social domain of environment
- Evaluation of project impacts on environment and social settings
- Public Consultation with the stakeholders
- Suggestion, mitigation measures of adverse impacts for the proposed project
- Preparation of Environmental Management Plan (EMP)
- Preparation EIA report

Considering the prime importance of the project and its urgency, the present EIA study has been prepared for obtaining the approval from concerned mining department for acquiring the land on lease for proposed mining activity and to set up the proposed Cement Plant Project.

**Scope of the study**

The scope of study includes the preparation of single stage Environmental Impact Assessment (EIA) study of the proposed mining project for obtaining the environmental approval from the concerned environment department for the compliance of section 12 of PEPA 1997 (Amended 2012) and to ensure compliance with the NEQS. The scope of study includes baseline survey of the proposed project, collect relevant data from primary and secondary sources, assess the impacts related to the subject project, suggest the mitigation measures to control the anticipated impacts, formulate the environmental monitoring program to check the environmental parameters at NEQS, prepare an Environmental Management plan to implement the recommended mitigation measures, consultation with the stakeholder or nearby community to know their concerns regarding the subject project.

The scope of study will be extended with the installation of proposed cement plant that will include complete engineering designs of the plant, drawings, diagrams, manufacturing process, packing, marketing, delivery, transportation of the final product, loading and unloading, storage at site, distribution sites, testing and product (cement) user guidelines.

**Identification of the project:**

According to the Punjab Environmental Protection Act 1997 (Amended 2012) and its interpretation as per Review of IEE & EIA Regulations, 2000 for filling, review and approval of environmental assessments, the present project is categorized in the category C (Mining and mineral processing) of Schedule-II for EIA, of PEPA, Regulations, 2000, requiring Environmental Impact Assessment (EIA). Further, the client is required to fulfill the legal requirements of the Section-12 of the Punjab Environment Protection Act 1997(Amended 2012). Copy of the IEE/EIA Regulation 2000 can be seen as **Annexure D.**
Proponent Detail
Mr. Muhammad Anwar Tariq (Dy. General Manager HR/IR) is authorized to perform as proponent during the proceedings of environmental approval (Authority letter is attached with the initial documents submitted in EPD).

Muhammad Anwar Tariq S/o Malik Tariq Mahmood bearing CNIC: 121010-0896167-7, R/o Taimoor Town near O.P.F School Gulshan Colony House NO. 3834/16-E, Dera Ismael Khan. CNIC and other relevant documents are attached in Annexure-E

Details of Consultant
Pak Green Enviro-Engineering (Pvt.) Ltd is an independent company, who conducts IEE, EIA, EMP and other environmental investigations through its panel of environmental consultants, public participation practitioners and experienced environmental managers. The company has its own recommended instruments to check the baseline environmental data/NEQS and lab analysis facility for flue gases, ambient air quality, water & waste water priority parameters.

Contact: Pak Green Enviro-Engineering (Pvt.) Ltd.
Office No. 314, Eden Center, 43 Jail Road, Lahore
Tel: +92-3004462976, +92-3044452189, +092-04237500464

The current study was carried out by the following professionals:

<table>
<thead>
<tr>
<th>Name of the EIA Team</th>
<th>Qualification and Brief Experience</th>
<th>Position in the EIA Team</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abdul Hafeez Nasir</td>
<td>A- Qualifications</td>
<td>Team Leader</td>
</tr>
<tr>
<td></td>
<td>1. Ph.D Scholar (Environmental Management)</td>
<td>Coordinator &amp; Supervisor</td>
</tr>
<tr>
<td></td>
<td>2. M.Phil (Environmental Science) GCU Lahore</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. M.Sc. (Biological Sciences major Ecology &amp; Environment) Forman Christian College University Lahore</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4. B.Sc. (Chemistry) Punjab University Lahore</td>
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</tr>
<tr>
<td></td>
<td>B- Experience</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Five years’ experience as Environmentalist</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1- Worked on World Bank Funded project Govt. of Punjab</td>
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</tr>
<tr>
<td></td>
<td>2- Carried out EIA for 15 projects</td>
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</tr>
<tr>
<td></td>
<td>3- Carried out IEE for 950 projects</td>
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<td></td>
<td>4- Carried out EMP for 50 projects</td>
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<tr>
<td></td>
<td>5- Carried out 500 Environmental Monitoring Reports</td>
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</table>
NATURE, SIZE AND LOCATION OF THE PROPOSED PROJECT

The subject project is for the purpose of mining for limestone and clay deposits. The area required for the proposed mining activity is 6331.43 Acres. The subject project involves the mining of two excessive limestone and clay deposits which are located in close proximity to the plant site. About 6500 tons/day Limestone deposits and 1500 tons/day clay deposits will be required for the production of 5000 tons/day of cement. Other minerals or ores as Iron Ore 200 tons/day and Gypsum 250 tons/day will also be used in the production of cement.

Mining for Limestone deposits will be done over an area of 400 SFT on daily basis through surface mining by controlled blasting at the depth of 100 ft for limestone while clay will be extracted through extraction process by excavators and other machinery at the depth of 60 ft for Clay. Clay will be acquired by mechanical extraction from the nearby area within the distance of 1-3 km from the plant site and adjacent to the limestone site. Both sites (limestone and clay) overlap each other.
Location of the mining area

The subject proposed mining site is located at Buchal Kalan village Tehsil Kalar Kahar District Chakwal.

Geographical location of the area:

The project is located at Buchal Kalan village Tehsil Kalar Kahar District Chakwal. Project co-ordinates are as follow:

North……………………………. Buchal Village + Bulah + Gufanawala Village at 5-6 km
West……………………………… Local Road
East……………………………. Makhyal Village at 2-3 Km
South……………………………. Lafi village at 7-8 km
SE………………………………. Sarkalan village 7-8 km

M/s Pak Green Enviro-Engineering (Pvt.) Ltd. has been engaged for providing consultancy services to conduct the single stage Environmental Impact Assessment (EIA) study of proposed mining project for M/s Lucky Cement Limited in District Chakwal.

IEE/EIA REGULATORY FRAMEWORK

Environmental Assessment was introduced in Pakistan as a legal requirement for the first time in 1983 through Environment Protection Ordinance, 1983 (the Ordinance). It was a Federal law applicable to the whole of Pakistan.2 Section 8 of the Ordinance required, from every proponent of a project that was likely to adversely affect the environment, to file a detailed environmental impact statement, with support of the environmental protection agency at the time of planning the project. The reporting requirements under Section 8 of the Ordinance were applicable to such industrial activities, discharges of air pollutants and waste, public waters and on such persons and areas as may be prescribed through regulations to be made under the Ordinance. However, no rules or regulations were notified. Moreover, process of an environmental impact assessment was not provided in the Ordinance.

In 1997, the Pakistan Environmental Protection Act (the “Act”) replaced the Ordinance. Once again, it was a Federal law, applicable to the whole of Pakistan. The Act, for the first time, defined EIA and IEE. The requirement of submission of IEE/EIA for review was before “construction or operation of the project”, unlike the Ordinance, where filing the EIA was at the time of planning the project. The Act provided a process of conducting an IEE and EIA and penalties6 for non-compliance, which was lacking in the Ordinance. Through the Act, the
The concept of public hearing was made an essential part of the review process. The Act further provided for making of rules/regulations for categorization of projects requiring IEE/EIA and manner in which the process provided in the Act shall apply.

**OBJECTIVE OF THE ENVIRONMENTAL IMPACT ASSESSMENT**

The aim of Environmental Impact Assessment (EIA) is to enable the approving authority and the developer to properly consider the potential environmental consequences of the project and to make recommendations to reduce it. It is important to provide sufficient information for the approving authority to make a decision on whether to approve the project and if so, under what conditions. The information provided should be clear, objective, and supported by maps or other descriptive detail.

**EIA Process**

EIA is a systematic process to identify, predict and evaluate the environmental impacts of proposed actions and projects. The process is applied prior to major decisions and commitments being made. Wherever appropriate, social, cultural and health effects are considered as an integral part of EIA. Particular attention is given to practical implementation of EIA to prevent and mitigate significant adverse effects of proposed undertakings.

**Screening**

The process of screening is dealt by the Regulations, which classifies projects in two categories: projects requiring IEE (Schedule I) and projects requiring more detailed EIA (Schedule II).

**Scoping:**

Scoping is the process to determine what issues, impacts and alternatives require further investigation/study. It is a systematic exercise that sets the Terms of Reference (ToR) for the EIA. Prioritizing issues though scoping is crucial for meaningful, efficient and effective EIA process. Scoping may be undertaken differently in different jurisdictions. In some jurisdictions it is the responsibility of the proponent while in others either the competent authority or an independent body is responsible for making scoping opinion. Once a draft document is prepared, it is normally consulted with different stakeholders. In some jurisdictions, consultations are done only with government authorities and experts, while in more developed systems consultation is extended to affected persons and general public also.
Methodology for EIA Report:
For the purpose of this report, environmental and social baseline data and conditions at/around the project site has been undertaken. The methodology adopted to conduct the EIA Study includes site visits, Review of Layout Plan, detail meetings with the representative of proponent, detail meetings with surveyor, discussion with local person, orientation session, development of data acquisition plan, Analysis of Data, review of existing data, primary & secondary data collection survey, Screening of Potential Environmental Impacts and Mitigation Measures and also interviews with people near the project area has been conducted to collect their opinion regarding the construction of food processing project and after findings it has been concluded that the project has mostly positive impacts on the socio-economic environment of the existing community.
Structure of the Report

The EIA report is divided into 10 chapters and appendices as:

Chapter 1: covers introduction to proposed project

Chapter 2: describes the Methodology to conduct Baseline study

Chapter 3: presents Project Description

Chapter 4: Provides the analysis of the project Alternatives

Chapter 5: provides the Legal Framework applicable to the proposed project

Chapter 6: describes in detail the Existing Environmental Baseline conditions of the study area
Chapter 7: exhibits the Impacts Assessment and their Mitigation Measures

Chapter 8: outlines the EMP to implement the suggested mitigation measures

Chapter 9: explains the Stakeholders Participation

Chapter 10: Gives the Conclusion and Recommendations

Reference

Appendices/Annexure

Annexure-A: ToRs

Annexure-B: letter for the lease of land for limestone mining

Annexure-C: NEQS Rules 2001

Annexure-D: Schedule-II of IEE/EIA Regulations 2000

Annexure-E: CNIC & Other relevant documents

Annexure-F: checklist & socioeconomic survey form

Annexure-G: Layout map of the project

Annexure-H: Feasibility Report

Annexure-I: Economic & Financial Analysis

Annexure-J: Detail of land & utilization of exact land for limestone and clay with total area, plant area, disturbed area and workable area.

Annexure-K: SOPs of safe handling and storage of Explosive material

Annexure-L: SOPs for safe blasting

Annexure-M: Detail of water requirement & tube well

Annexure-N: Hydrological Study Report


Annexure-P: Undertaking by Lucky Cement

Annexure-Q: Lab Reports

Annexure-R: Wind Direction data from Meteorological Department

Annexure-S: Environmental cost in Total project cost Document
Annexure-T: Stakeholders Performa

Filled Checklist

Glossary
CHAPTER 2

Methodology

The subject proposed mining project lies in the village Buchal Kalan of Tehsil Kalar Kahar District Chakwal. The environment description of the study area is described in detail in chapter 6.

Methodology

The methodology adopted to carry out the single stage EIA study of the proposed mining project was as follow;

A) Orientation
B) Planning of Data Collection
C) Data Collection
   a. Site Reconnaissance
   b. Analysis of Maps and Plots
   c. Literature Review
   d. Desk Top Research
   e. Discussions & meetings with stakeholders
   f. Public Consultations
   g. Field Studies

Approach Adopted to Conduct the Study

To conduct this study primary & secondary data was collected; a detailed review of the project Layout Plan was carried out to truly understand the Project and extent of the developmental activities. Also meetings were held with the stakeholders to get the information for the project. Also checklist was developed and interviews were conducted with local residents to know their point of view regarding the project. Checklist and socioeconomic survey form is attached in annexure-F.

Review of Layout Plan

A detailed review of the project Layout Plan was carried out to truly understand the Project and extent of the developmental activities. To review layout plan, a detail meetings were held with the client to ensure the consistency of the proposed project. The review of Layout Plan helped to visualize nature and extent of the negative impacts related with implementation and
operation of the purposed project on physical, biological and social environment of the locality.

Environmental Baseline Survey of the Project
To conduct the environmental base line study of the project, a multidisciplinary team was involved comprising engineers, environmentalist, ecologist and sociologist. Prior to start of the base line environmental survey, a checklist was developed. The major components which were considered for physical, ecological and social environment are discussed in the subsequent paragraphs.

A) Physical Environment
For collecting the information on the physical environment, following main parameters were considered:

a) Land Resources
b) Water Resources
c) Climate, Air and Noise Quality
d) Other Infrastructure

B) Biological Environment
e) For biological environment study, the following parameters were covered:
f) Flora
g) Fauna
h) Endangered Species (both flora & fauna)

C) Social and Cultural Study
i) To collect the social base line study of the project area, social survey was conducted to accomplish the following specific objectives:
j) To identify the potential project affected persons (if any) in the project demarcated area
k) To identify poor and vulnerable groups and strategies to ensure that such groups will get benefit from the project
l) To identify the effects on available common resources of the community due to implementation of the project
Analysis of Data

After collection of environmental and social data from both primary and secondary sources a critical analysis was made to assess the existing base line conditions and potential impacts.

Table: Baseline status

<table>
<thead>
<tr>
<th>ATTRIBUTE</th>
<th>BASELINE STATUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meteorology</td>
<td>The meteorological data of the proposed study area was collected from the Pakistan Department of Meteorology (PMD) for the last 15 years. The climate of the area can be classified as true semi-arid, sub-tropical with long winter and sub-humid. The general feature are high June- July temperature with occasional hot, dry wind and dust storms, cold nights in winter and two rainy seasons. Unseasonal rain fall is also occur in the start of the winter. The wind mostly flow from the north to the south in the study are region. Mean annual maximum temperature of the study area reach 29°C and minimum is about 14°C. Humidity of the area is high at night except of the month of the May and Jun when it is about 58% at midnight and 46% at 0300 hrs. During the other month the humidity rage is about 70% to 80% while the midday humidity is low and range is 23%-26% Rain fall pattern of the study area are as; 1. Mid Jun to mid September 2. December to March</td>
</tr>
<tr>
<td>Ambient Air Quality</td>
<td>Ambient air quality of the proposed study is monitored for the assessment of the pollutants in the existing environment. The values were found within the prescribe limit given by NEQs. Lab results are incorporated within this report.</td>
</tr>
<tr>
<td>Noise Levels</td>
<td>Noise level was monitored at different locations of the proposed site and found within NEQs limits at all locations surveyed. Lab results</td>
</tr>
</tbody>
</table>
Water Quality

Ground water samples from two villages, spring & lake water samples were collected from the nearby areas of the proposed project and were analyzed for various desirable characteristics. Results were within NEQs limits. Lab results are incorporated within this report.

Soil quality

Soil samples were examined for various physical and chemical parameters. Proposed study area is present in the salt range of tehsil Kallar Kahar. Mostly area is covered by the mountains. Fertile land is rare in the study area. Small patches of the soil are present that are used by the house hold for the vegetable harvesting. Hard rocks are present all over the upper layer. Clay is also present at about 1-3 km distance from the proposed mining site. The soils are medium textured with considerable amount of clay materials. Soil formation of that area is occurred through the mechanical weather of the old alluvial deposit and loess due to the wind and water of the rains.

Biological Environment

Land required for the proposed mining project is surrounded by hilly area. The subject project study area has scattered species of flora. Mainly shrubs and grasses were present on land and about 5-10 big plants were there; mostly the land is barren so the project will not cause any major adverse impacts on the surrounding. Also the study area had few species of fauna those were now disappeared due to population. The project proponent has ensured to take all the necessary mitigation measures to control any impact arise from the subject project and to restore the land with maximum plantation.

Socio-economy

Area is mainly located at Village Buchal Kalan of tehsil Kalar Kahar District Chakwal, express way and villages are present at specific distance of the proposed project site and so not come under the radius of study area. Also there are educational institutes, private and public health care centers available in the area. Overall economy of the area is satisfactory and good.
Screening of Potential Environmental Impacts and Mitigation Measures

After thorough review of the field notes, data collection, extent of proposed project activities and detailed discussion with design team, the potential impacts of the project were assessed and safety measures were proposed to mitigate the negative impacts and to enhance the positive impacts. The potential impacts and mitigation measures were assessed covering the following parameters:

- Environmental problems due to project location
- Environmental problems related with design
- Environmental problems associated with the construction
- Environmental problems resulting from the project operation.

Preparation of environmental monitoring program and institutional requirement

An Environmental Monitoring Program (EMP) depicting the mitigation measures and monitoring plan was also developed. Institutional capacity building of project was also reviewed and enhancement was proposed for effective implementation of the EMP. EMP has been developed for effective implementation of the recommended mitigation measures. The EMP included controls to minimize the identified impacts, and monitoring program to monitor residual impacts, if any, during the operation. The EMP also lays down procedures to be followed during the operation of the project and identifies roles and responsibilities for all concerned personnel during the project, including reporting in Operational Phase.

Reporting

The Environmental Impact Assessment Study presents the findings and compiles all the information into one document that includes:

- Introduction
- Methodology for undertaking the EIA study.
- Description of the project.
- Site & Technology Alternatives
- Governing legislation and statutory requirements.
- Information relating to the background environmental conditions in the area.
- Identification of environmental impacts.
- Evaluation of the significance of environmental impacts.
- Recommended mitigation measures and monitoring requirements.
- Development of Environmental Management Plan (EMP).
- Environmental Monitoring Program
- Participation of Stake holders
- Conclusion & Recommendation

**Submission and Review of Draft**

Pak Green Enviro-Engineering (Pvt.) Ltd. has given one copy of the draft report to the proponent for review. The objective was to give the client an opportunity to review the findings of the study. Ambiguities that the client had regarding the study were clarified, and suggestions/recommendations voiced for inclusion were added in the final report.

**Final Report**

Pak Green Enviro-Engineering (Pvt.) Ltd. reviewed the feedback obtained from the project proponents and all their comments were incorporated as changed in the draft report. One hard and one soft copy of the final report were submitted to proponent of M/s Lucky Cement Limited.
CHAPTER-3

PROJECT DESCRIPTION

This chapter characterizes the project detail, general geology of the area, project salient features, a general description of the raw materials the facility will use, the products they make, and the markets they serve, general description of mineral deposits, mining activity, description of the process of mining, its benefits, mining equipment, project utilities, mining impacts on environment, project waste products and safe handling and disposal.

**Mining** is the extraction of valuable minerals or other geological materials from the earth from an ore body, lode, vein, seam, or reef, which forms the mineralized package of economic interest to the miner.

Ores recovered by mining include metals, coal, oil shale, gemstones, limestone, dimension stone, rock salt, potash, gravel, and clay.

Pakistan as a country is rich in natural resources and as the process of excavation and exploration continues the extent of these vital resources keep expanding. According to many analysts, Pakistan is affluent in natural resources than any other country. The energy surplus resource potential of the country is more than oil producing gulf countries.

Mining is an important industry in Pakistan. Pakistan possesses numerous mines, processes more than 50 minerals regularly and many are still undiscovered.

Keeping in view the above mining scenario in Pakistan, proponent of M/s Lucky Cement Limited intends to set up a **Proposed Portland Cement Plant** at Buchal Kalan District Chakwal. Mining for specifically limestone and clay need to be required for the subject plant.

**Project need and Advantage:**

In 2008, global cement production stood at 2.8 billion tonnes, up 3.4% from the previous year. The growth mainly stems from emerging economies which are striving to meet their rapidly growing demand for housing and infrastructure.

The cement industry plays a major role in meeting society's needs for housing and infrastructure. Cement, the glue that holds concrete together, is a key ingredient of economic development.
Cement is one of the most important industries of Pakistan. Limestone and gypsum are the main raw materials for manufacturing of cement and they are present in abundance in Pakistan along with good supply of Natural gas. This great potential makes the country capable of producing cement not only for local use but also for export as well. Pakistan cement industry has exporting cement to the neighboring countries like U.A.E, Afghanistan, India, Iraq and Russia.

At present there are 22 cement plants are operating in Pakistan with the production of approximately 9.403 million tonnes. Out of these 22 cement plants, 17 are private and 5 are public. 11 new plants are also in planning stage and the capacity of these plants is estimated around 12.988 million tonnes. The industry has achieved a growth of 32% with the domestic demand increasing by around 24.95% and the exports by nearly 111.86% according to the financial year end June 30, 2007 ratings. Recently the country has been able to export to some of the African countries as well.

Pakistan has started exporting cement few years back and has earned repute as a premium quality cement producer in the global market in this short period. Pakistan exported around 7.716 million tonnes of cement in 2007-2008 and earned a foreign exchange of 459 million dollars. There is surely a great potential of growth in this industry in Pakistan.

To cater the demand of cement in the country the subject proposed mining project is being carried out for the proposed cement plant in District Chakwal.

**Advantages of Mining:**

The mining industry is a major force in the world economy, occupying a primary position at the start of the resource supply chain. According to a case studies conducted by ICMM shows that foreign exchange earnings from mining can increasingly create positive developmental effects. In many countries, the mining and metals industry is gaining recognition as an important contributor to the critical policy objectives of job creation and poverty reduction. Mining makes a very significant contribution to national investment totals especially when mining activity is building up from a low base (e.g. Tanzania 1999–2006). In the case of Brazil, Vale’s investments alone are the equivalent of almost 5% of total annual national investment. There is a growing economic contribution by the mining and metals industry to many low and middle income countries. The rapid expansion of mining activity in recent years has made many low and middle income countries more reliant on mining for generating foreign exchange earnings. Mining in recent years has been the single most dynamic component of many poorer countries’ total productive activity. Thus it has become a potential
source of both direct and indirect incomes and a potential catalytic force for faster overall economic growth. In many countries, the mining and metals industry can and should be recognized as an important potential contributor to the critical policy objectives of both job creation and poverty reduction.

In general mining of minerals contribute to:

- Economic development
- Contribute to construction industry
- Create job opportunities to the local people
- Poverty reduction
- Contribute in the development of infrastructure
- Improve living standard of the area
- Contribute into national GDP

**Project Site and Regulatory Compliance Status**

The subject project of mining will be recommended to start after obtaining the approval from the concerned department. M/s Lucky Cement Limited already running their cements plants in different districts which are well maintained, state of the Art, with installed pollution control devices as filter bags, wet scrubber etc. and in compliance with NEQS. The proposed cement plant will also be installed in same manner like their other plants with all precautionary measures. This EIA study has been carried out for the proposed mining project and if it gets approved by the concerned department then a full stage EIA study will be conducted for the *Proposed Cement Plant Project*.

**Type and category of the project:**

**Project Overview**

The subject project involves the mining of two excessive limestone and clay deposits which are located in close proximity to the *proposed Portland Cement Plant site* located at Buchal Kalan District Chakwal under the name of M/s Lucky Cement Limited. The proposed total area for the mining activity for both limestone and clay is 6331.43 Acres.

The subject project will deal with mining activity for non-metallic minerals such as limestone and clay. These two minerals are available in abundance in the vicinity of the proposed cement plant site. Limestone deposits will be mined through surface mining under controlled
blasting along with precautionary measures while clay will be acquired from nearby area within the plant site adjacent to the limestone site. Both sites overlap each other.

Before commencement of the subject project of mining it is necessary to obtain the NOC from concerned departments. EIA study is being carried out to obtain the Environmental Approval from concerned Environment Department for the mining project prior to start mining activity in the area.

According to the Punjab Environmental Protection Act 1997 (Amended 2012) and its interpretation as per Review of IEE & EIA Regulations, 2000 for filling, review and approval of environmental assessments, the present project is categorized in the category C (Mining and mineral processing) of Schedule-II for EIA, of PEPA, Regulations, 2000, requiring Environmental Impact Assessment (EIA). Further, the client is required to fulfill the legal requirements of the Section-12 of the Punjab Environment Protection Act 1997(Amended 2012).

Objectives of the project
Under this project M/s Lucky Cement Limited has planned to set up a proposed cement plant at Buchal Kalan District Chakwal. For the purpose of the proposed cement plant, mining for Limestone and clay is required. An Environmental Impact assessment report is being submitted to Environmental Protection Department for the issuance of NOC for subject mining project.

Present Project has following objectives;

- It is expected to benefit local population of Buchal Kalan
- To provide job opportunities to local public and to improve their living standards
- To improve the economic activities
- To provide better infrastructure
- It will fulfill the cement requirement in the country
- Private investment will be beneficial for the national economy and GDP as well
- Project will function in a sustainable way for the mining of limestone and clay deposits.

The other objectives of the study are,

- To identify and quantify significant impacts due to the proposed mining project on various environmental components through prediction of impacts.
- To evaluate the beneficial and adverse impacts of the proposed mining project.
• To assess and describe the mitigation measures taken by LUCKY CEMENT management
• To evaluate and check the Environmental Management Plan (EMP) detailing control technologies and measures to be adopted for mitigation of any adverse impacts as a consequence of the proposed mining project.
• To propose monitoring plan to ensure the compliance with emission standards

CONSIDERATION OF THE ALTERNATIVES
Alternatives for the proposed mining project have been considered and most suitable site has been selected after consideration of the other four alternatives sites. Four other alternative sites for the proposed mining project are:

• Manak Pur Village District Chakwal
• Sardayi Village District Chakwal
• Near mouza Dhoke Babral District Khushab
• Near mouza Khatakabad District Mianwali

Detail of each alternative site will be described in next section.

Site selection Criteria
The site selection criteria for the proposed site are as follows:

• Enough reserves of non-metallic mineral deposits i.e. limestone and clay
• Both deposits are in the proximity of proposed Cement Plant
• Plain Area/Barren Land
• No residential settlements or area near the radius of selected site.
• Enough water availability, tube well
• Less/few vegetation/plantation
• Easy access of raw material to proposed cement plant area
• Easy availability of clay deposits

General Geology of the area
The subject project area lies in the Buchal Kalan Village District Chakwal. The area falls in the mountains range of Salt Range which arises out of the Punjab plains and forms impressive scraps, gorges and hill slopes. Salt Range is a series of hills and low mountains between the valleys of the Indus and Jhelum rivers, located in the northern part of the Punjab
region of Pakistan. It derives its name from extensive deposits of rock salt that form one of the richest salt fields in the world; they are of Precambrian age and range up to more than 1,600 feet (490 m) in thickness. The range is approximately 186 miles (300 km) long from east to west, and its width, in the central and eastern parts, is from 5 to 19 miles. Its average height is 2,200 feet, and its highest altitude, at Sakesar Mountain, is 4,992 feet (1,522 m). In addition to extensive deposits of cement raw material the Salt Range contains deposits of coal, gypsum, and other minerals.

**Limestone Deposits**

Pakistan is endowed with extensive geological potential. The country possesses extensive reserves of mineral deposits such as coal, copper, gold, limestone etc. Lime Stone is present in salt Range Potwar Plateau, Margalla Hills and Zinda Pir (Attock) in large deposits.

The mineral deposits of our concern are limestone and clay. According to geological investigations the selected site has availability of extensive deposits of raw material required for manufacturing of cement that includes sakesar limestone and nammal limestone of early Eocene age. The limestone deposits are present in closed proximity of the proposed plant site. The deposits are of suitable grade and have adequate reserves for over 150 year’s requirement of 5000 tons per day cement plant. Clay deposits are also in abundance in the proposed project area and will be easily available for the proposed cement plant.
Raw Materials

Limestone deposits are located at the distance of 1-3 km from the plant site. Naturally occurring lime in form of calcium carbonate is abundantly available in our country and elsewhere in the world. Limestone is the most abundant and massively used industrial commodity globally as well as in Pakistan. It is found that these limestone’s, namely, Lockhart, Margalla Hill, Samanasuk, Sakesar and Nammal are of great economic importance and commercially exploitable.

Limestone, one of the largest produced crushed rocks, is a sedimentary rock composed mostly of the mineral calcite and comprising about 15 percent of the earth's sedimentary crust. This mineral is a basic building block of the construction industry and the chief material from which aggregate, cement, lime, and building stone are made.

Limestone is a rock with a variety of uses. Most limestone is crushed and used as a construction material. Pure limestone is nearly white in color, but most of the limestone used for buildings is produced in a range of different finishes, such as cream, black, gold, brown, pink and red.
Lime is also used in cement and it was seen that the compressive strength of concrete modified with lime was less than the normal concrete. But so far as the durability and %age water absorption are concerned, Lime played an important role and 24 hours %age water absorption decreases with increase in lime as a cement replacement in concrete. It is recommended for durability purposes that 20% replacement of lime with cement was more effective in concrete than with 40% for the mixes investigated.

Clay
The clay deposit is located at the distance of 2-3 km from the plant site adjacent to the limestone site. Clays and clay minerals have been mined since the Stone Age; today they are among the most important minerals used by manufacturing and environmental industries. Clay is a fine-grained natural rock or soil material that combines one or more clay minerals with traces of metal oxides and organic matter. Geologic clay deposits are mostly composed of phyllosilicate minerals containing variable amounts of water trapped in the mineral structure. Depending on the content of the soil, clay can appear in various colors, from white to dull gray or brown to a deep orange-red. Clay minerals typically form over long periods of time from the gradual chemical weathering of rocks, usually silicate-bearing, by low concentrations of carbonic acid and other diluted solvents. Clays exhibit plasticity when mixed with water in certain proportions. When dry, clay becomes firm and when fired in a kiln, permanent physical and chemical changes occur. These changes convert the clay into a ceramic material. Because of these properties, clay is used for making pottery, both utilitarian and decorative, and construction products, such as bricks, wall and floor tiles. Different types of clay, when used with different minerals and firing conditions, are used to produce earthenware, stoneware, and porcelain.

There are about 4 villages in the study area with an estimated population of about 22-2500. Outside the study area many industries such as Pakistan Cement, D.G. Cement and Best way Cement exist which have their own pollution sources. The whole area is rain fed and the little groundwater is available for irrigation purposes.

Location of the mining area
The subject proposed mining site is located at Buchal Kalan village Tehsil Kalar Kahar District Chakwal.
Geographical location of the area:
The project is located at Buchal Kalan village Tehsil Kalar Kahar District Chakwal. Project co-ordinates are as follow:

North…………………………….. Buchal Village + Bulah + Gufanawala Village at 5-6 km
West……………………………… Local Road
East…………………………….. Makhyal Village at 2-3 Km
South……………………………. Lafi village at 7-8 km
SE……………………………….Sarkalan village 7-8 km

All the surrounding villages are present out of the radius of study area except the Makhial Village which is present at 2-3 Km and where only clay excavation will be done which would have minor negative impact on the surrounding.

Land Coordinates:

N 32.66430  E 072.62503

Aerial Map
Existing Land Use:
The study site is situated in the Buchal Kalan village Tehsil Kalar Kahar District Chakwal. Land required for the proposed mining project is surrounded by hilly area. Land selected for the proposed project is barren only some grasses & shrubs are present in scattered quantity. Mostly area is covered by the mountains. Fertile land is rare in the study area. Small patches of the soil are present that are used by the house hold for the vegetable harvesting and grazing. Hard rocks are present all over the upper layer. Clay is also present at about 1-3 km distance from the proposed mining site.
Road Access:
Currently, Main Khushab Road is used to access the mining site but M/s Lucky Cement will built their own paved road to join the mining site to plant. The link roads named Sarkalan Road and Makhial Road also used currently to assess the site.

Vegetation features of the project:
The proposed study area is barren and has scattered amount vegetation/flora. Mainly grasses and shrubs like Parenthanium are present on site and about 5-10 trees or big plants like Acccia modesta (Kikar) present in the area that will be cut off during the proposed mining/extraction activity and will be restored with native plants. Mostly the land is barren so the project will not cause any major adverse impacts on the surrounding.
Cost and magnitude of the Project
The current status of the project is proposed, activity will be start after the environmental approval from EPD. Total area of the project is 6331.43 Acres. A complete layout map of the area is annexed (Annexure-G). Total cost for the mining project is 24,233 million as per Feasibility Report attached herewith as ANNEX-H, also Economic and financial analysis of the project is attached in Annexure-I.

Schedule of Implementation
M/s Lucky Cement has acquired the grant of lease for limestone mining from Department of Mines & Minerals Punjab while for the grant of lease for clay mining it has been applied to Department of Mines & Minerals Punjab. Also, proponent has applied to the concerned Environment Department for Environmental Approval for the subject proposed mining project. Mining activity for non-metallic minerals would be started when Cement Plant will come in operation after obtaining the Environmental Approval.

Project Description
The subject project involves the mining of two excessive limestone and clay deposits which are located in close proximity to the proposed Portland Cement Plant site at Buchal Kalan village Tehsil Kalar Kahar District Chakwal. The proposed total area for the mining activity for both limestone and clay is 6331.43 Acres.
Limestone deposits are available within the distance of 1-2 KM from the plant site while clay deposit is found within 1-3 km. Both sites (limestone and clay) overlap each other. While other minerals i.e. gypsum and laterite (iron ore) are not found in the project area and will be brought from Kohat and Mianwali District. The plant is proposed to be established on a fairly level ground.

About 6500 tons/day Limestone deposits and 1500 tons/day clay deposits will be required for the production of 5000 tons/day of cement. Other minerals or ores as Iron Ore 200 tons/day and Gypsum 250 tons/day will also be used in the production of cement.

Mining for Limestone deposits will be done over an area of 400 SFT on daily basis through surface mining by controlled blasting at the depth of 100 ft for limestone while clay will be extracted through extraction process by excavators and other machinery at the depth of 60 ft for Clay. Clay will be acquired from the nearby area within the distance of 1-3 km from the plant site and adjacent to the limestone site.

Study area:
The present EIA study area for mining activity within 4-5 km radius will be considered adequate from the mining site for keeping in view meteorological, physical, and biological factors and the nature of emissions from the plant.

Salient Features of the Project
The concerned project of acquiring/leasing the land for the purpose of mining has following features:

Promoter: M/s Lucky Cement Limited

Plant location: Buchal Kalan Tehsil Kalar Kahar District Chakwal

Land Area Specification

Total Area for the mining site: 6331.43 Acres
Area for Limestone Mining site: 4626.03 Acres
Area for Clay Mining Site: 1705.4 Acres
Area for proposed cement plant: 400-500 Acres
Area for mining limestone: 400 SFT on daily basis
Area for excavation clay: as per demand of cement plant on daily basis
At the proposed site the amount of reserves of limestone Tonnage is 1215041453 (1215 million tons) and clay reserves (Tonnage) is 83982607.75 Tonns (83.98 million tons).

Detail of Land & for Utilization of exact land for limestone and clay with total area, plant area, disturbed area and workable area is attached in Annexure-J

**Minerals to be mined:**
*Limestone & Clay*

**Amount of Mineral Deposits to Be Mined:**
*Limestone 6500 tons/day, clay 1500 tons/day*

**Other ores or minerals required:**
*Iron Ore 200 tons/day, Gypsum 250 tons/day (will be brought from other areas)*

**Depth for extracting mineral:**
*About 100-200 ft for limestone mining/extraction (depth can be varied as per Environmental Management)*

*About 60 ft for clay extraction (depth can be varied as per Environmental Management)*

**Process of mining:**
*Surface Mining under controlled blasting for limestone Extraction*

*Mechanical extraction/excavation for clay mining*

**Explosive Material for blasting:**
*Emulite, Detonators*

**Storage & Handling**
*As per SOPs of Safe handling & Storage of explosive material attached as ANNEX-K*

**Type of Blasting:**
*Controlled blasting*

**Process of manufacturing cement:**
*Dry process with the heat efficient preheating/proclaiming Technology*

*Capacity of the cement plant: 5000 ton/day*

**Detail of Machinery:**
*Hydraulic excavators*
Drillers
Hauled trucks
Loading trucks
Four wheel loaders
Dump trucks
Bulldozers and compressors

Water Requirement for Mining Activity:
Five tube wells installed at proposed cement plant each with 30m³

Process of Mining
After a mineral deposit has been discovered, delineated, and evaluated, the most appropriate mining method is selected based on technical, economic, and environmentally accountable considerations. The first step in selecting the most appropriate mining method is to compare the economic efficiency of extraction of the deposit by surface and underground mining methods.

Mining of limestone requires the use of drilling and blasting techniques. The blast technique use the latest technology to insure vibration, dust, and noise are kept at a minimum.

Material is loaded at the blasting face into trucks for transportation to the crushing plant.

The subject proposed project of mining will undergo surface mining for the extraction of raw material i.e. limestone for the manufacturing of cement.

Extraction of mineral or energy resources by operations exclusively involving personnel working on the surface without provision of manned underground operations is referred to as surface mining.

Surface mining is done by removing (stripping) surface vegetation, dirt, and, if necessary, layers of bedrock in order to reach buried ore deposits. Surface mining can be classified into two groups on the basis of the method of extraction; mechanical extraction, or aqueous extraction.

The subject proposed mining activity has only concern with mechanical extraction method.

Mechanical extraction methods employ mechanical processes in a dry environment to recover minerals, encompassing the specific mining methods or techniques as⁹:

Techniques of surface mining include:
- **open-pit mining**, which is the recovery of materials from an open pit in the ground, quarrying, identical to open-pit mining except that it refers to sand, stone and clay;
- **Strip mining**, which consists of stripping surface layers off to reveal ore/seams underneath; and
- **Mountaintop removal**, commonly associated with coal mining, which involves taking the top of a mountain off to reach ore deposits at depth. Most (but not all) placer deposits, because of their shallowly buried nature, are mined by surface methods
- Finally, **landfill mining** involves sites where landfills are excavated and processed.

The subject proposed mining project will undergo open pit mining technique surface mining method for limestone.

Open pit method employ a conventional mining cycle of operations to extract minerals: rock breakage is usually accomplished by drilling and blasting for consolidated materials and by ripping or direct removal by excavators for unconsolidated soil and/or decomposed rock, followed by materials handling and transportation.10

Open-pit mines are used when deposits of commercially useful minerals or rocks are found near the surface; that is, where the overburden (surface material covering the valuable deposit) is relatively thin or the material of interest is structurally unsuitable for tunneling. Open-pit mines that produce building materials and dimension stone are commonly referred to as "quarries."

The subject proposed mining project will deal with controlled blasting for limestone extraction using millisecond delay electric detonators (blasting material), in case of hard rock extraction, that will be employed and as a result big piles of rocks and fragments will be pulled down in a single action otherwise mechanical extraction will be done for loose deposits or overburden. Broken rock is loaded into large rear dump trucks using hydraulic excavators and is then hauled from the pit to be placed within the dedicated waste emplacements or, in the case of ore, direct to the primary crusher or run-of-mine (ROM) ore stockpile.11

Distance between the crusher plant and location of limestone and clay quarries will be about 1-km.
Steps in Blasting

Step 1: Drilling
- Cleaning of bushes & grasses with the help of bulldozer
- Marking of bore holes in singular or multiple rows
- Drilling with the help of DOWN THE HOLE (drill machine)
- Model selected for this drilling is Flaxy Roc D45 (Atlas Copco)
- This machine is equipped with sophisticated dust collector for collection of representative sample and keeping the environment cleaner and friendly.

Step 2: Blasting
Blasting includes the following steps:

Stemming

Stemming prevents the loss of explosives energy from blowouts by plugging the end of the drill hole which produces better result from the blasts).

Fragmentation
• Improved fragmentation will be achieved by giving the time lag between the shot holes.

• This will be done by applying short delay detonators or detonating relays.

• Short delay blasting also controls the ground vibration.

**Blasting feature**

Scheduled blasting will be followed i.e. Schedule of blasting will be in day time and 2-3 Days blasting per week will be done. Also SOPs for safe blasting will be followed (attached as Annex-L) in which controlled blasting using millisecond delay electric detonators (blasting material) will be employed and as a result big piles of rocks and fragments will be pulled down in a single action preventing the formation of dust clouds, also by installing the dust collectors on drill rigs.

After blasting fragmented rocks/stones will be transferred to proposed cement plant site with help of Dump trucks.

Mining of clay requires the mechanical extraction/excavation by use of excavators and other machineries. The mechanical extraction/excavation is the environment friendly technology to insure vibration, dust, and noise are kept at a minimum.

The clays are excavated from open cast mines or through extraction and loaded onto dumpers which transport the materials and unload into open yard storage. Then it is transported by trucks and unloaded into the hopper of a clay crusher.

The subject proposed project will undergo mechanical extraction/excavation of raw material i.e. clay for the manufacturing of cement using excavators or bulldozers then loaded through loaders and transported to the plant site with the help of dumpers or dump trucks.

![Diagram of mining process]

The environmental damage caused by surface mining is related to the large amount of surface material that humans remove during mining operations. The environmental effects of surface mining include
- Habitat destruction
- Soil erosion
- Air pollution from dust particulates
- Water pollution
- Pollution (especially from sediments)
- Noise and vibration also may disturb the surrounding environment, and it is necessary to place a safety zone around the pit to protect people and equipment from fly rocks.\textsuperscript{12}

Controlled blasting method is used to control adverse impacts such as:

- Over break
- Reduce ground vibration
- Reduce fractures within remaining rock walls
- Reduce Noise
- Reduce dilution/waste of ore etc.
- Environmental impacts of surface mining

**Nearest educational institute**

Nearest educational institute named Govt. Girls Community Model Primary School is present at the distance of 2-3km from the proposed activity site where the clay is to be extracted.

![Fig: Nearest educational institute](image-url)
Surface Infrastructure

Roads, railways power lines and access routes to and within the plant

- The main road named Khushab Road is used to access the mining site but M/s Lucky Cement will built its own paved road to join the mining site to plant. It will improve the road infrastructure of the area.
- The link roads named Sarkalan Road and Makhial Road is present which also used currently to assess the mining site.
- There are no railway power lines in the area.

Fig: Main Khushab Road
Fig: Sarkalan Road

Fig: Makhial Road
Solid waste management facilities

Solid waste generation from the mining activity, domestic and project process sources will be disposed off properly. A solid waste management division will be formulated to deal with the proper disposal of solid waste, supervised by HSE Manager, SW Manager, and other related personnel.
Solid waste generated from the mining/extraction activity as loose rocks, stones, mines residues, as waste clay etc. that cannot be used for cement production will be utilized as road filling purpose, in restoration of the quarry/extracted area and during the construction of check dams. As such there will be no process waste during clay extraction but there would be 20% reserve loss as solid wastage from clay such as if any human settlement or habitat comes under the vicinity of the clay extraction area will be counted as reserved loss of 20%. Solid waste from the domestic and plant process sources will be disposed off if agreement is made with the contractors.

To keep the plant site neat and tidy, a contract will be awarded to a contractor who will employ a work force of 20 sweepers to do the needful. Another contract will be awarded by Lucky Cement for gardening purposes and a work force of 25 gardeners will be employed to maintain the lawns, grow flowers and plant trees.

The detail final extent of the dumps cannot be described at this stage, for this proper solid waste management plan will be formulated with detailed study if this project got approval.

**Water supply & treatment for proposed mining project**

Five tube wells will be installed to fulfill the water demand for both Mining activities for the purpose of sprinkling on road and for drilling & for Cement Plant with 30m$^3$/h capacity for each tube well. But for mining activity no separate tube well will be installed. Water requirement for mining activity will be fulfilled by the tube well installed for cement plant. (*Detail of water requirements and Tube wells is attached as ANNEX-M.*)

Hydrological study of the area conducted by Dr. Zulfiqar Ahmad Dept. of Earth Sciences Quaid-e-Azam University Islamabad, wherein he has confirmed that the area has adequate reservoir of ground water (*Hydrological Study Report is attached as ANNEX-N*)

There will be no hazardous effluents release form the mining activity so there will be no chances for ground water contamination by the subject project. Waste water generated from the mining activity will be used as sprinkling on the quarry area or for restoration of the land. There is no such drain in the nearby area but injection wells are present in some houses at the depth of 10-15 ft for waste water disposal.

**Water supply & treatment for proposed cement plant**

About 4000 m$^3$/day of water shall be used in the plant which will be arranged through deep hole drilling. As the dry process is employed to produce cement, the major water use in the plant is for cooling purpose. Since all the cooling water is recycled, only small amount of
water to replenish the losses is required every day. Most of the water is consumed for domestic, cleaning, washing and gardening purposes.

Waste water from domestic and plant process (from cooling) sources will be treated in septic tanks and waste water treatment plant before being subjected for different uses, which will be installed in the plant after approval the subject project that will be supervised by HSE Manager, Treatment plant In-charge, Chemist and other related personnel. The portion of water will be utilized for domestic purposes will be chlorinated with sodium hypochlorite before use. The portion will be used for the makeup of cooling water is subject to addition of chemicals for the treatment of scaling and to arrest bacterial and algal growth. The treated water from the domestic use will be stored in a clear water tank. Domestic Supply will then be drawn from the tank and continuously pumped into the distribution system. For plant cooling, the water after treatment shall be stored in a separate tank from where it is pumped into the recirculation system.

The sewage plant location, its design capacity and process cannot be described at this single stage EIA study, a detailed separate study will be conducted for this at the time of full stage EIA study for proposed Cement Plant if this project got approval.

**Potable water plant location**

In the mining area drinking water requirement is fulfilled by underground water by springs and by wells. Local people of the area extract ground water from Rocket motor (in their local language) and by submersible pumps or motor pumps. Depth of ground water table is 450-500 ft from the project site. Well is present in village Buchal study area at the distance of 512 m away from the proposed mining site with depth of 100-150 ft. Spring named Abb-e-Shifa is present at the distance of 4 km away from the project site. The water quality of well, spring and underground water is satisfactory. Water analysis has been conducted for this by the team of Pak Green Laboratories (EPA Certified) and lab results are incorporated within this report.

Also, project proponent ensured to install RO Plant in proposed cement plant for the purpose of drinking water for the workers and staff.

**Disturbances of water courses**

There are no proper water channels within the radius of our study area or proposed mining site and there will be as such no waste water production from the quarries so there is no chance to mix up the quarry water with any water channel.
Rain water in the area flows down the hills or evaporate. There is no storm water or rain water storage facility in the area. The subject project will construct check dams to harvest the rain water or storm water in the area that will be used for vegetation or for agricultural purposes and that will be of persistent use to recharge the water table and also local people will be benefited from this.

Check Dams may be temporary structure constructed with locally available material. The various types are brush wood dam, loose rock dam and woven wire dam. The main function of the check dams is to impede the soil, water removed from watershed, to store the water for the use of drinking and agricultural purpose, control the flow velocity and to recharge the groundwater through seepage. This structure is cheap but lasts for 2-5 years. Also permanent check dams can be constructed using stones bricks and cements. Small earth works is also needed on both sides in which water is stored above the ground and also recharges the ground water through seepage. M/s Lucky Cement will construct permanent check dams by constructing check walls according to the specification of natural contour of the catchment area, dam check wall height can vary from 6-20 ft in height and 4-12 ft in width, complete study of the check dams can be provided after the work permit from the Mines and Mineral Department and that will be issued after the EPA Punjab approval. Check dams will be constructed to retain the rain water in the catchment area for recharge of the ground water table through natural seepage. This project will be initiated in the area at large scale and M/s Lucky Cement will install RO Plant in the nearby villages to provide the clean drinking water to the locals.


Ref: Renganayaki S. P. & Elango L. A REVIEW ON MANAGED AQUIFER RECHARGE BY CHECK DAMS: A CASE STUDY NEAR CHENNAI, INDIA, Department of Geology, Anna University, Chennai-600 025, Tamil Nadu, India, IJRET: International Journal of Research in Engineering and Technology, ISSN: 2319-1163.
Project area along with location of check dams and elevation can be seen in below Google map showing elevation of project Area.
Air Pollution and control

Air pollution from the proposed mining activity will be dust or particulate matter generation and vibration. In the quarry area, concerted efforts will be made to keep the fugitive dust levels to a minimum. To achieve the objective, Sprinkling of water will be done, controlled blasting using millisecond delay electric detonators (blasting material) will be employed and as a result big piles of rocks and fragments will be pulled down in a single action preventing the formation of dust clouds, also by installing the dust collectors on drill rigs and by sufficient dust sprays to suppress the harmful dust arising from the mining operations during loading and transportation of limestone and clay also SOPs for safe blasting will be followed.

In proposed cement plant, emissions of dust and harmful gases are possible from numerous locations. To preserve the environment and to safeguard the health of workers and nearby residents, such emissions must be controlled.

Inside the factory even at a minor dust generation points elaborate arrangements to trap the dust will be made to keep the environment clean. In particular, instead of multi cyclones on the cement cooler, which are usually a source of dust, a heat exchanger and a bag collection system, will be installed.

At proposed cement plant of M/s Lucky Cement Limited, the bag filters will be employed to arrest the dust particles in the exhaust emissions. Bag filters are well known for their high removal efficiency under all operating conditions provided the filters are maintained properly.

Two types of dust collectors namely 7500 glass bag filters and plenum pulse fabric filters will be employed in the plant. The two high temperature glass bag filters will be installed to filter the dust in the exhaust gases from the kiln and pre-heater system. Glass bag filters are independent of any operational parameter and ensure perfect dust collection to a level of nil opacity. Unlike electrostatic precipitator these do not have to be switched off under certain unfavorable conditions. In the case of any break down, repairs can be easily made without shutting down the plant. Ambient Air Quality has been conducted by the team of Pak Green Laboratories (EPA Certified) and lab results are incorporated within this report

Land Disturbance

Land in the study area for proposed mining activity is plain and barren and with little amount of flora. After the proposed mining activity the land in the study area will be restored and native plants will be planted there. Moreover, upper strata of land where clay is to be
extracted is not fertile and after extracting the clay at depth of about 60-70 ft, fresh layer of clay is present and beneath it limestone or rocky surface get start, that soil is fertile and good for harvesting purposes. So it will be good contribution for harvesting in that fresh clay or soil after removing the upper layer of clay for clay excavation.

**Impacts on flora and fauna**

The proposed study area is barren and has little amount of scattered flora with vegetation. It is about 5-10 trees or big plants present in the area that will be cut off during the proposed mining activity and will be restored with native plants. Rare species of Fauna were present in the study area; some of them have migrated to other areas due to population increase and some species have been vanished due to over hunting, so there is no such species or rare species of fauna exist in the area that can be impacted by this proposed mining project.

**Noise pollution**

Currently, average noise level at the proposed site ranges from 41-53 dB (A). During the operation of the project due to controlled blasting the noise level will not exceed 65 dB(A) at the distance of 2 km radius, activity site is located at a safe distance from the nearest human settlement. M/s Lucky Cement Limited is already involved in mining activities and running their cement plants in different districts of Pakistan and other countries. The controlled blasting method ensures that noise less than 65 dB (A) at day time at the radius of 2 km distance. Man power involved during blasting activities will be provide safety equipments and PPEs as Ear Muffs and ear plugs and OSHA standards will be followed. Detail description of Noise Management will be described in Chapter “Description of Impacts and Mitigation Measures”.

Noise level monitoring has been conducted at different locations by the team of Pak Green Laboratories (EPA Certified) and lab results are incorporated within this report

**Workshops, administration and other buildings**

If this subject project of mining activity gets approved by the concerned Environment Department then a detailed full stage EIA study for the Proposed Cement Plant of M/s Lucky Cement Limited will be carried out to oversee the detailed impacts of the cement plant in the nearby surrounding area. At the proposed cement plant area for offices, administration building, and for other building as check dams etc. will be reserved.
Housing, recreation and other employee facilities
Labor colony, recreational area and other employee security and facilities will be providing to workers and staff of the proposed cement plant. (Project proponent ensured)

TRANSPORTATION OF THE MINERALS
The quarry area contains excessive deposits of cement grade raw materials namely limestone and clay. The two mineral are available in closed proximity to the proposed plant site. Gypsum and Laterite are not found in the project area and will be brought from Kohat and Mianwali districts.

The information regarding Gypsum and laterite will be included in the “full life cycle EIA” of the Proposed Cement Plant (The Project).

To meet the requirement about 6500 tons of limestone and 1500 tons of clay shall be extracted every day from the deposit area. Six dumper trucks, of 35 tons capacity each, will be used for transport the limestone to the crushers, whereas 2 dumper trucks will be used for the transport of clay.

Road shall be built from the crusher to the locations of limestone and clay quarries. The quarry roads will be designed to allow proper operation of the load dumpers with minimum rolling resistance. The width of the quarry roads will be varying from 12 m in hilly to 20 m in the plain terrain respectively. The roads are hard surfaced and to avoid dusty conditions are continuously sprayed with water.

POWER DEMAND
Lucky Cement Limited will be established its own power plant. The power will then be distributed to various load centers through transformers. The power distribution for machines is on a 3-phase, 3-wire system and for lightening on a 3-phase, 4-wire system. The Energy will be used for drilling and blasting and will be fulfilled by the proposed power plant. Separate study for the proposed power plant will be conducted after approval of the mining lease form EPA-Punjab.

MAN POWER REQUIREMENT
The man power requirement for the proposed limestone & clay mining project will be more than 100-120 persons while for the proposed cement plant it would be about 800-1500 permanent employees will be hired.
Health, Safety & Hygiene
Health, Safety & Hygiene includes the following:

First Aid facility
At workplace workers and employers should have enough information, knowledge and training regarding first aid treatment in case of any emergency. The subject project will provide proper medical facilities to workers and staff to cope with any incidental accidents and proper training about first aid will be provided to workers and staff.

Safety Trainings
Workers and all the staff will be provided with proper training about the work and safety practices.

Use of Drugs and Narcotics
Drugs and narcotics are strictly prohibited during working hours in working area. Smoking will be only allowed in rest timings at properly isolated places.

Security:
The mining site will be fenced properly to avoid any damage to nearby settlements. Safety signs & boards should be placed at during mining activity. At the time of extraction activity proper SOPs will be followed like pre-announcement in the loud speaker and others.

Personal Protective Equipment (PPEs)
Workers will be provided with PPEs as Masks, Gloves, Helmets, Safety shoes, Ear plugs, Ear muffs & other personal protective equipment during the working hours and blasting to insure personnel health & safety. Implementation of PPEs will be ensured by the proponent for the proposed project.

Risk Assessment and Disaster Management Plan
Risk Assessment study for the proposed subject project was carried out. According to the studies and local people of the area the subject area is not natural disaster prone. Project proponent will develop Disaster Management Plan (DMP) in place for onsite emergency.

Occupational Exposure Mitigation Planning
To control any occupational health and safety impact a detailed planning for mitigation measures has been done in the design stage of the project. Apart from the occupational exposure mitigation plans for various activities and work areas of hazards, following existing
administrative control measures will be extended to and followed. All employees will be
trained for EHS policies and practices.

The management will develop environmental management plan to implement the mitigation
measures further. The plan will include institutional measures such as occupational health &
safety planning and environmental compliance monitoring for environmental parameters.

RESTORATION / REHABILITATION PLAN
Land rehabilitation is the process of returning the land in a given area to some degree of its
former state, after some process (industry, natural disasters, etc.) has resulted in its damage.
Many projects and developments will result in the land becoming degraded, for example mining, farming and forestry. After mining finishes, the mine area must
undergo rehabilitation.

- Waste dumps are contoured to flatten them out, to further stabilize them against erosion.
- If the ore contains sulfides it is usually covered with a layer of clay to prevent access
  of rain and oxygen from the air, which can oxidize the sulfides to produce sulfuric acid.
- Landfills are covered with topsoil, and vegetation is planted to help consolidate the
  material.
- Dumps are usually fenced off to prevent livestock denuding them of vegetation.
- The open pit is then surrounded with a fence, to prevent access, and it generally
  eventually fills up with groundwater.
- Tailings dams are left to evaporate, then covered with waste rock, clay if need be,
  and soil, which is planted to stabilize it.

According to clause 7.16 Restoration and Rehabilitation of National Mineral policy 2013,
“Mineral-title holders may be obliged under the agreement with Government to carry out
adequate restoration including landscaping to turn the mine site to the original position as far
as possible”\(^{13}\) attached as Annexure-O. M/s Lucky cement will follow the National Mineral
policy 2013 for Restoration and Rehabilitation.

M/s Lucky cement will implement the drilling program which will include the following
steps:

- Minimize the area affected by drill cuttings, and contain mud in a sump.
- Minimize the area cleared and leveled for drill platforms.
- Minimize disturbance to the vegetative mat.
- Plug holes properly using grout, rock, logs or commercial plugs as the situation warrants, whenever holes could pose a hazard or artesian conditions are encountered.
- Re-contour the site and re-vegetate as the situation warrants. Apply seed mix and fertilizer if natural vegetation techniques are unlikely to be successful.

M/s Lucky has developed proper Restoration and reclamation plan to restore the natural landscape of the area. Plant nursery, garden will be developed to rehabilitate the native plants of the area. After the proposed mining/extraction activity the Quarried/extracted area will be restored and reclaimed with maximum plantation.

At Buchal Kalan project, extraction of limestone will be done through open pit mining method.

In this method limestone will be approached from surface to subsurface by the formation of pit; successive benches would be made from top to bottom by drilling and blasting operation (Benches would be wide enough to support cultivation later) as shown in figures below.

**Fig: Limestone open pits restoration and reclamation**
Restoration & Rehabilitation Plan

Mining plans are mostly time extensive: 100s of years are taken to exploit deposit. In Buchal Kalan project, Lucky cement has proposed to reclaim mining site through the following.

The plan will include:

- Top soiling of the limestone benches to make them suitable for cultivation.
- Plantation of native plants & trees will be done.
- M/s Lucky Cement shall establish pasture and commercial forestry for the local people.
- During the reclamation/restoration of the project area due to the succession process Natural re-colonization will occur, converting the land into the original grazing pasture.
- Due to ecological succession process Eco system will be recovered.
- Rain water percolation to subsoil and ground water by the construction of check dams.
- Estimated annually 3.5-4 Acre area will be quarried.
- Estimated 2-2.5 acre area will be restored annually.
- Restoration will be done with the consultation of land owners and forestry department.
- Restoration plan will be included in the agreement with the land owners and compensation will be given to land owners as per Mining Concession Rules 2002.
- Some land will be converted to agriculture based on drip irrigation technique (some patches).
- Plantation in the area will be done comprising local specie restoration named as:  
  * Olea caspedata* (Kau) and *Acacia modesta* (Phulai)  
  * Dodonaea viscosa* (Sanatha)  
  * Ziziphus mauritiana*(Bair Tree)

Note: These plants will be planted at the boundary wall of the restored agriculture patches and on the clear area.

Case study

A case study of closure and rehabilitation of Golden Cross mine New Zealand is illustrated through pictorial form in which mined area has been rehabilitated and restored and the area
has been re-vegetated for grazing. Lucky Cement undertakes to work on the same pattern. Undertaking for hiring of Ecologist and restore the area is attached as **ANNEX-P**.

Above left: The open pit was capped, recontoured, and drainage channels added. Above right: The rehabilitation process almost complete, 2001: the recontoured open pit can be seen in the foreground with the rehabilitated tailings dam in the background. The bush at bottom left is part of the Coromandel State Forest Park. (photos http://www.minerals.co.nz/html/green_from_gold/gx.html)
Government approvals required by the project:

M/s Lucky Cement has acquired the grant of lease for limestone mining from Department of Mines & Minerals Punjab (letter attached) while for the grant of lease for clay mining it has been applied to Department of Mines & Minerals Punjab. Also, proponent has applied to the concerned Environment Department for Environmental Approval for the subject proposed mining project. Project proponent will also get approvals from all other concerned departments at the time of full scale EIA of proposed Cement Plant.
CHAPTER 4

ANALYSIS OF ALTERNATIVES (TECHNOLOGY & SITE)

Introduction

From the point of view of locating an industry the features, which are considered extremely important, are:

- Availability of suitable land.
- Availability of required utilities and infrastructure
- Road access to the site for easy transportation of materials and finished goods.
- Optimum investment requirement for the development of the infrastructure.

Technology selection

Surface comprises 90% of the world's mineral tonnage output. Also called open pit mining, surface mining is removing minerals in formations that are at or near the surface. Ore retrieval is done by material removal from the land in its natural state.

Surface mining involves quarrying which is excavating minerals by means of machinery such as cutting, cleaving, and breaking. Explosives are usually used to facilitate breakage. Hard minerals such as limestone, sand, gravel, and slate are generally quarried into a series of benches.

Strip mining is done on softer minerals such as clays and phosphate is removed through use of mechanical shovels, track dozers, and front end loaders.

The subject proposed mining/extraction project will adopt mechanical extraction to excavate the clay or to remove the loose or soft mineral overburden. Extraction of clay will be done by use of bulldozers/excavators and then loaded through loaders and transported through dump trucks. This methodology is safe and environment friendly with no or few impacts like major impact is PM/dust which will be controlled through water sprays on dusty tracks and during excavation/extraction. Other impacts will also be controlled through adopting proper mitigation measures. Activity/extracted site will also be restored with native plants to reclaim the land.

The subject proposed mining project will adopt surface mining method for limestone extraction by controlled blasting techniques where hard rock would be required to extract
into a series of benches from the surface otherwise mechanical extraction will be done to remove the loose or soft mineral overburden.

Blasting is an essential part of the mining cycle. In virtually all forms of mining, rock is broken by drilling and blasting the rock. Blasting technology is the process of fracturing material by the use of a calculated amount of explosive so that a predetermined volume of material is broken. From the earliest days of blasting with black powder, there have been steady developments in explosives, detonating and delaying techniques and in the understanding of the mechanics of rock breakage by explosives. Good blast design and execution are essential to successful mining operations. Improper or poor practices in blasting can have a severely negative impact on the economics of a mine. The use of excessive explosives at a mine site can result in damages to the rock structures and cause unwanted caving and large increases in support costs.

Blasting is used in both open pit and underground mining operations. While traditional blasting utilized black powder and dynamite, there are many different types of explosives used today. Common explosives used in industry now are ANFO (ammonium nitrate/fuel oil), slurries, and emulsions. Blasting utilizes the heat and immense pressure of the detonated explosives to shatter and fracture a rock mass. The type of explosives used in mining is high explosives which vary in composition and performance properties. The mining engineer is responsible for the selection and proper placement of these explosives, in order to maximize efficiency and safety. Blasting occurs in many phases of the mining process, such as development of infrastructure as well as production of the ore. Many factors are taken into account when determining what type of blast design or explosive will be used. Rock type, density, and strength are all important factors, as well as fracture condition of the rock, and water conditions.

**BLASTING IN SURFACE MINES**

Most rocks require blasting prior to excavation in surface mines. Usually four types of explosives are
used in surface mining: slurries, dry mixes, emulsions and the hybrid heavy ANFO. Selection of explosives depends on many factors, which primarily includes critical diameter, hydrostatic pressure, temperature, minimum primer weight, density weight strength, bulk strength, gap sensitivity, water resistance, loading procedures, coupling or decoupled properties, shelf life, reliability for bulk operations and overall drilling and blasting economics.

**Controlled Blasting**

Controlled blasting is a technique of blasting for the purpose to reduce the amount of over break and to control the ground vibrations. Following are the different types of controlled blasting techniques:

*Pre-Splitting:* this is an old but highly recognized technique with the purpose to form a fracture plane beyond which the radial cracks from blasting cannot travel. Other methods include Trim (Cushion) Blasting, Smooth blasting (contour or perimeter blasting) for underground mines and muffle blasting as a solution to prevent fly-rock from damaging human habitants and structures.

**Secondary Blasting**

"Irrespective of the method of primary blasting employed, it may be necessary to reblast a proportion of the rock on the quarry floor so as to reduce it to a size suitable for handling by the excavators and crushers available. Two methods of secondary blasting of rock are available. The first, called the plaster or mudcap method, is to fire a charge of explosive placed on the rock and covered with clay, the shock of the detonating explosive breaking the block. The second technique, known as pop-shooting, is to drill a hole into the block and fire a small charge in this hole, which is usually stemmed with quarry fines."

**Non-Explosives Rock Breaking**

Non-explosives are used in areas very closed to sensitive structures. These are mostly used in construction industry for breaking oversize rocks, concrete etc. Rockfrac and Dexpan produce expansion chemicals which are used to break rocks. Most of these are used in limestone and sandstone quarrying. Expansion chemicals require huge amount of drilling. There are also hydraulic rock splitters that can be used where blasting is not permitted, or where it is not suitable."
The subject proposed mining project will adopt controlled blasting technique for safe blasting or breaking of the rocks and to produce less environmental damage.

**Characteristics of Explosives**

Rational large scale mining and excavation have forced the development of mining equipment and consequently also explosive products including manufacturing, distribution and handling. The safety and working environment has become most significant parameters when the overall mining operation is evaluated. This has to a great extent influenced the product development towards less sensitive explosives. Today most of the commercial explosives in the world are used in large diameter drill holes. The explosive is then handled as bulk explosives.

ANFO is since more than 25 years the most common bulk explosive as it is cheap, easy and safe to handle. ANFO is unfortunately not water resistant and despite a lot of efforts has been made to add ingredients in order to increase the water resistance; this has only succeeded to a marginal degree. The overall cost for the excavation including loading, hauling, crushing etc. must be minimized. By changing the explosive usually all operations are affected. More powerful explosive in the drill holes gives for example finer fragmentation and a faster flow of rock through the loading, hauling-crushing operation.

**EMULITE** is an emulsion explosive. It consists of small droplets of ammonium nitrate solution, tightly packed in a mixture of oil and wax. Looked at through a microscope, its structure resembles that of a honeycomb. The thickness of the oil and wax membranes separating the droplets is less than one ten thousandth of a millimetre. This involves an extremely large contact area between the fuel-oil and wax and the oxidizer-ammonium nitrate. As a result very rapid and complete explosive combustion is obtained. The oil and wax membrane also protects every droplet of ammonium nitrate and makes the explosive highly water resistant.

EMULITE contains no raw materials classified as explosives and becomes itself an explosive only in the final stage of production. EMULITE is extremely insensitive to accidental initiation through friction, fire or other mechanical stimuli. It is therefore extremely safe to manufacture and handle than any other commercial explosive.\(^\text{15}\)

The subject proposed mining project will use EMULITE emulsion explosive for limestone extraction for the purpose of controlled blasting in case of extracting hard rock. M/s Lucky
Cement will also follow the SOPs for careful storage and handling of explosive materials for blasting. (Attached herewith)

SITE ALTERNATIVES

Four alternatives sites were identified initially for the proposed mining project. These sites were also located in District Chakwal, Khushab and District Mianwali. The present site has been selected after consideration of the other four alternative sites. These sites and their reasons of rejection are summarized below.

SITE A: Manakpur Village in District Chakwal

*Geographic Coordinates:*

N 31° 54567  E 074° 25554

Aerial Map
Reasons of Rejection
The site was not selected due to the following reasons:

Positive Aspects

- The site was very near to the Lahore-Islamabad Motorway
- Apparently insufficient deposits of limestone and clay were there.

Negative Aspects

- Cluster of electricity lines at the site
- Kalar Kahar Lake is near to this site
- Other cement plants as Bestway Cement, D.G. Cement plant and Pakistan Cement Plants is located in the proximity of this site and are already involved in the mining activities in the area. The mining activities of all the three plants enhance the accumulative impacts on the environment, so if the proposed mining project will be installed at this site then it will increase the impacts of already running plants.
- Residential Settlements are present near the site
- Flora and Fauna are in abundant at this site. Large trees, plants, shrubs, vegetation are in abundant at the site.
- Mining lease for limestone was also rejected.

Conclusion for Alternative Site A
On the basis of above negative aspects of the site under consideration and environmental variables & Economic Analysis, the site was not suitable for the proposed mining activities.
Pictorial view of Alternative Site
SITE B: Sardayi Village in District Chakwal

Geographic Coordinates:
N 32° 73578  E 072° 70110

Aerial Map

Reasons of Rejection
The reasons of rejection of this site are:

Positive Aspects

- Road network was available
- Apparently insufficient deposits of limestone and clay were also there.

Negative Aspects

- Area for the mining activities and installation of plant is not plain
- Less availability of space to build plant, offices etc.
- Main Water Channels are present in the area that can be disturbed from the proposed mining activities
- Residential settlements are near the site
- There is possibility of floods due to hilly torrents in the area.
- Fauna & Floral Species like cactus or medicinal plant are present at this site in abundance.

**Conclusion for Alternative Site B**
On the basis of above negative aspects of the site under consideration and the site was not suitable for the proposed mining activities.

**Pictorial View of Alternative Site B**
Another site C near Mouza Dhoke Babral District Khushab
Another site near Dhoke Babral in District Khushab was considered for the lease of mining for limestone and clay.
The site was rejected due to the following reasons:

**Positive aspects of the site:**

- The site was connected to the road networks
- The site was apparently abundant in deposits of limestone
Water availability was satisfactory in the area.

**Negative Aspects of the site:**

- The area was near the RAMSAR Protected sites
- There were number of water bodies that can be polluted due to mining activities and also the site was declared as birds’ sanctuaries as per RAMSAR site Conventions and Wildlife Department.
- The area was under consideration for the Tourism Development Project.
- Also cantonment sensitive site was present near the site under consideration
- The deposits for limestone at this site has maximum sulphur contents in limestone that is not feasible for the cement

**Conclusion of Alternative Site C**

With the consultation of concerned stakeholders and on the basis of environmental variables & Economic Analysis with reference to transportation, the above Site C was not suitable for the mining activity. Results of Environmental parameters of the area are attached with the report as **Annex-Q**.

**Pictorial View of alternative site C**

![Pictorial View of alternative site C](image_url)
Pak Green Enviro-Engineering (Pvt.) Ltd.

Proposed Mining Project of M/s Lucky Cement Limited

Environmental Consultants

Environmental Impact Assessment (EIA)
Alternative Site D near Khatak Abad District Mianwali

Another site near Khatak Abad District Mianwali was considered for the lease of mining for limestone and clay.

The site was not selected due to the following reasons:

Positive aspects

- The road network was available that linked to Khushab, Mianwali, Kalabagh and Lucky Marwat Road.
- Water availability at the under consideration site was satisfactory
- The site was apparently abundant in deposits of limestone and clay
- The area was not overloaded due to the cement industrial activities

**Negative aspects**

- The site under consideration was near to the Lucky Cement Pezu Plant at approximately at the distance of 100 km and cement is supplied from the Lucky Cement Existing plant to this area and also the requirement/demand of cement is too low due to the backwardness of the area and zero new development projects.
- The proposed Kalabagh Dam is near the under-consideration site and if constructed in future the water table will become high and this will affect the stability of the project and also any plant installed there will affect environmentally to the Kalabagh Dam.
- The site is rich in vegetation features and protected species of fauna like Teeter, Chakor, Hiran are also there.
- The site was near the already existing Mapple Leaf cement plant mining activities that already extracting the deposits. The mining activity of plant could enhance the accumulative impacts on the environment, so if the proposed mining project will be installed at this site then it will increase the impacts of already running plant.

**Conclusion for Alternative Site D**

On the basis of above negative aspects of the site under consideration, the site was not suitable for the proposed mining activities.

**Selected Site: Buchal Kalan Village in District Chakwal**

Total Area for the mining: 6331.43 Acres

N 32.66430  E 072.62503
Advantages of Setting up Proposed Mining Project and Cement Plant

- Enough reserves of non-metallic mineral deposits i.e. limestone and clay
- Plain Area/Barren Land
- No residential settlements or area near the study area.
- No environmentally sensitive area within the study radius
- Enough water availability, tube well
- Less/few vegetation/plantation
- No such fauna at the site
- The area was not flood prone
- Easy access to proposed cement plant area
- Easy availability of clay deposits
- Convenient plot layout
- Easy access or availability of reserves to plant site
- Raw material receipt by already constructed road, 50 ft area will be left for mining activity.
- Due to the location of the project, Economic Activity will be increased in the area that will be a positive impact with respect to social uplifting of the area community.
- With this proposed mining project and by the operation of the proposed cement plant project, commercial activity in the area shall increase. A large market including shops those of auto repairs goods transportation, general provision, food supplies, and restaurants etc. will come up long the approach road and main road, thus there will be some rapid change in the land use and ultimately local will be benefited.

Pictorial View of Selected Site for mining activity for both deposits
Activity Alternative
The subject project is for the lease of mining for extraction of limestone deposits and clay. Project proponent wants to establish a cement plant in future after the detail study of the leased area (separate EIA study for the proposed Cement Plant will be conducted). The project proponent has considered other businesses/units but due to the increasing demand of cement in the construction industry the proponent has planned to initiate the said project in Punjab Province. Project proponent has vast experience of operating such type of projects in other provinces of the Pakistan.

Schedule Alternative
Surface Mining under controlled blasting for limestone Extraction will be carried out and clay mining Mechanical extraction/excavation will be done. Scheduled blasting will be followed i.e. Schedule of blasting will be in day time and 2-3 Days blasting per week will be done. Also SOPs for safe blasting will be followed in which controlled blasting using millisecond delay electric detonators (blasting material) will be employed and as a result big piles of rocks and fragments will be pulled down in a single action preventing the formation of dust clouds, also by installing the dust collectors on drill rigs.

Economic and Environmental Analysis among Sites
The economic and environmental analysis of sites was done on the following parameters/variable:

<table>
<thead>
<tr>
<th>Parameters for Economic Analysis</th>
<th>Parameters for Environmental Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost of Land</td>
<td>Ambient Air Quality</td>
</tr>
<tr>
<td>Energy</td>
<td>Water availability</td>
</tr>
<tr>
<td>Transportation</td>
<td>Landscape</td>
</tr>
<tr>
<td>Raw material</td>
<td>biodiversity</td>
</tr>
<tr>
<td>Man power</td>
<td>Social environment</td>
</tr>
<tr>
<td>Import/export</td>
<td></td>
</tr>
</tbody>
</table>

Cost of land
The comparison of sites was done on the basis of cost of land and for this we set the range from 1 to 3 i.e. 1 for Good, 2 for satisfactory and 3 for Average. The cost estimation was made on the basis of surface rent/land compensation, land leveling, and purchase of land for plant (future plan), land cost for approach road, cost for land purchase for labor colony, and environmental cost.
Comparison of Sites over cost

<table>
<thead>
<tr>
<th>Site Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>alternative site A Manakpur</td>
<td>3</td>
</tr>
<tr>
<td>alternative Site B Sardayi</td>
<td>3</td>
</tr>
<tr>
<td>alternative site C Dhoke Babarl</td>
<td>2</td>
</tr>
<tr>
<td>alternative site D Khatakabad</td>
<td>1</td>
</tr>
<tr>
<td>Selected site</td>
<td>2</td>
</tr>
</tbody>
</table>

Discussion

According to above graphical representation, the costs for two sites i.e. for Manakpur Village and Sardayi Village were falling in the range of less cost but these sites were not selected due to other potential negative aspects i.e. the accumulative ambient air impacts of other cement plants, the human re-settlement and presence of sites near Kalar Kahar lake. Costs for the alternative site C i.e. near Mouza DHOKE BABRAL and selected site NEAR BUCHAL KALAN were falling in the same range i.e. medium cost but the alternative site C was not selected due to the area was near the RAMSAR Protected sites and limestone deposits were mixed with sulphur contents. the alternative site D i.e. near Khatak Abad District Mianwali was falling in the range of high cost so it was not selected due to proposed Kalabagh Dam near the under-consideration site and if constructed in future the water table will become high and this will affect the stability of the project and also any plant installed will affect environmentally to the Kalabagh Dam. So the selected site was most suitable for said project.
Energy Input

The comparison of sites was done on the basis of raw material/transportation required and availability of raw materials and for this we set the range from 1 to 3 i.e. 1 for good, 2 for satisfactory and 3 for Average.

<table>
<thead>
<tr>
<th>Comparison of sites over input for energy generation</th>
</tr>
</thead>
<tbody>
<tr>
<td>alternative site A Manakpur</td>
</tr>
<tr>
<td>alternative Site B Sardayi</td>
</tr>
<tr>
<td>alternative site C Dhoke Babral</td>
</tr>
<tr>
<td>alternative site D Khatakabad</td>
</tr>
<tr>
<td>Selected site</td>
</tr>
</tbody>
</table>

Discussion

According to above graphical representation, two sites i.e. alternative site A & Alternative Site B were at low input for energy generation but were rejected due to other negative aspects i.e. environmental impacts as mentioned earlier. The remaining two sites i.e. alternative site C and selected Site were at medium inputs for energy generation but the alternative site C was not selected due to environmental impacts i.e. being in the RAMSAR protected area. The alternative site D was at high input for energy generation. The selected site also falls in the medium range of input for energy generation and selected due to easy access road and low environmental impacts.
Transportation Charges

The comparison of sites was done on the basis of transportation charges involved for supply of machinery, fuel, raw material and supply of cement to market and for this we set the range from 1 to 3 i.e. for good, 2 for satisfactory and 3 for Average.

<table>
<thead>
<tr>
<th>Comparison of sites over Transportation</th>
</tr>
</thead>
<tbody>
<tr>
<td>alternative site A Manakpur</td>
</tr>
<tr>
<td>alternative Site B Sardayi</td>
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<tr>
<td>alternative site C Dhoke Babral</td>
</tr>
<tr>
<td>alternative site D Khatakabad</td>
</tr>
<tr>
<td>Selected site</td>
</tr>
</tbody>
</table>

Discussion

According to above graphical representation, three sites i.e. alternative site A & Alternative Site B and Selected site were at low transportation charges but two alternative sites were rejected due to not suitability of the area and selected site i.e. Buchal kalan was suitable due to easy supply of raw material from lease area to proposed cement plant. The remaining two alternative sites were falling at high and medium transportation charges ranges which were not suitable for the said project.

Raw material

The comparison of sites was done on the basis of raw material availability and their quality and quantity and for this we set we set the range from 1 to 3 i.e. 1 for good 2 for Satisfactory and 3 for average. Raw material i.e. limestone and clay deposits were observed on all the
alternative sites but the quantity and quality of the raw material at the selected site was most suitable and satisfactory.

<table>
<thead>
<tr>
<th>comparison of sites over Raw material</th>
</tr>
</thead>
<tbody>
<tr>
<td>alternative site A Manakpur</td>
</tr>
<tr>
<td>alternative Site B Sardayi</td>
</tr>
<tr>
<td>alternative site C Dhoke Babral</td>
</tr>
<tr>
<td>alternative site D Khatakabad</td>
</tr>
<tr>
<td>Selected site Buchal Kalan</td>
</tr>
</tbody>
</table>

Man power

The comparison of sites was done on the basis of availability of Man Power and for this we set we set the range from 1 to 3 i.e. 1 for good 2 for Satisfactory and 3 for average. Man power at all the sites was equally available but due to good approach road the selected site can be given priority.

<table>
<thead>
<tr>
<th>comparison of sites over availability of Man power</th>
</tr>
</thead>
<tbody>
<tr>
<td>alternative site A Manakpur</td>
</tr>
<tr>
<td>alternative Site B Sardayi</td>
</tr>
<tr>
<td>alternative site C Dhoke Babral</td>
</tr>
<tr>
<td>alternative site D Khatakabad</td>
</tr>
<tr>
<td>Selected site Buchal Kalan</td>
</tr>
</tbody>
</table>
Export

Export of the cement phased a decline of 11.6% in the last year and local sale increased by 7.9% due to increased local development activities, an attribute of population growth and increased industrial activities. Installation of cement plants will accommodate the future demands of the cement in the country. **Data for Import and Export is attached with this report.**

Ambient Air Quality

The comparison of sites was done on the basis of their ambient air quality and for this we set the range from 1 to 3 i.e. 1 for high but within limits, 2 for Medium but within limits and 3 for Low.

<table>
<thead>
<tr>
<th>comparison of sites over ambient air quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>alternative site A Manakpur</td>
</tr>
<tr>
<td>alternative Site B Sardayi</td>
</tr>
<tr>
<td>alternative site C Dhoke Babral</td>
</tr>
<tr>
<td>alternative site D Khatakabad</td>
</tr>
<tr>
<td>Selected site</td>
</tr>
</tbody>
</table>
Discussion
According to above graphical representation, the ambient air quality was within the NEQS limits at all the sites but at selected site it was medium but within limits the reason was other cement plants are also existing in the district but within the district the site is more suitable as compared to two other sites i.e. Alternative Site A & B.

Water Availability

The comparison of sites was done on the basis of water availability in the area and for this we set the range from 1 to 3 i.e. 1 for plenty of water, 2 for satisfactory and 3 for Low.

<table>
<thead>
<tr>
<th>comparison of sites over water availability</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>alternative site A Manakpur</td>
<td>2</td>
</tr>
<tr>
<td>alternative Site B Sardayi</td>
<td>2</td>
</tr>
<tr>
<td>alternative site C Dhoke Babral</td>
<td>2</td>
</tr>
<tr>
<td>alternative site D Khatakabad</td>
<td>1</td>
</tr>
<tr>
<td>Selected site</td>
<td>2</td>
</tr>
</tbody>
</table>
Discussion
According to the survey report, the penalty of water was available at alternative site D i.e. near Khatakabad District Mianwali, perhaps it is due to the presence of water body near the site while water availability at all the remaining sites including selected site was satisfactory. The project proponent has admitted to maintain the water table due to construction of check dams for recharge the groundwater.

Landscaping

The comparison of sites was done on the basis of existing landscape of the area by consideration of mining activities, installation of cement plant and development of labor colony and for this we set the range from 1 to 3 i.e. 1 for good, 2 for satisfactory and 3 for not good.

<table>
<thead>
<tr>
<th></th>
<th>comparison of sites over landscaping</th>
</tr>
</thead>
<tbody>
<tr>
<td>alternative site A Manakpur</td>
<td>2</td>
</tr>
<tr>
<td>alternative Site B Sardayi</td>
<td>2</td>
</tr>
<tr>
<td>alternative site C Dhoke Babral</td>
<td>1</td>
</tr>
<tr>
<td>alternative site D Khatakabad</td>
<td>3</td>
</tr>
<tr>
<td>Selected site</td>
<td>1</td>
</tr>
</tbody>
</table>
Discussion

According to the survey of the area, the landscape of the Alternative site C and selected Site was good due to the natural contour of the area i.e. contour of the selected site is in a such topography having steady slope and bench mining can be done easily, by avoiding any hazard during the activities. Selected site can be given a priority due to positive impacts on environment as compared to Site C which comes under RAMSAR Protected area.

Biodiversity

The comparison of sites was done on the basis of biodiversity of the area and for this we set the range from 1 to 3 i.e. 1 for rich in biodiversity, 2 for medium and 3 for rare.

<table>
<thead>
<tr>
<th></th>
<th>Comparison of sites over Biodiversity</th>
</tr>
</thead>
<tbody>
<tr>
<td>alternative site A Manakpur</td>
<td>1</td>
</tr>
<tr>
<td>alternative Site B Sardayi</td>
<td>1</td>
</tr>
<tr>
<td>alternative site C Dhoke Babral</td>
<td>1</td>
</tr>
<tr>
<td>alternative site D Khatakabad</td>
<td>2</td>
</tr>
<tr>
<td>Selected site</td>
<td>3</td>
</tr>
</tbody>
</table>
Discussion
According to the survey of the area, the biodiversity of the selected site was rare due to lack of rich fauna and flora at site.

Social Environment

According to the survey of the area, all the sites were socially viable but due to the installation of the said project the social environment of the area will be enhanced. Socially the selected site is more acceptable by the proponent due to availability of experienced labor in the district Chakwal.

<table>
<thead>
<tr>
<th>comparison of sites over Social Environment</th>
</tr>
</thead>
<tbody>
<tr>
<td>alternative site A Manakpur</td>
</tr>
<tr>
<td>alternative Site B Sardayi</td>
</tr>
<tr>
<td>alternative site C Dhoke Babral</td>
</tr>
<tr>
<td>alternative site D Khatakabab</td>
</tr>
<tr>
<td>Selected site Buchal Kalan</td>
</tr>
</tbody>
</table>
Criteria used to evaluate the impact factor as:

**1 to 3 i.e., 1 for good, 2 for satisfactory, 3 for average/not satisfactory**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Accumulative Analysis on the basis of Economic &amp; Environmental Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sites</td>
</tr>
<tr>
<td></td>
<td>A. Manakpur Village</td>
</tr>
<tr>
<td>cost of land</td>
<td>3</td>
</tr>
<tr>
<td>Energy Input</td>
<td>3</td>
</tr>
<tr>
<td>Transportation Charges</td>
<td>3</td>
</tr>
<tr>
<td>Raw material Availability</td>
<td>2</td>
</tr>
<tr>
<td>Man power Availability</td>
<td>2</td>
</tr>
<tr>
<td>Ambient Air Quality</td>
<td>1</td>
</tr>
<tr>
<td>Water Availability</td>
<td>2</td>
</tr>
<tr>
<td>Landscaping</td>
<td>2</td>
</tr>
<tr>
<td>Biodiversity</td>
<td>1</td>
</tr>
<tr>
<td>Social Environment</td>
<td>2</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td>2.1</td>
</tr>
</tbody>
</table>

Accumulative Analysis of the sites has been done on the basis of Economic & Environmental Analysis in which variables or parameters were selected against each site and impact factor for each site was evaluated on the set criteria in the range of 1 to 3 i.e. 1 for good, 2 for satisfactory and 3 for average or not satisfactory. As per above table, the impact factor of Site C, D and Selected site falling in the same criteria i.e. 1 for Good but the alternative sites C &
D cannot be selected due to their environmental impacts as being the Alternative Site C in RAMSAR protected area and presence of water body near the Alternative Site D also it covers the Lucky cement already existed Pezu Plant, whereas the other two alternative sites A & B falling in the satisfactory criteria i.e. 2, so the selected site located at Buchal Kalan is most suitable site for the proposed project of mining as per above discussed Economic and Environment criteria for the site selection.
CHAPTER 5

ENVIRONMENT LEGISLATIVE REQUIREMENT & FRAMEWORK

General
This section deals with the current environmental policy as well as administrative and legal framework and provides an overview of the regulations and guidelines of Pakistan related to The EIA of Mining Project and specifically Punjab Environmental Protection Act 1997 (Amended 2012).

The requirement for an EIA is laid out in Punjab Environmental Protection Act, 1997 (Amended 2012). Under this Act, No project involving construction activities or any change in the physical Environment can be under taken unless an EIA or IEE study is conducted, followed by an approval from concerned departments.

NATIONAL/PROVINCIAL, POLICIES, LAW, REGULATIONS AND GUIDELINES

PEPA-1997 (Amended 2012):
The Government of Pakistan promulgated “Pakistan Environmental Protection Act” in 1997. Two organizations, the Pakistan Environmental Protection Council (Pak-EPC) and the Pakistan Environmental Protection Agency (Pak-EPA), are primarily responsible for administering the provisions of the Act. The Pak-EPC oversees the functioning of the Pak-EPA. Among its members major ones include representatives of the Federal and Provincial Governments especially the Provincial Environmental Protection Agencies (PEPA), industry, non-governmental organizations, academia, environment experts, Federation of Chamber of Commerce and Industry and the private sector. The Pak-EPA, through the PEPAs, is required to ensure compliance with the National Environmental Quality Standards (NEQS) and establish monitoring and evaluation systems. As a primary implementing agency in the hierarchy, it is responsible for identifying the need for, as well as initiating legislation whenever necessary. Pak-EPA is also authorized to delegate powers to its provincial counterparts, the provincial EPAs. One of the functions delegated by the Pak-EPA to provincial EPA is the review and approval of Environmental Impact Assessment (EIA) and Initial Environmental Examination (IEE) reports of the projects undertaken in their respective jurisdictions.
Pakistan Environmental Protection Act” 1997 has been amended in the year 2012 as Punjab Environmental Protection Act” 1997 (Amended 2012) with some substitutions and eliminations of Sections, Clauses and Sub-Clauses.

**Salient features of PEPA-1997 (Amended 2012):**
Among many other salient features of the Punjab Environmental Protection Act, 1997 (Amended 2012) it empowers the Pak-EPA to:

- Delegate powers, including those of environmental assessment, to the provincial EPAs;
- Identify categories of projects to which the Initial Environmental Examination (IEE) and Environmental Impact Assessment (EIA) provisions will apply;
- Develop guidelines for conducting IEE and/or EIA and procedures for the submission, review and approval of the same;
- Develop environmental emission standards for parameters such as air, water and noise and;
- Enforce the provisions of the PEPA through environmental protection orders and environmental tribunals headed by magistrates with wide-ranging powers, including the right to fine violators of the Act.

Under the provisions of the 1997 Act, Pak-EPA has empowered Provincial EPAs to manage the environmental concerns of their respective provinces. The provincial EPAs can frame environmental regulations tailored to the requirements of their province, provided these regulations meet or exceed the minimum standards set by the Pakistan EPA. They are also required to review and approve IEEs/EIAs of all the development projects undertaken in their respective provinces, including the projects implemented by federal agencies.

**Guidelines for Environmental Assessment-1997:**
The Pak-EPA published a set of environmental guidelines for conducting environmental assessments and the environmental management of different types of development projects. The guidelines that are relevant to the proposed project are listed below:

The guidelines on the preparation and review of environmental reports target the project proponents, and specify:

1) The nature of the information to be included in environmental reports.
2) the minimum qualifications of the EIA conductors appointed,
3) The need to incorporate suitable mitigation measures at every stage of project implementation and.

4) The need to specify monitoring procedures.

The report must contain baseline data on the project area, detailed assessment thereof, and mitigation measures.

**Regulations for Environmental Assessment-Regulation-2000:**
Under Section 12 (and subsequent amendment) of the PEPA-1997, a project failing under any category specified in Schedule-I requires the proponent to file an IEE with the concerned federal agency (Pak-EPA). Projects falling under any category specified in Schedule II require the proponent to file an EIA with the federal agency. Within ten working days of the IEE or EIA having been deposited, the federal agency will confirm that the document submitted is complete for the purpose of review. During this time, will the federal agency require the proponent to submit any additional information; it will return the IEE or EIA to the proponent for revision, clearly listing those aspects that need further discussion. Subsequently, the federal agency shall make every effort to complete an IEE review within 45 days and an EIA review within 90 days of filing.

**APPROVAL FROM PUNJAB ENVIRONMENTAL PROTECTION AGENCY**
As per the 2000 Regulations, SCIL will be required to submit the IEE report to Punjab Environmental Protection Agency (Punjab EPA) and seek approval on the same from PEPA. 10 hard copies and 2 soft copies of the IEE report will need to be submitted to Punjab EPA. Punjab EPA will grant its decision on the IEE as per the rules and procedures set out in the 2000 Regulations.

**PAKISTAN ENVIRONMENT IMPACT ASSESSMENT PROCEDURE**
These guidelines are descriptive documents describing the format and content of IEE/EIA reports to be submitted to provincial EPA/EPD for obtaining NOC. Following are the areas which are covered by these guidelines.

- The Environmental Assessment report formation (scoping, type and category of project, description of project, alternatives, site selection, baseline data)
- Assessing impacts (identification, analysis and significance)
- Mitigation and impact management and preparing an Environmental Management Plan
- Reporting (drafting style, main features, short comings, other forms of presentation)
- Review and decision making (role, steps, remedial options, checks and balances)
THE NATIONAL ENVIRONMENTAL QUALITY STANDARDS (NEQS)
The NEQS promulgated under the PEPA 1997 specify standards for industrial and municipal effluents, gaseous emissions, vehicular emissions, and noise levels. The PEPA 1997 empowers the EPA’s to impose pollution charges in case of non-compliance to the NEQS. Standards for disposal of solid waste have as yet not been promulgated. During the project, NEQS will apply to all type of effluents, emissions and noise levels from construction camp, commissioning and operation of the proposed project and associated facilities.

SELF-MONITORING & REPORTING RULES (SMART)
Pakistan Environmental Protection Council constituted an Environmental Standards Committee in 1996 to devise realistic modalities for NEQS enforcement and simplified monitoring procedures with the consultation of representatives of industrial interest groups, nongovernmental organizations (NGOs) and other stakeholders. Their efforts succeeded in the bringing up of “Self-Monitoring and Reporting System for Industry”. As per the rules set by this system, industries have to monitor effluents and emissions in compliance with the NEQS and report it to provincial or federal EPAs. This system classifies industry into three categories A, B and C each corresponding to a specified reporting frequency.

Mining projects are classified as Category-A for monitoring of both liquid effluents and gaseous emissions. All industrial units in Category-A are required to submit environmental monitoring reports on monthly basis and they shall maintain a record of the times during which start-up and upset conditions occur, and shall mention the total time elapsed in such conditions in its monthly environmental monitoring report.

FRAMEWORK OF ENVIRONMENT AND WILDLIFE INSTITUTION IN PAKISTAN
The Federal Ministry of Environment was the main government organization responsible for the protection of environment and resource conservation. It is headed by a federal minister. The Ministry works with PEPC, and the Federal and Provincial EPAs formed under the PEPA 1997. The roles, responsibilities and authorities of PEPC and the EPA’s are defined in the PEPA 1997. However, after 18th constitutional amendment, the said ministry has been devolved into provinces and federal ministry is working under the umbrella of Ministry of Climate Change.
Now, Pakistan Environmental Protection Agency is an attached department of the Ministry of Climate Change and responsible to implement the Pakistan Environmental Protection Act 1997, in the country, an Act to provide for the protection, conservation, rehabilitation and improvement of environment, for the prevention and control of pollution, and promotion of sustainable development. Pakistan Environmental Protection Agency also provides all kind of technical assistance to the Ministry of Climate Change.

The PEPC has been formed by the Federal Government. Its members include the Prime Minister of Pakistan, as the Chairperson; the Minister for Environment as the vice-Chairperson; Governors of the Provinces; Ministers in charge of the subject of environment in the Provinces; Secretary to the Federal Government in-charge of the Ministry of Environment; Director General Federal EPA; heads of other federal and provincial departments; environmentalists and community representatives including scientists. The functions and powers of the Council include formulation of national environmental Policy, enforcement of PEPA 1997, approval of the NEQS, incorporation of environmental considerations in to national development plans and policies and provide guidelines for the protection and conservation of biodiversity in general and for the conservation of renewable and non-renewable resources.

**National Conservation Strategy-Pakistan:**
The National Conservation Strategy (NCS) -Pakistan as approved by the Federal Cabinet in March 1992 is the guiding document on the environmental issues in the country. The NCS outlines the country’s primary approach towards encouraging sustainable development, conserving natural resources, and improving efficiency in the use and management of resources.

The NCS has 68 specific programs in 14 core areas in which policy intervention is considered crucial for the preservation of Pakistan’s natural and physical environment. The core areas that are relevant in the context of the envisaged project are pollution prevention and abatement, restoration of supporting forestry and stations, and preservation of cultural heritage. A mid-term review of the achievements, impacts and prospects of Pakistan’s NCS was undertaken “between” 1999-2000.
Guidelines for Public Consultation:
These guidelines deal with possible approaches to public consultation and techniques for designing an effective program of consultation that reaches out to all major stakeholders and ensures that their concerns are incorporated in any impact assessment study.

NATIONAL ENVIRONMENTAL POLICY ACT 2005
In March 2005, GoP launched its National Environmental Policy, which provides a framework for addressing the environmental issues. Section 5 of the Policy commits for integration of Environment into development planning as instrument for achieving the objective of National Environmental Policy. It further states in clause (b) of sub-section 5.1 that EIA related provisions of Environmental Protection Act 1997, will be diligently enforced for all development projects. It also provides broad guidelines to the Federal Government, Provincial Governments, Federally administered Territories and Local Governments to address their environmental concerns and to ensure effective management of their environmental resources.

PAKISTAN LABOR POLICY, 2010
The main objective of the Labor Policy, 2010 is the social and economic well-being of the labor of Pakistan. The Labor Policy, 2010 has following 4 parts:

i. Legal Framework
ii. Advocacy, rights of workers and employees
iii. Skill development and employment; and
iv. Manpower export

CUTTING OF TREES ACT, 1975
This Act prohibits cutting and chopping of trees without permission of the Forest Department. The act imposes fine or imprisonment or both, for illegal cutting of trees but has not mentioned any compensatory afforestation.

PUNJAB WILDLIFE ACT, 1974
This Act was enacted in 1974 for the regulation of activities relating to protection, conservation and management of wildlife in the province. Enabling rules were notified in the same year to enforce the Act.
PUNJAB PLANTATION AND MAINTENANCE OF TREES ACT, 1974
The provincial Government enacted this law in 1974 to regulate tree plantation and enforce measures for the protection of tree plantations in the province.

ANTIQUITIES ACT, 1975
The Antiquities Act of 1975 ensures the protection of cultural resources in Pakistan and aims to protect ‘antiquities’ from destruction, theft, negligence, unlawful excavation, trade and export. Antiquities have been defined as ancient products of human activity, historical sites, or sites of anthropological or cultural interest, and national monuments. The law prohibits new construction in the proximity of a protected antiquity and empowers the GoP to prohibit excavation in any area that may contain articles of archeological significance.

PAKISTAN PENAL CODE, 1860
This act defines the penalties for violations concerning pollution of air, water bodies, and land.

CANAL AND DRAINAGE ACT, 1873
The canal and drainage Act 1873, prohibits corruption or fouling of water in canals (defined to include channels, tube wells, reservoirs and watercourses), or obstruction of drainage. This Act will be applicable to the construction and operation and Maintenance works to be carried out during the proposed project.

PAKISTAN CLEAN AIR PROGRAM
The Pakistan Clean Air Program is an initiative of the Pak-EPA to comprehensively address the air quality issue in the country. Key elements of the PCPA include an Air Quality Monitoring Program, Air Quality Indicators, Research Programs, Air Quality Resource Center, Regulatory Measures, Economic Instruments, Emissions Inventory, Air Dispersions Models, and Air Quality Abatement Technology Clearing House.

The objectives of the program are to:

- Protect and enhance the country’s air resources
- Protect public health and welfare against any actual or potential adverse effects that may reasonably be anticipated to accrue from air pollution.
- Preserve, protect and enhance the air quality in urban areas and the countryside and in areas of natural. Recreational, scenic, cultural or historic value, in particular, the
protected areas of the country, i.e. national parks, wildlife sanctuaries, game reserves and national monuments.

- Ensure the economic growth will occur in a manner consistent with the preservation of existing clean air resources.
- Assure that emissions from any source in any province do not interfere with pollution prevention programs in any other province; and
- Assure that Pakistan’s international obligations regarding the trans-boundary effects of air pollution are met.

GUIDELINES FOR PUBLIC CONSULTATION

These guidelines deal with possible approaches to public consultation and techniques for designing an effective program of consultation that reaches out to all major stakeholders and ensures the incorporation of their concerns in any impact assessment study. These guidelines cover:

- Consultation, involvement, and participation of stakeholders
- Effective public consultation (planning, stages of EIA where consultation is appropriate); and
- Facilitation involvement (including the poor, women, and Non-Governmental Organizations (NGOs))

NATIONAL MINING POLICY, 2013

Objectives of the Policy

The Federal and Provincial Governments of Pakistan are conscious of their responsibility for creating a favourable environment for an effective and vibrant mineral sector in Pakistan. The Federal and Provincial Governments are also cognizant of the need to keep pace with the changing international investment climate, and the important objectives which need to be satisfied in order to secure foreign and local private risk capital investment into the mineral sector.

The broad goals are to enhance the contribution of the mineral sector to the GDP by efficient and sustainable development of mineral resources through private sector investment for the benefit of the people of Pakistan. In order to achieve this goal, this National Mineral Policy aims to achieve the following:
i) Enhancement and sustenance of revenue flow to the Provincial and Federal Governments;

ii) Creation of an investment-friendly climate to enhance international competitiveness;

iii) Optimization of exploration, development and exploitation of minerals;

iv) Value-addition of minerals and growth of upstream & downstream sectors;

v) Mitigation of adverse environmental effects of mineral development;

vi) Generation of mass-scale employment and socio-economic uplift through enhanced skills, sustainable mineral development, technology transfer and regional infrastructure development;

vii) Administrative restructuring and capacity building of federal and provincial institutions;

viii) Generation of geological data, development of a national and provincial cadastre and provision of online accessibility to such data;

ix) Ensuring safe mining operations and safety and security of investors;

x) Rehabilitation/resettlement due to mining operations;

xi) Pricing mechanism for minerals based on international best practices;

xii) Contract agreements as per international standards; and

xiii) Data sharing by federation with federating units.

According to NATIONAL MINING POLICY, 2013, Pakistan, in common with other countries, wishes to pursue an approach of sustainable development consistent with environmental priorities. Companies will be expected to ensure that their mining operations are carried out in an environment tally acceptable and safe manner and that such operations are properly monitored. To ensure that the mineral resources development activities are undertaken in an appropriate manner, environmental stewardship needs to be incorporated throughout the development process. This can be achieved through:

i. Implementation of the regulatory environmental management measures including Environmental Impact Assessment, as well as environmental management system, plan and audit;

ii. Compliance with the national environmental protection law and other appropriate national and international standards, codes, guidelines and policies;

iii. Ensuring effective implementation of progressive post-mining rehabilitation;
iv. Promoting the recovery, recycling and reuse of minerals, metals and mineral-based products;

v. Ensuring the implementation of effective mine waste management measures; and

vi. Promoting and disseminating information on the use of best mining practices, public disclosure and corporate social responsibility (CSR).

THE MINES ACT 1923

According to THE MINING ACT 1923 (IV of 1923), the owner, agent and manager of every mine shall be responsible that all operations carried on in connection there with are conducted in accordance with the provision of this Act and of the regulations, rules and bye-laws and of any orders made there under.

(2) In the event of any contravention of any such provisions by any person whomsoever, the owner, agent and manager of the mine shall each be deemed also to be guilty of such contravention unless he proves that he had taken all reasonable means, by publishing and to the best of his power enforcing those provisions to prevent such contravention; Provided that the owner or agent shall not be so deemed if he proves-

(a) that he was not in the habit of taking and did not in respect of the matter in question take, any part in. the management of the mine; and

(b) that he had made all the financial and other provisions necessary to enable the manager to carry out his duties; and

(c) that the offence was committed without his knowledge, consent or connivance.

(3) Save as hereinbefore provided, it shall not be a defense in any proceeding brought against an owner or agent of a mine under this section that a manager of the mine has been’ appointed in accordance with the provisions of this Act.

Also, the Act stated that every mine shall be provided to workers with conservancy, canteen, shelter, first aid rooms and medical appliances. The Act also address regarding the occupational accidents, occupational diseases, inquiry in cases of accidents, Hours And Limitation Of Employment, Employment of women in mines, Extra wages for overtime, Young persons not to be employed without certificates of fitness (No person who has not completed his seventeenth year shall be employed in any part of a mine), Limitation of working hours for young persons, Leave And Holidays With Wages.
INDUSTRIAL POLICY

• Foreign investors are permitted to hold 100% of the equity of industrial projects without any permission of the Government.

• No prior Government sanction is required for establishment of an industry outside negative areas declared by District Government irrespective of its cost and size except the following covered under schedule ‘C’:

a. Arms & Ammunition.


c. High Explosives.

d. Radio Active Substances.

e. Alcoholic Beverages or Liquors.

1. No industrial unit mentioned in Schedule-A of the notification No. AEA-III.3.9/91, dated 30.09.2002 or industrial unit exceeding a total cost of Rs. 100.00 million shall be set up within 10 miles (16 Kms) of International Border.

2. No industrial unit shall be set up in areas affected by flood flowing transversely in the strip of one mile of either side across the Grand Trunk Road from Shahdara Town to Muridke Town, without prior permission of the Provincial Government.

According to the notification No. AEA-III-3-5/2003 (Vol-III), dated 06.12.2006, “no new sugar mill shall be setup and no enlargement in capacity of the existing sugar mills is allowed in the Province”.

4. Each district Government may declare “negative area” for industry. Such “negative area” be determined by a District Committee after consultation with all stake-holders in light of general policy guidelines to be issued by the Industries Department and exemptions allowed under Schedule ‘B’ of this Notification.

5. No industrial unit mentioned in Schedule ‘C’ of this Notification shall be set up anywhere in the Punjab without prior approval of the Government.
6. The Government reserves the right to refuse establishment / enhancement of any industrial undertaking which is in contravention of the public interest, ecology or any other law / rules for the time being in force.

7. The Government may relax any of the provisions of this notification in case of a particular unit or industry or class of units or industries.

8. NOC from Environment Protection Department, Govt. of the Punjab is required for setting up new Industries.

Tourism has been given the status of industry in accordance with Ministry of Industries & Production Circular No. 1-129/99-INV-IV dated 2nd August 1999.

- The Housing and Construction Sector has also been declared as industry (Finance Division Notification No. 10(10)/IF-II/98, dated 07.04.1999 and 04.06.1999.

- In accordance with Government notification No. 3(2)/97-INV-IV dated 05.03.1997, Computer Software and Information Technology (IT) have been declared as Industry.

GUIDELINES FOR SENSITIVE AND CRITICAL AREAS

The objective of the guideline is to provide guidance to project proponents and other stakeholders in the environmental assessment process, so that the proposed projects are planned and sited in a way that protects the values of sensitive and critical areas. These guidelines will help proponents of projects requiring Environmental Reports:

- In identifying what are the officially notified protected areas in Pakistan. These may include critical ecosystems including wildlife reserves and forests, archaeological sites, monuments, buildings, antiquities, or cultural heritage sites;
- If a proposed development is on a notified protected area or within the vicinity of such an area, then the approach detailed in this guideline should be adopted.

INTERNATIONAL GUIDELINES, PROTOCOLS AND AGREEMENTS

As Pakistan is a member of a number of International Organizations like UNO, Organization of the Islamic Conference (OIC), South Asian Association for Regional Corporation (SAARC), Economic Corporation Organization (ECO) etc., so it has to follow the international protocols and obligations related to the environment. The protocols and obligations related to the proposed project are as under:
CONVENTION ON BIOLOGICAL DIVERSITY, 1994

The Convention on Biological Diversity (CBD), known as informally as the Biodiversity Convention, is an international legally binding treaty. The convention has three main goals:

- Conservation of Biological Diversity (or biodiversity)
- Sustainable use of its components; and
- Fair and equitable sharing of benefits arising from genetic resources.

In other words, its objective is to develop national strategies for the conservation and sustainable use of biological diversity. It is often seen as the key document related to sustainable development.

THE RIO DECLARATION

The Rio Declaration comprises of 27 principles which address important issues such as: sustainable development to integrate environmental protection into the development process; common but differentiated responsibilities to conserve, protect and restore the earth’s ecosystems; public participation and information access at the national level, reduce and eliminate unsustainable patterns of production and consumption.

International Union for Conservation of Nature and Natural Resources (IUCN) Red List

The red list is published by IUCN and includes those species that are under potential threat of extinction. These species have been categorized as:

- Endangered: species that are sent to be facing a very high risk of extinction in the wild in the near future, reduction of 50% or more either in the last 10 years or over the last three generations, survive only in small numbers, or have very small populations.
- Vulnerable in Decline: species that are seen to be facing a risk of extinction in the wild, having apparent reductions of 20% or more in the last 10 years or three generations.
- Vulnerable: species that are seen to be facing a high risk of extinction in the wild, but not necessarily experiencing recent reductions in population size.
- Lower Risk: species that are seen to be facing a risk of extinction that is lesser in extent that for any of the above categories.
• Data Deficient: species that may be at risk of extinction in the wild but at the present time there is insufficient information available to make a firm decision about its status.
CHAPTER 6

DESCRIPTION OF ENVIRONMENT
This section describes the baseline environmental conditions, which cover the existing Physical, biological, ecological and socio-economic environment of the project site as well as District Chakwal. Data was collected by reviewing secondary data from different universities research articles and publications, Governmental department studies, Non-Governmental organization reports and primary data was collect from the field visit and survey at different timed intervals and with the consultation of stockholders.

Proposed mining site location:
Proposed mining site located at approximately 3km in the north of village Buchal Kalan District Chakwal. This proposed mining site is fall in the salt rang of river Jhelum and Sindh.

Aerial View of the proposed mining site:
BRIEF DESCRIPTION OF THE DISTRICT
Chakwal was given the status of district in 1985. Attock and Rawalpindi districts are located on its North; Khushab on its South, Jhelum on its East and Mianwali district is on its West. The total area of the district is 6524 square kilometers and includes the following tehsils:-

1. Chakwal
2. Choa Saidan Shah
3. Kalar Kahar
4. Talagang

Physical Environment/ Resources
Proposed mining site is located within the Salt Range, series of hills and low mountains between the valleys of the Indus and Jhelum rivers, located in the northern part of the Punjab region of Pakistan. It derives its name from extensive deposits of rock salt that form one of the richest salt fields in the world; they are of Precambrian age and range up to more than 1,600 feet (490 m) in thickness. The range is approximately 186 miles (300 km) long from east to west, and its width, in the central and eastern parts, is from 5 to 19 miles. Its average height is 2,200 feet, and its highest altitude, at Sakesar Mountain, is 4,992 feet (1,522 m). In addition to the salt deposits, mined from ancient times, the Salt Range contains coal, gypsum, limestone and other minerals as shown in below table.

ORES AND MINERALS
a) Reserves.

District Chakwal is very rich in mineral resources. Mineral reserves like Limestone, Argillaceous Clay, Coal, Rock Salt, Gypsum, Dolomite, Marble, Mill Stone and Ebry Stone are being commercially exploited by the private and public sector agencies.

b) Major Minerals

Production of the major minerals for the period from 2005-06 to 2007-08 is given in Table-5.1.
Table 5.1: List of mineral present in the Chakwal salt range and their annually production

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Mineral type</th>
<th>Production (M. Tons)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Limestone</td>
<td>1718019</td>
</tr>
<tr>
<td>2</td>
<td>Coal</td>
<td>255711</td>
</tr>
<tr>
<td>3</td>
<td>Rock Salt</td>
<td>327093</td>
</tr>
<tr>
<td>4</td>
<td>Argillaceous Clay</td>
<td>303476</td>
</tr>
<tr>
<td>5</td>
<td>Gypsum</td>
<td>37023</td>
</tr>
<tr>
<td>6</td>
<td>Dolomite</td>
<td>17800</td>
</tr>
<tr>
<td>7</td>
<td>Mill Stone</td>
<td>1110</td>
</tr>
<tr>
<td>8</td>
<td>Fireclay</td>
<td>457</td>
</tr>
<tr>
<td>9</td>
<td>Bentonite</td>
<td>2754</td>
</tr>
<tr>
<td>10</td>
<td>Ebry. Stone</td>
<td>40</td>
</tr>
<tr>
<td>11</td>
<td>Silica Sand</td>
<td>55</td>
</tr>
<tr>
<td>12</td>
<td>Iron Ore</td>
<td>20</td>
</tr>
<tr>
<td>13</td>
<td>Ochers</td>
<td>150</td>
</tr>
</tbody>
</table>

Sources of data: PRE-INVESTMENT STUDY DISTRICT CHAKWAL 2009

Industrial uses of Minerals

The industrial uses of major minerals are given hereunder:-

1. Limestone Cement, Sugar, Soda Ash and Lime Plaster.
4. Rock Salt = Used as raw material in the manufacturing of:
   i) Sodium Hydroxide.
   ii) Sodium Bicarbonate.
   iii) Sodium Carbonate.
5. Gypsum = Plaster of paris, cement, chemicals and soil conditioning.
6. Dolomite = Refractories.
NATURAL RESOURCES

3.1 AGRICULTURE
   a) Main Crops

Wheat, Ground Nut, Jawar, Rape / Mustard Seed, Bajra and Gram are the main crops grown in the District. Production of these crops during the period 2005-06 to 2007-08 is given in Table – 5.2.

Table 5.2. PRODUCTION OF MAIN CROPS

<table>
<thead>
<tr>
<th>CROP</th>
<th>PRODUCTION (000 M.TONS)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2005-06</td>
</tr>
<tr>
<td>Wheat</td>
<td>134</td>
</tr>
<tr>
<td>Ground Nut</td>
<td>25</td>
</tr>
<tr>
<td>Jawar</td>
<td>80</td>
</tr>
<tr>
<td>Rape / Mustard Seed</td>
<td>7</td>
</tr>
<tr>
<td>Bajra</td>
<td>6</td>
</tr>
<tr>
<td>Gram</td>
<td>10</td>
</tr>
</tbody>
</table>

Source: Directorate of Agriculture, Crop Reporting Service, Punjab.

Besides, Maize, Bajra, Moong, Mash, Masoor, Oil Seed such as Rape / Mustard and Sun Flower are also grown in minor quantities in the district.

Main Fruits
Citrus and Guavas are main fruits grown in the district. Production of these fruits during the period 2005-06 to 2007-08 is given in Table – 4

TABLE 5.3: PRODUCTION OF MAIN FRUITS

<table>
<thead>
<tr>
<th>FRUIT</th>
<th>PRODUCTION (M.TONS)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2005-06</td>
</tr>
<tr>
<td>Citrus</td>
<td>367</td>
</tr>
<tr>
<td>Guavas</td>
<td>178</td>
</tr>
</tbody>
</table>

Source: Directorate of Agriculture, Crop Reporting Service, Punjab.

Besides, Apricot, Banana, Loquat, Pears, Peaches and Pomegranate are also grown in minor quantities in the district.
c) Main Vegetables

Turnip, Cauliflower, Tomato, Lady Finger, Onion, Matter Green and Carrot are main vegetables grown in the district. Production of these vegetables during the period 2005-06 to 2007-08 is given in Table – 5.4.

<table>
<thead>
<tr>
<th>VEGETABLE</th>
<th>PRODUCTION (M.TONS)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2005-06</td>
</tr>
<tr>
<td>Turnip</td>
<td>383</td>
</tr>
<tr>
<td>Cauliflower</td>
<td>345</td>
</tr>
<tr>
<td>Tomato</td>
<td>291</td>
</tr>
<tr>
<td>Lady Finger</td>
<td>470</td>
</tr>
<tr>
<td>Onion</td>
<td>247</td>
</tr>
<tr>
<td>Matter Green</td>
<td>294</td>
</tr>
<tr>
<td>Carrot</td>
<td>202</td>
</tr>
</tbody>
</table>

Source: Directorate of Agriculture, Crop Reporting Service, Punjab.

Besides, Potatoes, Chillies and Garlic are also grown in the district in minor quantities.

FORESTS

a) Location of Forests and Area under forestation.

An area of 1, 04,936.55 Hectares is under forests, which is about 14.57 % of the total area of the District. There is also linear plantation of 260 Km. alongside the roads/rails/canals in the District. Trees grown in the area are phalai, kikar and shisham, etc.

Production of Timber and Fire-wood

The production of Timber and Fire-Wood in the District during the period 2005-06 to 2007-08 was not reported.

LIVESTOCK POPULATION

a) Animal Population.

The animal population of the District is given in Table – 5.5.
Table 5.5:

<table>
<thead>
<tr>
<th>ANIMAL POPULATION</th>
<th>POPULATION (000 HEADS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cattle</td>
<td>435</td>
</tr>
<tr>
<td>Buffaloes</td>
<td>145</td>
</tr>
<tr>
<td>Sheep</td>
<td>158</td>
</tr>
<tr>
<td>Goat</td>
<td>580</td>
</tr>
</tbody>
</table>

**Source:** Punjab Development Statistics 2008.

**Poultry Population**
As per Punjab Development Statistics 2008 there are 2100 broiler and 315 layer poultry farms in the District having rearing capacity of 11991 and 1580 thousand birds respectively. There are 49 breeding farms having rearing capacity of 340 thousands birds.

**Availability of Hides / Skins and Slaughter House Wastes.**
As per Punjab Development Statistics 2008, 155300 animals were slaughtered in recognized / un-recognized slaughter houses in the District during the year 2006-07, which is a reasonable estimate of the availability of hides and skins in the District.

The availability of slaughter house by – products is estimated as under:-

- Blood 57.34 M.Tons
- Bones 269.98 M.Tons
- Tallow 51.37 M.Tons

**Production of Wool.**
The sheep population of 158 thousand heads in the district is expected to yield about 158 M. Tons of coarse wool annually.

**INFRA-STRUCTURAL FACILITIES**

**COMMUNICATION NET-WORK**

a) **Road-Links.**

The District has a total metalled led road-length of 2552.66 Kilometers. The District is linked with Rawalpindi, Attock, Mianwali, Khushab and Jhelum Districts through metalled road.

The Lahore Islamabad Motorway is linking in this District from Lahore to Rawalpindi at 200 Km to 250 Km. The interchange of Kallar Kahar and Balkasar are located in this District.

**Rail-Links.**
There is no major Rail Links in the District.

**GENERAL QUALITY AND AVAILABILITY OF SUB-SOIL WATER**
Underground water resources are not adequate in the District except in towns of Kalar Kahar and Choa Saiden Shah. The sub soil water at these places is suitable for industrial purposes. Most of the other parts of the District are deficient in underground water resources.

**EFFLUENT DISPOSAL FACILITIES**
There are a number of natural nullahs in the District, which are considered sufficient for the disposal of effluent. However, the prior approval from Irrigation & Power Department is necessary for the disposal of effluent in these nullahs.

**POWER SUPPLY**
There are 6 grid stations in the district ranging in capacity from 66 KV to 132 KV.

**NATURAL GAS AVAILABILITY**
At present natural gas is available in Chakwal town and Choa Saiden Shah Tehsils.

**TELE-COMMUNICATION FACILITIES**
There are 65 telephone exchanges operating in the district, ranging in capacities from 48 lines to 6190 lines. Cellular phone services are available in the district.

**SOCIAL INFRA-STRUCTURAL FACILITIES**
Social infra-structural facilities available in the district are given in Table 5.6 on Tehsil wise basis.

<table>
<thead>
<tr>
<th>SOCIAL INFRA-STRUCTURAL FACILITIES</th>
<th>PRIMARY / MIDDLE / HIGH SCHOOL</th>
<th>COLLEGE</th>
<th>HOSPITAL</th>
<th>POLICE STATION</th>
<th>RAILWAY STATIONS</th>
<th>POST OFFICE</th>
<th>BANKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>TEHSIL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chakwal</td>
<td>639</td>
<td>3</td>
<td>1</td>
<td>5</td>
<td>0</td>
<td>31</td>
<td>78</td>
</tr>
<tr>
<td>Talagang</td>
<td>466</td>
<td>2</td>
<td>1</td>
<td>4</td>
<td>0</td>
<td>34</td>
<td>31</td>
</tr>
<tr>
<td>Choa Saiden Shah</td>
<td>110</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>14</td>
<td>9</td>
</tr>
<tr>
<td>Kallar Kahar</td>
<td>140</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>8</td>
<td>8</td>
</tr>
</tbody>
</table>

**INDUSTRIAL ESTATE**
Punjab Small Industries Corporation has established an industrial estate in Chakwal.

The overall position regarding allotted and vacant plots in the Estate is given in Table 5.7.
SIZES AND AVAILABILITY OF PLOTS

<table>
<thead>
<tr>
<th>IN THE INDUSTRIAL ESTATE</th>
<th>Size of Plots</th>
<th>Total No. of Plots</th>
<th>Allotted Plots</th>
<th>Vacant Plots</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mini Industrial Estate, Chakwal Rawalpindi Road</td>
<td>2 Kanals</td>
<td>17</td>
<td>16</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>1 Kanals</td>
<td>51</td>
<td>50</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>½ Kanals</td>
<td>51</td>
<td>50</td>
<td>1</td>
</tr>
</tbody>
</table>

Source: Punjab Small Industries Corporation.

DRY PORT
There is no Dry Port in the District.

Declaration of Negative Areas
In pursuance of the Clause 4 of the Location Policy Notified on 30-09-2002, by the Industries Department, Government of the Punjab. The District Govt. Chakwal has declared the following negative areas:-

1. No industrial unit or trade organization can be established without the prior permission of the District Government, Chakwal falling in negative area such as:-

a) Small, medium and heavy industries within the jurisdiction of old Municipal Limits of Chakwal City which comprise Union council’s No. 1, 2, 3, 4 and 5.

Former Municipal Limits of Talagang Town (Union Council Sharq and Gharb and Villages Tehi, Akwal, Malikwal and Nakkah Kahut.

c) Flood affected aras of villages of Tehsil Talagang such as Dhoke Pathen Muthrala, Datwal, Murkhal, Dhok abakki Surali, Kotehra, Jabbi Shah Dilawar, shah Muhammad Wali, Chaki shah Jee.

d) Area fallen under jurisdiction of Union Council, Choa Saiden Shah viz:-

i) Along the road on the either side starting from Choa Saiden Shah Town to Sarac Chowk along Choa Saiden Shah road up to five kilometers.

ii) Along the road on either side starting from Choa saiden shah town from (Choa Saiden Shah Chowk) to Katas up to five kilometres on Choa Saiden Shah Kallar Khahar road.

2. The area falling in the district within the radius of half kilometre on either side from the Motorway and 220 feet on either side on metalled roads.

The Area effecting on receipt of restrictions or embargo imposed by the Federal Government or Punjab Provincial Government issued from time to time.

5. The applications for the establishment of industries and trades detailed in the Punjab Local Government Ordinance 2001 shall be submitted to the Enterprise and Investment Promotion Department for scrutiny and onward submission to the competent authority.

**Declaration of specified Positive Areas**

Vide the Finance Act, 2008, the Government of Pakistan has enacted a new section “23A” in the Income Tax Ordinance 2001. The Section “23A” is reproduced below:-

“First year allowance.- (1) Plant, Machinery and equipment installed by any industrial undertaking setup in specified rural and under developed areas, and owned and managed by a company shall be allowed first year allowance in lieu of initial allowance under Section 23 at the rate specified in Part II of the third schedule against the cost of the “eligible depreciable assets” put to use after July 1st, 2008.

(2) The provision of Section 23 except sub-sections (1) and (2), thereof, shall mutatis mutandis apply.

The Federal Government may notify “Specified areas” for the purpose of sub-section(1)”

In pursuance of the above mentioned notification District Government Chakwal has identified and approved whole of area of the District as positive specified area except already notified area.

**EXISTING PATTERN OF INDUSTRIAL DEVELOPMENT**

**DESCRIPTION OF EXISTING INDUSTRIES**

There are about 29 large, medium and some small industrial units in the district. Industry-wise installed capacity of major industrial units is given in Table-5.8.
### INDUSTRY – WISE INSTALLED CAPACITY SR. NO.

<table>
<thead>
<tr>
<th>INDUSTRY</th>
<th>NO. OF UNITS</th>
<th>INSTALLED CAPACITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agricultural Implements</td>
<td>4</td>
<td>3400 Nos.</td>
</tr>
<tr>
<td>Cement</td>
<td>3</td>
<td>5700 Th. M.Tons</td>
</tr>
<tr>
<td>Ceramics Products</td>
<td>1</td>
<td>30000 Nos.</td>
</tr>
<tr>
<td>Cold Storage</td>
<td>2</td>
<td>115000 Bags</td>
</tr>
<tr>
<td>Flour Mills</td>
<td>5</td>
<td>720 M.Tons/ Day</td>
</tr>
<tr>
<td>Paper Cone</td>
<td>1</td>
<td>1400000 Nos.</td>
</tr>
<tr>
<td>Poultry Feed</td>
<td>1</td>
<td>97500 M.Tons</td>
</tr>
<tr>
<td>Textile Spinning</td>
<td>6</td>
<td>184136 Spindles</td>
</tr>
<tr>
<td>Textile Weaving (Mill Sector)</td>
<td>1</td>
<td>100 Looms</td>
</tr>
<tr>
<td>Tobacco</td>
<td>1</td>
<td>47250 Th. Nos.</td>
</tr>
</tbody>
</table>

Source: DO (E&IP), Chakwal, Punjab.

### FUTURE INDUSTRIAL POTENTIAL

Keeping in view the availability of raw material, skilled labour, linkage between the industrial units, local / national / international demand, future industrial potential of district Chakwal is discussed hereunder:

It would, however, be kept in mind that though the above mentioned factors facilitate the success of any industrial unit, yet the entire success depends upon the investors / entrepreneurs and the capabilities of the personnel having the managerial control because any of these factors, if lacking is manageable. Therefore, it is advisable that detailed feasibility of industrial projects must be carried out before making final decision for investment.
AGRICULTURE
Main crops of District Chakwal are wheat, groundnut and Jawar, the average annual production of which during the period 2005-08 was 163, 27 and 88 thousand M.Tons respectively (Chapter 3, Section 3.1).

There are five flour mills in the district having combined capacity of 720 M.Tons per day i.e. 216000 M.Tons per annum (720 M.Tons x 300 Days), which does not reflect scope of additional flour mills.

Groundnut also possesses industrial potential. Peanut oil / butter manufacturing and processing / roasting / packing units have very good prospects.

LIVESTOCK
As per Punjab Development Statistics 2008, the population of cattle, buffaloes, sheep and goats was 435, 145, 158 and 580 thousand heads respectively.

As regards poultry population there are 2100 broilers, 315 layers and 49 breeding poultry farms in the district having rearing capacity of 11991, 1580 and 340 thousand birds respectively.

The annual availability of hides and skins is estimated at 155 thousand pieces.

In view of proximity to Rawalpindi and Islamabad cities, there exist very good prospects for dairy farms, dairy products, cattle/goats/sheep fattening farms, hatchery / breeding poultry farms, tannery, poultry / cattle feed mills, leather footwear and leather products manufacturing units.

MINERALS
District Chakwal is quite rich in minerals. Argillaceous Clay, Coal, Dolomite, Gypsum, Limestone and Rock Salt are commercially excavated in the district, but no end-user industry exists in the district. However, in adjoining Jhelum district, there are three cement plants and a soda ash unit.

In district Chakwal there exists bright scope / prospects for a Gypsum processing, Dolomite processing, Cooling / Iodinised / Pharmaceutical Grade / Table Salt units.

After a detailed study, a Coal based power-generating unit soda ash and ceramic tableware units can also be established in the district.
INDUSTRY
Though Cotton is not grown in the district Chakwal but there are six textile-spinning units out of which three units also manufacture Polyester/Viscose Yarn. This reflects very good prospects for textile weaving and processing, hosiery, terry towels, bed sheets and sizing units.

MAN POWER

TOTAL POPULATION OF THE DISTRICT
According to Punjab Development Statistics 2008 total population of Chakwal district is 1,267 thousand persons out of which 618 thousand are males and 649 thousand are females. Density of population in the district is 194 persons per square kilometres.

BASE LINE STUDY AND ENVIRONMENTAL DESCRIPTION OF THE PROPOSED STUDY AREA AT BUCHAL KALAN

Physical Environment/ Resources

Physical resources
Physical resources of the proposed study area include geology, topography, soil, climate, meteorology, ambient air quality, surface water, ground water and other existing pollutants prior to the operation of the project.

Geology and Topography:
Proposed study site is located at Buchal kalan tehsil Kallar kahar, District Chakwal. Area under study is about 2.5km distant from the main Khushab road. Sir Kalan Local road linked the proposed site to the khushab road. The study area is hilly and sub mountainous. The topography is rugged and elevation ranges from the 450 m to 500 m above the sea level. Hill torrents are present in the area which mostly run from the north to south and drain the rain and strom water of the hilly area into deeper valleys and places. Population of the study area is about 25,000 including temporary settlements in that area. There is no such historical place is present in the study area. Mostly people of that area are in army and other part of the country for their income. Agriculture is rare due to the calcareous and mountainous region. Custom of the under study area are same and no religious groups are present in the proposed area.
Meteorology of the District Chakwal

Chakwal is located in the Dhanni region of the Potohar in northern Punjab, which is a semi-arid area with a shortage of irrigation systems and water sources for agriculture. Over 70% of the population engages in agriculture, mostly subsistence agriculture dependent on rainfall. Monthly average rainfall of base line period (1981-2010) is displayed in Figure below.

Fig: Monthly Rain Fall data of the district Chakwal
The computed rainfall scenarios using the base line data of 1981-2010, for each season with departures from base line period and the preceding decades are given below graph.

**Fig:** Decades Rain Fall data of the district Chakwal

**Temperature of District Chakwal**

The mean monthly maximum and minimum temperatures, according to the base line data (1981-2010) are displayed in the Figure below. The annual average temperature of Chakwal District is 29.6°C.
Fig: Monthly temperature of the Chakwal

Fig: Annual temperature of the chakwal
Wind direction
Wind direction of the proposed area is mostly North-West (Data from The Meteorological Department for the wind direction of one year is annexed in Annexure-R)

Ambient air quality:
Ambient air quality of the proposed study is monitored by the Pak Green Laboratory for the assessment of the pollutants in the existing environment. This study is carried out according to the Pak-NEQS. Some data is collected from the concern authority such as Pakistan Environmental Protection Department. Punjab environmental protection department has imitated the limited air quality monitoring program.

To determine the possible effect of the project on the air quality it is necessary to monitor pollutants levels at some sites in the study area. The sampling of the ambient air for the measurement of parameters of interest should, ideally, be conducted over at least one year. A period of one year is considered minimum, to take account of seasonal variations, which may be quite pronounced. In view of the limited scope, it was not possible to embark upon such an extended monitoring program during this study. So, baseline study for M/S lucky cement limited for proposed mining site for 24 hour is carried out to assess the already exist pollutants in ambient air.

Pak Green Laboratory conduct the ambient air gases (SOx, NOx, CO, CO2, O2, O3) Particulate matter and noise level monitoring at the proposed site Buchal Kalan on the 06-06-2015 for the primary data source of the ambient air before the commencement of the project and also at alternative sites, Lab Results for Environmental parameters are annexed as ANNEX-Q.

Following is the brief description of methodology adopted to carry out the monitoring at the site.

Methodology:
Following is the brief description of methodology adopted to carry out the base line monitoring at the proposed mining site.

Survey Planning
A survey was planned according to requirement of EIA Report preparation for the M/S Lucky Cement for the proposed mining site at Buchal Kaaln Tehsil Kallaar Kahar District Chakwal
Identification of Monitoring Locations
Locations for the base line study of required environmental parameters were identified and finalized by Pak Green Laboratory according to the SOPs for the base line for EIA Report.

Monitoring Plan
On the basis of identified monitoring locations a monitoring plan was developed in order to achieve precision and accuracy in the monitoring and sampling of the required environmental parameters.

Basic Environmental conditions
During the measurement following conditions were prevailed at site

1. Metrological Conditions:
   - During ambient air gases, particulate matter analysis and noise level monitoring weather was dry and sky was clear. Air was blowing at normal speed.

Status of operation:
Project is proposed so there is no operational or machinery emissions at the site during monitoring hours. A link road named Sir Kalan road is only source of vehicular emission and noise source at the proposed mining site during the monitoring.

Ambient air Gases:

Sulphur Dioxide
Sulfur dioxide is a gas. It is invisible and has a nasty, sharp smell. It reacts easily with other substances to form harmful compounds, such as sulfuric acid, sulfurous acid and sulfate particles.

About 99% of the sulfur dioxide in air comes from human sources. The main source of sulfur dioxide in the air is industrial activity that processes materials that contain sulfur, eg the generation of electricity from coal, oil or gas that contains sulfur. Some mineral ores also contain sulfur, and sulfur dioxide is released when they are processed. In addition, industrial activities that burn fossil fuels containing sulfur can be important sources of sulfur dioxide.

Sulfur dioxide is also present in motor vehicle emissions, as the result of fuel combustion. In the past, motor vehicle exhaust was an important, but not the main, source of sulfur dioxide in air. However, this is no longer the case.
So$_2$ measured at three identified point by using the battery operate SO$_2$ gas analyzer of LaMotte USA. The sampling time was 30 mint per site.

The results are shown in table given below, with the standards comparison. The results indicated that the SO$_2$ values at the entire monitoring site are in compliance with Pak-NEQs limits. According to the international standards for the SO$_2$ for 24 hour of USA are 365 $\mu$g/m$^3$ while World Bank have 500 $\mu$g/m$^3$

**Nitrogen Dioxide**

Nitrogen dioxide is a nasty-smelling gas. Some nitrogen dioxide is formed naturally in the atmosphere by lightning and some is produced by plants, soil and water. However, only about 1% of the total amount of nitrogen dioxide found in our cities' air is formed this way.

Nitrogen dioxide is an important air pollutant because it contributes to the formation of photochemical smog, which can have significant impacts on human health.

The major source of nitrogen dioxide in Pakistan is the burning of fossil fuels: coal, oil and gas. Most of the nitrogen dioxide in cities comes from motor vehicle exhaust (about 80%). Other sources of nitrogen dioxide are petrol and metal refining, electricity generation from coal-fired power stations, other manufacturing industries and food processing.

NO$_2$ is also measured at the selected point at the proposed site for 30 mint each site. Results are present in below given table:

The comparison of results with the Pak NEQS limits and international standards provide the information that the NO$_2$ level is well below and air quality is healthy and good.
Carbon Monoxide (CO)
Carbon monoxide is a gas and is found in air. High levels of carbon monoxide are poisonous to humans and, unfortunately, it cannot be detected by humans as it has no taste or smell and cannot be seen.

The natural concentration of carbon monoxide in air is around 0.045 parts per million (ppm), and that amount is not harmful to humans. Natural sources of carbon monoxide include volcanoes and bushfires.

![Image: Gases analysis at the mining site for the proposed mining project and proposed cement plant]

Fig: Gases analysis at the mining site for the proposed mining project and proposed cement plant

The main sources of additional carbon monoxide are motor vehicle exhaust and some industrial activities, such as making steel.

Results of the carbon monoxide are in table: Pak NEQS limits for the CO are 10 mg/m³ (one hour exposure) our results are less than the prescribed limits.
Particulate matter (PM10)
Thick, black smoke belching out of the exhaust pipes of vehicles. Swirls of dust picked up by the wind. Ash and soot coming from your campfire. These are all examples of particulate matter (PM). PM is the term used for solid or liquid particles emitted to the air. Some particles are large enough to be seen, and others are so small they can only be detected with an electron microscope.

Particulate matter can come from many sources. Generally, any activity which involves burning of materials or any dust generating activities are sources of PM. Some sources are natural, such as volcanoes and water mist. Humans create huge quantities of particulate and many of these sources are regulated, such as smoke stacks at factories, power plants, and auto paint shops. However, there are many sources that are not regulated and your home is one of them. We often burn wood or coal for heat in the winter, we can release dust into the air in our yards, and during renovation, and large amounts of dust may be released if they are not kept in check. Vehicles, like our cars and SUVs, produce particulates, as do gas powered lawn mowers, leaf blowers, and weed whackers.

FIG: PM monitoring at the proposed mining site for M/S Lucky cement Limited at Buchal Kalan
The Environmental Protection Agency (EPA), many health professionals, and, of course, the Hamilton County Department of Environmental Services are all very concerned about particulate pollution. In fact, the concern about particulates is related to their very small size. Since the late 1970's, we only monitored particulate matter pollution that was 10 microns in diameter or less, called PM$_{10}$. A micron (or micrometer) is a millionth of a meter.

We monitor PM at selected sites at the proposed mining area for the assessment of existing PM in the environment. The results are given in the table:

Standards for the PM$_{10}$ in ambient air are 150 μg/m$^3$ (24 hour exposure) our results are in compliance with the PAK NEQS limits and international Slandered for PM$_{10}$.

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Time</th>
<th>CO mg/m$^3$</th>
<th>NO μg/m$^3$</th>
<th>NO$_2$ μg/m$^3$</th>
<th>NO$_x$ μg/m$^3$</th>
<th>SO$_x$ μg/m$^3$</th>
<th>H$_2$S μg/m$^3$</th>
<th>PM μg/m$^3$</th>
</tr>
</thead>
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<td>7:00 PM</td>
<td>0.012</td>
<td>2.945</td>
<td>14.78</td>
<td>17.72</td>
<td>12.85</td>
<td>2.88</td>
<td></td>
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<tr>
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<td>8.165</td>
<td>19.70</td>
<td>27.87</td>
<td>13.71</td>
<td>2.28</td>
<td></td>
</tr>
<tr>
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<td>9:00 PM</td>
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<td>6.425</td>
<td>15.80</td>
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<td>12.85</td>
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<tr>
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<td>12.046</td>
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<tr>
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<td>11:00 PM</td>
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<td>18.872</td>
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<td></td>
</tr>
<tr>
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<td>0.062</td>
<td>8.566</td>
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<tr>
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<td>10.841</td>
<td>15.39</td>
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<td>0.075</td>
<td>6.023</td>
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<td>6.98</td>
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<td>11.99</td>
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<td>11.71</td>
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<td>6.98</td>
<td></td>
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<td>33.327</td>
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<td>40.51</td>
<td>11.99</td>
<td>7.13</td>
<td></td>
</tr>
</tbody>
</table>
Water Quality
Pak Green Laboratory collected the underground water sample on the 06-06-2015 from the different villages for the water quality analysis of the study area. Water table of the study area is about 400 ft to 550 ft (Source local people during survey of villages).

Water typically is not considered desirable for drinking if the quantity of dissolved minerals exceeds 1,000 mg/L (milligrams per liter). Water with a few thousand mg/L of dissolved minerals is classed as slightly saline, but it is sometimes used in areas where less-mineralized water is not available. Water from some wells and springs contains very large concentrations of dissolved minerals and cannot be tolerated by humans and other animals or plants. Many parts of the Nation are underlain at depth by highly saline ground water that has only very limited uses.

Dissolved mineral constituents can be hazardous to animals or plants in large concentrations; for example, too much sodium in the water may be harmful to people who have heart trouble. Boron is a mineral that is good for plants in small amounts, but is toxic to some plants in only slightly larger concentrations

Springs water
Study area contains two main water bodies which are natural springs named Neelwan and Abbe-shafa at the distance of 4 km (Approximately). Local people use the drinking water from those sources. Currently there is no pipeline system or water supply is present in the proposed study. Water is good quality of both the springs. Results are present in table:

### Table: Spring Water Quality

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Parameters</th>
<th>Unit</th>
<th>WHO</th>
<th>Pak-NEQS</th>
<th>Results</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>PH</td>
<td>-</td>
<td>-</td>
<td>6.5-8.5</td>
<td>8.1</td>
</tr>
<tr>
<td>2</td>
<td>Electrical Conductivity</td>
<td>uS/m</td>
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<td>-</td>
<td>821.5</td>
</tr>
<tr>
<td>3</td>
<td>TDS</td>
<td>mg/L</td>
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<td>&lt;1000</td>
<td>410.75</td>
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<tr>
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<td>Turbidity</td>
<td>NTU</td>
<td>5</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>Taste</td>
<td>-</td>
<td>-</td>
<td>Non-Objectionable</td>
<td>Non-Objectionable</td>
</tr>
<tr>
<td>6</td>
<td>Odor</td>
<td>-</td>
<td>-</td>
<td>Non-Objectionable</td>
<td>Non-Objectionable</td>
</tr>
<tr>
<td>7</td>
<td>Total Hardness</td>
<td>mg/L</td>
<td>-</td>
<td>&lt;500</td>
<td>230.8</td>
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<tr>
<td>8</td>
<td>Arsenic</td>
<td>mg/L</td>
<td>0.010</td>
<td>≤0.05</td>
<td>Nil</td>
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<tr>
<td>9</td>
<td>Cadmium</td>
<td>Mg/L</td>
<td>.003</td>
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<td>10</td>
<td>Chloride (Cl⁻)</td>
<td>mg/L</td>
<td>250</td>
<td>&lt;250</td>
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<td>11</td>
<td>Copper (Cu)</td>
<td>mg/L</td>
<td>2</td>
<td>2</td>
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<tr>
<td>12</td>
<td>Sulphate (SO₄²⁻)</td>
<td>mg/L</td>
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<td>13</td>
<td>Nickle</td>
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<td>0.02</td>
<td>≤0.02</td>
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<td>14</td>
<td>Sodium (Na)</td>
<td>mg/L</td>
<td>200</td>
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<td></td>
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<td></td>
<td></td>
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<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Lead (pb)</td>
<td>Mg/L</td>
<td>0.01</td>
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<tr>
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<td>Calcium (Ca)</td>
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<td>Magnesium</td>
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<td>19</td>
<td>Selenium</td>
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<td>0.01</td>
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<tr>
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<td>21</td>
<td>Bicarbonate</td>
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<tr>
<td>22</td>
<td>Zinc (Zn+2)</td>
<td>mg/L</td>
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<td>5.0</td>
<td>2.46</td>
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<td>23</td>
<td>Total Coli-form</td>
<td>-</td>
<td>Must not be detected in 100 ml sample</td>
<td>Must not be detected in 100 ml sample</td>
<td>Nil</td>
</tr>
<tr>
<td>24</td>
<td>E Coli</td>
<td>-</td>
<td>Must not be detected in 100 ml sample</td>
<td>Must not be detected in 100 ml sample</td>
<td>Nil</td>
</tr>
</tbody>
</table>
Dharabi Lake is situated between Kalar Kahar & Chakwal far away from our site somewhat at the distance of 23 km (between Buchal Kalan & Dharabi Lake), so there is no impact likely to be on the catchment area of Dharabi lake by the subject project of mining. **Google Map illustration is given below:**
Underground water:
Pak Green Laboratory collected the underground water from different villages including Laafi, Buchal Kalan, Sir Kalan and Makhial from different sources for the assessment of drinking water quality. These sources include the motor pumps, well and hand pumps. Physical parameters are measured at the site such as pH, Color, EC, TDS, Temperature and turbidity by using the meters. Results of underground water are in table: Ground Water have
TDS more but less than the standards due to which cause smell after a few day of the extraction. If water regularly extracted from the sources then no smell is appeared. (Source local people interview)

Table: Drinking water quality

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<tr>
<th>Sr. No.</th>
<th>Parameters</th>
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<th>WHO</th>
<th>Pak-NEQS</th>
<th>Results Sample.1 *MP</th>
<th>Results Sample.2 *MP</th>
<th>Results Sample.3 *W</th>
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<td>-</td>
<td>-</td>
<td>6.5-8.5</td>
<td>8.12</td>
<td>8.23</td>
<td>8.05</td>
</tr>
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<td>2</td>
<td>Electrical Conductivity</td>
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<td>-</td>
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<td>1820</td>
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<tr>
<td>3</td>
<td>TDS</td>
<td>mg/L</td>
<td>1000</td>
<td>&lt;1000</td>
<td>874.2</td>
<td>910</td>
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<td>NTU</td>
<td>5</td>
<td>5</td>
<td>3</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>Taste</td>
<td>-</td>
<td>-</td>
<td>Non-Objectionable</td>
<td>Non-Objectionable</td>
<td>Non-Objectionable</td>
<td>Non-Objectionable</td>
</tr>
<tr>
<td>6</td>
<td>Odor</td>
<td>-</td>
<td>-</td>
<td>Non-Objectionable</td>
<td>Non-Objectionable</td>
<td>Non-Objectionable</td>
<td>Non-Objectionable</td>
</tr>
<tr>
<td>7</td>
<td>Total Hardness</td>
<td>mg/L</td>
<td>-</td>
<td>&lt;500</td>
<td>285.2</td>
<td>281.7</td>
<td>295.4</td>
</tr>
<tr>
<td>8</td>
<td>Arsenic</td>
<td>mg/L</td>
<td>0.010</td>
<td>≤0.05</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
</tr>
<tr>
<td>9</td>
<td>Cadmium</td>
<td>Mg/L</td>
<td>.003</td>
<td>0.01</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
</tr>
<tr>
<td>10</td>
<td>Chloride (Cl(^1))</td>
<td>mg/L</td>
<td>250</td>
<td>&lt;250</td>
<td>67.5</td>
<td>69.4</td>
<td>71.5</td>
</tr>
<tr>
<td>11</td>
<td>Copper (Cu)</td>
<td>mg/L</td>
<td>2</td>
<td>2</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
</tr>
<tr>
<td>12</td>
<td>Sulphate (SO(_4)^2-)</td>
<td>mg/L</td>
<td>250</td>
<td>-</td>
<td>18.7</td>
<td>24.6</td>
<td>23.4</td>
</tr>
<tr>
<td>13</td>
<td>Nickle</td>
<td>mg/L</td>
<td>0.02</td>
<td>≤0.02</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
</tr>
<tr>
<td>14</td>
<td>Sodium (Na)</td>
<td>mg/L</td>
<td>200</td>
<td>-</td>
<td>14.5</td>
<td>13.5</td>
<td>17.5</td>
</tr>
<tr>
<td>15</td>
<td>Lead (pb)</td>
<td>Mg/L</td>
<td>0.01</td>
<td>≤0.005</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
</tr>
<tr>
<td>16</td>
<td>Calcium (Ca)</td>
<td>Mg/L</td>
<td>-</td>
<td>-</td>
<td>64.8</td>
<td>67.5</td>
<td>68.4</td>
</tr>
<tr>
<td>17</td>
<td>Magnesium</td>
<td>Mg/L</td>
<td>-</td>
<td>-</td>
<td>28.9</td>
<td>27.3</td>
<td>30.2</td>
</tr>
<tr>
<td>18</td>
<td>Potassium</td>
<td>Mg/L</td>
<td>-</td>
<td>-</td>
<td>4.2</td>
<td>4.16</td>
<td>4.7</td>
</tr>
<tr>
<td>19</td>
<td>Selenium</td>
<td>mg/L</td>
<td>0.01</td>
<td>0.01</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
</tr>
<tr>
<td>20</td>
<td>Carbonate</td>
<td>Mg/L</td>
<td>-</td>
<td>-</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
</tr>
<tr>
<td>21</td>
<td>Bicarbonate</td>
<td>mg/L</td>
<td>500</td>
<td>-</td>
<td>294.5</td>
<td>312.5</td>
<td>305.6</td>
</tr>
</tbody>
</table>
### Surface water quality:

There is no canal and lake is present in the study area. Surface water body in the study area is a rain and matan Village drainage water storage pond that is present about 3 Km from the proposed site. Pak Green Laboratory Collected the surface water sample from that pond according the sampling rule. Physical parameters are performed at the site while the chemical analysis of the water are performed in the laboratory.

The results are given in the table.

### Table: Drinking water quality physical parameters measured at the site

<table>
<thead>
<tr>
<th>No.</th>
<th>Parameter</th>
<th>Unit</th>
<th>Value 1</th>
<th>Value 2</th>
<th>Value 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>22</td>
<td>Zinc (Zn+2)</td>
<td>mg/L</td>
<td>3.0</td>
<td>5.0</td>
<td>2.65</td>
</tr>
<tr>
<td>23</td>
<td>Total Coliform</td>
<td>-</td>
<td>Must not be detected in 100 ml sample</td>
<td>Must not be detected in 100 ml sample</td>
<td>Nil</td>
</tr>
<tr>
<td>24</td>
<td>E Coli</td>
<td>-</td>
<td>Must not be detected in 100 ml sample</td>
<td>Must not be detected in 100 ml sample</td>
<td>Nil</td>
</tr>
</tbody>
</table>

Table: Surface water quality

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Parameters</th>
<th>Unit</th>
<th>NEQS</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Color</td>
<td>-</td>
<td>Objectionable/Unobjectionable</td>
<td>objectionable</td>
</tr>
<tr>
<td>2</td>
<td>Odor</td>
<td>-</td>
<td>Objectionable/Unobjectionable</td>
<td>objectionable</td>
</tr>
<tr>
<td>3</td>
<td>PH</td>
<td>-</td>
<td>6-9</td>
<td>8.9</td>
</tr>
<tr>
<td>4</td>
<td>Temperature</td>
<td>°C</td>
<td>40</td>
<td>28.4</td>
</tr>
<tr>
<td>5</td>
<td>TDS</td>
<td>mg/L</td>
<td>3500</td>
<td>3179.56</td>
</tr>
<tr>
<td>6</td>
<td>TSS</td>
<td>mg/L</td>
<td>200</td>
<td>7.5</td>
</tr>
<tr>
<td>7</td>
<td>T. Hardness</td>
<td>mg/L</td>
<td>---</td>
<td>711.4</td>
</tr>
<tr>
<td>8</td>
<td>BOD</td>
<td>mg/L</td>
<td>80</td>
<td>1180</td>
</tr>
<tr>
<td>9</td>
<td>COD</td>
<td>mg/L</td>
<td>150</td>
<td>2560</td>
</tr>
<tr>
<td>10</td>
<td>Chlorides</td>
<td>mg/L</td>
<td>1000</td>
<td>254.1</td>
</tr>
<tr>
<td>11</td>
<td>Carbonate</td>
<td>mg/L</td>
<td>---</td>
<td>28.2</td>
</tr>
<tr>
<td>12</td>
<td>Bicarbonate</td>
<td>mg/L</td>
<td>---</td>
<td>156.5</td>
</tr>
<tr>
<td>13</td>
<td>Sulfate</td>
<td>mg/L</td>
<td>600</td>
<td>1488.4</td>
</tr>
<tr>
<td>14</td>
<td>Calcium</td>
<td>mg/L</td>
<td>---</td>
<td>9</td>
</tr>
<tr>
<td>15</td>
<td>Magnesium</td>
<td>mg/L</td>
<td>---</td>
<td>168.3</td>
</tr>
<tr>
<td>16</td>
<td>Potassium</td>
<td>mg/L</td>
<td>--</td>
<td>42.5</td>
</tr>
<tr>
<td>17</td>
<td>Cadmium</td>
<td>Ppb</td>
<td>0.1</td>
<td>0.0019</td>
</tr>
<tr>
<td>18</td>
<td>Chromium</td>
<td>mg/L</td>
<td>1.0</td>
<td>Nil</td>
</tr>
<tr>
<td>19</td>
<td>Copper</td>
<td>mg/L</td>
<td>1.0</td>
<td>1.1</td>
</tr>
<tr>
<td>20</td>
<td>Lead</td>
<td>mg/L</td>
<td>0.5</td>
<td>0.007</td>
</tr>
<tr>
<td>21</td>
<td>Arsenic</td>
<td>mg/L</td>
<td>1.0</td>
<td>Nil</td>
</tr>
<tr>
<td>22</td>
<td>Zinc</td>
<td>mg/L</td>
<td>5.0</td>
<td>1</td>
</tr>
<tr>
<td>23</td>
<td>Iron</td>
<td>mg/L</td>
<td>8.0</td>
<td>0.7</td>
</tr>
</tbody>
</table>

Soil

Proposed study area is present in the salt range of tehsil kallar kahar. Mostly area is covered by the mountains. Fertile land is rare in the study area. Small patches of the soil are present that are used by the house hold for the vegetable harvesting. Hard rocks are present all over the upper layer. Clay is also present at about 1-3 km distance from the proposed mining site. The soils are medium textured with considerable amount of clay materials. Soil formation of
that area is occurred through the mechanical weather of the old alluvial deposit and loess due to the wind and water of the rains.

Climate:
The meteorological data of the proposed study area was collected from the Pakistan Department of Meteorology (PMD) for the last 15 years. The climate of the area can be classified as true semi-arid, sub-tropical with long winter and sub-humid. The general feature are high June- July temperature with occasional hot, dry wind and dust storms, cold nights in winter and two rainy seasons. Unseasonal rain fall is also occur in the start of the winter

Rain fall pattern of the study area are as;

3. Mid Jun to mid September
4. December to March

The wind mostly flow from the north to the south in the study are region. Mean annual maximum temperature of the study area reach 29°C and minimum is about 14°C.

Humidity of the area is high at night except of the month of the May and Jun when it is about 58% at midnight and 46% at 0300 hrs. During the other month the humidity rage is about 70% to 80% while the midday humidity is low and range is 23%-26%.

Noise
To monitor the current level of noise Pak Green Laboratory analyze the noise level at different selected point at the proposed site. The results of noise are given in the noise table. Current noise level is within NEQS limits and international standards which are 65 dB (A) (Day time Commercial). Current noise source is only vehicles at the proposed site.

Table: noise level

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Locations</th>
<th>Minimum Level dB (A)</th>
<th>Maximum Noise dB (A)</th>
<th>Average Noise dB (A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Point-01</td>
<td>44.5</td>
<td>46.8</td>
<td>45.65</td>
</tr>
<tr>
<td>2</td>
<td>Point-02</td>
<td>50.2</td>
<td>56.9</td>
<td>53.55</td>
</tr>
<tr>
<td>3</td>
<td>Point-03</td>
<td>45.6</td>
<td>51.2</td>
<td>48.4</td>
</tr>
<tr>
<td>4</td>
<td>Point-04</td>
<td>41.3</td>
<td>44.8</td>
<td>43.05</td>
</tr>
<tr>
<td>5</td>
<td>Point-05</td>
<td>40.1</td>
<td>43.7</td>
<td>41.9</td>
</tr>
<tr>
<td>6</td>
<td>Point-06</td>
<td>43.7</td>
<td>49.8</td>
<td>46.75</td>
</tr>
</tbody>
</table>
Ecological Resources

Fisheries:
The project area is almost free from any commercial fishing activity. There are no lakes, natural water springs are present at 4 km distant from the proposed project site. These springs have no fish. Therefore, Fishery or any worth mentioning aquatic biology in this area is out of question.

Biodiversity:
Natural capital of a country mainly includes all of the country’s wilderness areas and scenic landscapes, including also with their associated flora and fauna. Pakistan has a total of nine major ecological zones. The contribution of the “Natural Capital” is recognized at three distinct levels: species, genera, and communities (habitat and ecosystem) both collectively and within each level, the range or variety of the resources are referred to as the “Biological Diversity”. The term has relevance for each of Pakistan’s administrative units district, province, and particularly country. The more the number of species, genera, and habitats and ecosystems present within these units, the greater is said to be the Biodiversity. The biodiversity of the area, with this background, is discussed as under.

Flora:
There is a very wide range of plant species in the study area. But proposed project site have very low vegetation and plants species. Following species are most commonly found in the study are of four villages.

Amongst plants, the species which are most abundant in the Study area are Kau (Olea cuspidata), Phulai (Acacia modesta), Sanatha (Dodones viscosa), Gurgura (Monotheca buxifolia), and Pataki (Gymnospo Riaroyleana).
Native species of shrubs and trees at the proposed site

The general vegetation consists of dry deciduous scrub. The grass species which are dominant in the area are Sariala (Heteropogan contortus), Khawi (Cymbopogan jwarancusa), Mesquite (Prosopis juliflora), and Karir (Capparis sphylla).

Fig: Vegetation view of the proposed mining site for M/S Lucky Cement at Buchal Kalan
Fauna:
Fauna is very less in the proposed project site due to the less vegetation and tree canopy. Other reason of the less fauna in the proposed site is absence of water body nearby the project site.
The species which exist in various areas of Chakwal district are:

Grey partridge– found all over the district, especially in areas, which are sparsely populated.

Black partridge– found along the seasonal channels and water holes in the bell as throughout the district.

Chakore– found in dry rocky areas in the district especially in the Choa Saidan Shah area.

See See partridge– found at a number places in the district in the dry rocky area especially in the Kallar Kahar mountain belt leading into subdivision Talaga.

Rare or endangered species:
There are no game reserves or protected lands/areas or endangered or rare species either in the area in the range of 15km from the project site. Kallar Kahar Lake (wetland protective area) is present a bout 20 km from the site

PROPOSED STUDY SITE SOCIO-ECONOMIC STATUS:
For socio-economic study of the proposed mining site for the M/S Lucky Cement Limited conducted by Pak Green Enviro-Engineering Pvt. Ltd. on the 06-06-2015. Pak Green Team conduct the survey of the proposed area for the primary data collection. Secondary data collected by the various governmental institutions of tehsil Kaller kahar, arranged the interviews of the various experts including the doctor, teachers and local people of the buchal kalan, Makhial Village, laapi and the sir Kalan village.

Nearby Villages of our proposed are four villages at different distance named:

1. Makhial Village
Makhial Village is present in east at the distance 2-3 km (Approx.) from the proposed mining site having population about 600-800 people. There is no significant Government institutions in village. A private clinic is present. A local road name Sir Kalan Road link the village with the Khushab Road.

2. Buchal Village:
Buchal Village is present in North at 4 km distance from the proposed site having about 1100 to 1200 houses. In buchal kalan four public sector colleges are present including a women college. Government middle and high school are also present. A government dispensary is also present for 24 hour emergency. The overall economic status of the area is good.

3. Laafi Village
Laafi village is also present in the north about 7-8 km from the proposed mining site. Laafi village consist about 50 houses. Mostly people came into the buchal for the daily wages while there is no government school and hospital is present in the village.

4. Sar Kalan Village
Sir kalan Village is present in the South at about 7-8 km from the proposed study site. Village linked by the sir kalan road to the main khushab road. Economically sir kalan village is not good. Government basic facilities are not good. Electricity is also present in the village.

Language
Inhabitants of Chakwal District speak Dhani, Majhi, and Potohari dialects of Punjabi Language.

Education
In the proposed study area four villages are include that have good educational institute four degree colleges are present while the primary and high school educational public sector institute are present. Private sector colleges and schools are also present in the Bushal Kalan. Mostly people of the villages now have trend to educate their child instead of other childhood labor and working for the earning.

Fig: During Socio Economic survey for M/S Lucky Cement Limited at Buchal Kalan
Health
A government dispensary is present at the bushal kalan that provide the 24 hour emergency services to the community. A private eye hospital is also present at the Buchal Kalan Adda. Medical store and many small clinics are also present in the study area.

Pak Green Team visit the rural dispensary at buchal kala along with the Lucky cement team for the detail discussion and interview of senior doctor. Doctor provide the information about the health status of the study area that was satisfactory, but in serious emergency situation does not treat the patient and patient transfer to the district headquarter Chikwal or Rawalpindi for the treatment.

Common diseases in the study area:

1. Asthma
2. TB
3. Blood Pressure
4. Anemia
5. Joints
6. Leishmaniasis by biting fly
7. Gastro (Seasonal)
8. Rabies (Dogs, domesticated and feral)
9. Malaria

Fig: Pictorial view during the visit of rural dispensary at Buchal Kalan for the health status information of the area
Culture
The people of Chakwal carry very plaidresses. Men usually wear shalwar kameez or Dhoti Kurta, a turban on special events with Chappals, Khusas or Sandles. In winter season they add a Sweater, Coat or a Dhuessa with it. The extra educated class also wears shirts with trousers. Women almost always wear shalwar kameez with dupatta with a sweater or woolen shawl in winter. The culture of Chakwal is mainly based on the mode of living as taught in Islam, but Chakwal is the place where a large number of Hindus lived before independence of Pakistan. The people of Chakwal live a straight and simple life as emphasized by their religion.

Recreational Resources and Development:
The project area has not any private recreational facilities.

Aesthetic Values:
Like the general trend among the citizens of area, most of the people have low awareness about environment. Even then, some people take cleanliness and neatness of the environment
lightly. Some people throw municipal solid wastes (MSWs) on the streets. Sense of personal responsibility to keep the environment clean as good citizens is even now lacking among a few people.

**Archaeological and Historical Treasures:**
Archaeological or historical treasures within the project area are not available.
CHAPTER 7

SCREENING OF ENVIRONMENTAL IMPACTS & MITIGATION MEASURES

The primary function of an environmental impact assessment study is to predict and quantify the magnitude of potential impacts, assess and evaluate the magnitude. The impact assessment forms the basis for development of Environmental Management Plan. Environmental impacts could be positive or negative, direct or indirect, local or regional and also reversible or irreversible.

This chapter identifies and defines the potential significant beneficial as well as adverse environmental and social impacts of the proposed mining project on the environment.

In general mining activity and cement plants are considered notorious for damaging agricultural productivity and adversely affect the human health in wide areas around the plants. These effects are mainly attributed to the release of dust and harmful gases to the atmosphere during the mining activity and manufacturing process of cement.

Methodology for impact evaluation:

The methodology adopted for impact evaluation includes the Project Impact Evaluation Matrix and checklist. Impact evaluated through Matrix are discussed below while checklist was used to identify the impacts and attached in annexure.

Project Impact Evaluation Matrix

The impact Evaluation matrix was developed by placing project activities on x-axis and different environmental parameters likely to be affected by the proposed project actions grouped into categories i.e. Physical, Biological and Socio Economic Environment. For the impact assessment, project impact assessment matrix is used by dividing the project action into different phases (Construction phase and operation phase). But impacts due to our subject project can only be quantified during mining activity i.e. only in operation phase. A project impact evaluation matrix is attached in next section of this chapter.

The evaluation of impacts has been carried out on the basis of developing matrix, in which impacts have been rated on the basis of their significance. For rating impacts significance following criterion has been developed;

NA – Not Available
O – Insignificant (No or minimal impact)
LA – Low Adverse (Short term, reversible or less damage to environment)

MA - Medium Adverse (Long term reversible damage to environment)

HA – High Adverse (severe irreversible adverse damage to the environment)

LB – Low Beneficial (Short term benefits or less beneficial to the environment)

MB – Medium Beneficial (Long term benefits to environment)

HB – High Beneficial (Continuous benefits to environment)
Legend:

- **O** = Negligible/No impacts
- **B** = Beneficial
- **LA** = Low Adverse
- **MA** = Medium Adverse
- **HA** = High Adverse

**IMPACT ANALYSIS AND PREDICTION**

In order to give correct categorization to the present project Rapid Environmental Assessment Procedure was followed. It revealed that there some major impacts of the project have identified which will be controlled by adopting proper mitigation measures. These impacts are mainly attributed to the release of dust and harmful gases to the atmosphere during the mining activity but most of the impacts are projected as moderate/minor impacts although project has many positive impacts on local public and economy. M/s Lucky Cement will adopt proper procedures to carry out the operation or mining activity in environmental friendly way.

**Meetings:**

For the impact analysis and predictions detailed meetings were held with the proponent, management of M/s Lucky Cement and with other stakeholders. Issues were discussed that may affect the environment and also the implementation of proposed project. All possible mitigation measures were considered and incorporated in the Environmental Management Plan.

**Consultations**

Scoping sessions, focused group discussion and way side consultations were held with the relevant stakeholders, inhabitants of the villages, shopkeepers and workers in the area. These included local government departments, educational institutes, NGOs, health departments, public representatives and local residents. The purpose of such consultations is to obtain the feedback from the relevant persons.

The environmental issues have been identified during literature review, consultation with stakeholders, relevant reports and visits to project site. Various types of environmental issues likely to crop up during the life cycle of project are grouped in the following stages:

- **Project location**
- **Project design**
Environmental Parameters:

Environmental impacts due to Project Location
The subject project is located at Buchal Kalan Tehsil Kalar Kahar District Chakwal. The surrounding area is hilly and mostly barren land. The selected site is present on the belt which has abundant reserves of deposits of our concerned raw material. Moreover, there is no human settlement within the radius of the selected site and has good road infrastructure. Man power is available in the area. After environmental assessment of the study area the subject project site is most suitable to execute the project regarding the location environmental impacts.

Impacts
Project is present in the hilly and barren area of Salt Range. There is no nearby human settlement within the radius of the selected site. The selected site does not fall in the category of sensitive area and no environmentally sensitive localities exist within radius of study area. Also, there could be the issue of traffic congestion due to transportation of the raw material to the plant. If the project proponent maintain HSE conditions and comply with the NEQS limits than, there is no significant impacts on the nearby community.

If the mitigation measures are effectively implemented, the residual impact of the Subject activities on the area’s geophysical environment is expected to be insignificant.

Impact significance: Low or may be positive

Nature of impact: Direct

Duration: Long-term

Timing: Operation phase

Reversibility: NA

Likelihood: Low (unlikely),

Consequences: Mild or may be positive

Mitigation measures
- No human settlement within the radius of the study area
- The district Chakwal has already good road infrastructure that is used currently to access the site but Lucky Cement will build its own road to access the mining site to the proposed cement plant that will better the road infrastructure of the area.
- There would be no issue of congestion of traffic after constructing the road
- Location can be considered as the positive impacts due to abundance of raw material.
- The project provides the jobs to the local residents as well as to those from the suburban areas

Environmental impacts due to the project design
Subject project is a proposed mining project over a total area of 6331.43 Acres. Mining activity will be done with proper fencing and specific area would be extracted or mined once in one time. Grazing and harvesting would be allowed on the remaining portion of the mining area other than the specific extracted area. There is no proper structure for this project only surface mining will be done that will exert no such impacts on the environment.

Following are the possible Environmental impacts due to the design:

Impacts
- Soil structure and soil bearing capacity
- Road infrastructure design
- Rain water harvesting capacity of the drainage system

Impact significance: low
Nature of impact: direct
Duration: NA
Timing: NA
Reversibility: NA
Likelihood: Low to Medium
Consequences: Low to Medium

Mitigation measures and recommendations
Following are the mitigation measures and recommendation to minimize the anticipated impacts

- Proper design of fencing
- Proper Mining activity design
- Mining activity will not be done in scattered manner. One specific portion will be mined in one time.
- Road infrastructure should be according to the laws and regulations
- Waste water drainage should be design vast to bear the rain water capacity of the society.

Environmental impacts during the construction phase
The subject project deals with mining activity so impacts during construction phase are not applicable to this project.

Environmental impacts during operation phase/Mining activity.

Potential Positive Impacts

Employment Opportunity
Proposed mining project will help the cement and construction industry which will have a ripple effect of increasing local employment. During the proposed mining activity and construction and operation of cement plant project, the requirement of engineers, workers, laborers, technicians, para-professionals etc. will generate employment opportunities. Locals will also have the opportunity to diversify their incomes by being employed during the project. Local people will be preferred for the jobs which in return will increase their livelihood and improve their living standards. It is estimated that more than 100 persons will be employed during the proposed mining project and around 800-1500 persons will be employed for proposed cement plant project. Hence there will be large employment opportunity arise by this project.

Increase in business
With the influx of the laborers for the proposed project, there will be more opportunities for small scale business such as many auto shops, a petrol pump, a bank and restaurants may be established where mostly local residents work and make their earning. Lucky Cement Limited will install power plant for the operation of proposed cement plant project, many people will also get employment opportunities by this power plant.
Better living standard of the area

Due to the job opportunism created, the people of the study area shall receive economic uplift and now have better living standards. This is evident of Pacca houses in villages around the vicinity of the plant. The price of the land, rather, has gone up due to economic and commercial activities along the approach.

Land Value

With this proposed mining project and by the operation of the proposed cement plant project, commercial activity in the area shall increase. Many shops including those of auto repairs goods transport, general provision, food supplies, and restaurants have come up long the approach road, thus there is some gradual change in the land use.

The land values in the nearby villages shall increase. There is every likelihood that land values along the access routes will further increase because of the potential of the land to exploit commercial activities.

Road infrastructure

After the approval for the installation and operation of the proposed project, the project management is committed for the widening/construction of link road named Sarkalan Road which is the main approach road for the nearby villages named Makhial Village, Sarkalan Village, Matan Kalan and Lafi village.

Residential Colony

Project proponent is committed to develop a residential colony for its employees and workers with the project implementation. It is envisaged the basic amenities such as schools, shops, will be provided in the residential colony that will uplift the economic status of the area.

Safe environment for the workers

Management of M/s Lucky Cement Limited shall take appropriate measures to provide a pollution free and safe environment during the proposed mining project and during construction and operation of the proposed cement plant project. Other medical facilities will be provided to workers along with their job security.
Social Services

M/s Lucky Cement Limited will develop a department for the social services of the company employees and the poor people settled in the nearest villages. For example, the availability of drinking water is not good in some areas. Project proponent of M/s Lucky Cement Limited is committed to install a drinking water plant that will serve the poor people of the area. in-charge of social service will probe the issues of the poor people in the area and actions will be taken to resolve their issues. Other social services like health facilities, medical services will be provided to the worker and his family, the services may be limited to outdoor checkups, full treatment or partial examination etc.

Negative Impacts

Acquisition of the land for lease

The project proponent has applied to the Department of Mines & Minerals Punjab for the lease of the 6331.43 Acres area for the proposed mining activity. The proponent has obtained the lease of land for limestone mining and for clay it is in process. Currently the proposed area is not under any mining activity.

Assessment of Impact:
The acquisition of the land for lease can raise conflict with stakeholders. Currently the land is used for grazing and very small patches are present for agricultural practices which are seasonal.

Mitigation and Monitoring Measures:
Based on the discussion above, the following measures are proposed:

- The land clearing/mining process will be very slow and time taking. Owners of the land will be allowed for land grazing after the leasing but that will be restricted at safe distance.
- Proponent will follow the rules and guidelines of the concerned Government Departments.
- Land will be acquired after the consensus with stakeholders
- Land will not be acquired or possessed forcefully
- Gender equity, or the lack of it, reflects women’s access to and control of natural resources, public health, and education services, their participation in decision-making
and political processes, and their ownership of productive assets in comparison with men will be considered.

- Proper compensation will be given to stakeholders as per policy and negotiation
- The land will be restored with maximum plantation and patches for agricultural practices will be maintained.
- Aesthetic of the area will be maintained and not whole the land will be used for quarrying.
- Land will not be reclaimed on undulating surface. It will be making leveled for the agricultural practices.

**Residual Impact:**
If the mitigation measures are effectively implemented, the residual impact of the proposed activities on the area’s geophysical environment is expected to be insignificant. Land cost will be paid to the stakeholders above the actual cost of the land. Currently the use of land in the area is less but in future by the implementation of the project economic status of the land holders will be uplifted.

**Impact significance:** Low or may be positive

**Nature of impact:** Direct

**Duration:** Short-to medium-term

**Timing:** Construction & Operation phase

**Reversibility:** Possible

**Likelihood:** Low (unlikely), as the mitigation measures will ensure that vegetation clearing is minimized

**Consequences:** Mild or may be positive

**Topographic/Soil**
Land under consideration is mainly planed area with less undulating patches. Some area falls in the mountainous patches/topography. Estimated 6500 tons of limestone and 1500 tons of clay shall be extracted daily from the quarry area. The activity can result in scarring of the landscape and aesthetic beauty.
Assessment of Impacts

Clearing of native plants will disturb the complexity of the ecosystem of the proposed area. Dust emissions will generate during the quarrying of clay and limestone. Flue gases will be generated due to the involvement of generators and other machinery.

Mitigation and Monitoring Measures:

Based on the discussion above, the following measures are proposed:

- The mining activities will be very slow and spread over an estimated time period of more than 150 years.
- Restoration and reclamation plan will be developed to restore the natural landscape of the area.
- Plant nursery, garden will be developed to rehabilitate the native plants of the area.
- Mining site will be fenced in a way that the exit route for reptiles will be towards the natural habitat but not towards the any human settlements.
- Technique of controlled and time specific blasting will be ensured for “safe habitat of the animals”.
- Project proponent will make any possible efforts to limit the impact on flora and fauna.
- The management of M.s Lucky Cement has serious concern to preserve the environment and natural elevation beauty of the hills.

Residual Impact:

If the mitigation measures are effectively implemented and keeping in view the length of time to bring about the change in topography, the overall average impact may not be considered significant.

Impact significance: mild to high

Nature of impact: Direct

Duration: Short-to medium-term (as a whole project the duration is long term otherwise its short term duration.)

Timing: Construction & Operation phase

Reversibility: Possible
This passage is not visible.
1. There is no storm water or rain water storage facility in the area. The subject project will construct check dams to harvest the rain water or storm water in the area that will be used for vegetation or for agricultural purposes. The other purpose of check dam is to store the percolated water to stable the disturbed water table.

2. Water will be extracted only from the deep confined aquifer.

3. Given that water is to be extracted from a confined aquifer whose recharge rate, (just as the actual volume of water available or its rate of depletion) is not known, the extraction will be monitored to ensure that it does not lead to irreversible environmental damage.

4. Also, project proponent ensured to install RO Plant in proposed cement plant for the purpose of drinking water for the workers and staff.

5. Project proponent of M/s Lucky Cement Limited is committed to install a drinking water plant that will serve the poor people of the area.

**Residual Impact:**
Post-mitigation residual impact on groundwater has been deemed acceptable if it meets the following criteria:

**Nature of impact:** Direct

**Timing:** Operation phase

**Duration:** Long-term; depends on the rainfall pattern and recharge regime of the deep aquifer

**Reversibility:** Yes

**Likelihood:** Moderate

**Consequences:** Low, as monitoring and corrective action will ensure that there is no adverse impact.

**Impact significance:** Low to moderate

**Contamination of Soil and Water**
Due to the machinery used during mining activity, raw material transportation vehicles, stored oil tanks, fuels, and other substances are the potential sources of soil contamination. There is no such drain in the nearby area but injection wells are present in some houses at the depth of 10-15 ft for waste water disposal.
Potential Impact:
Effluents released as a result of project activities, if not contained properly, may contaminate the soil. Water quality may deteriorate if pollutants are mixed with surface runoff during rain and carried to water resources in the vicinity, or if pollutants leach into the ground. Potential sources of pollution in such cases may include:

- Waste water from domestic and plant process (from cooling) sources
- Waste water generated from the mining activity
- Oil and grease from vehicles and machinery
- Stored fuel, oil, and other substances
- Pollutants can also be transferred through the food chain, thereby affecting community health and well-being.

Assessment of Potential Issues:
Waste water generated from the mining activity will be used as sprinkling on the quarry area or for restoration of the land.

Waste water from domestic and plant process (from cooling) sources will be treated in septic tanks and waste water treatment plant before being subjected for different uses, which will be installed in the plant after approval the subject project that will be supervised by HSE Manager, Treatment plant In-charge, Chemist and other related personnel. The portion of water will be utilized for domestic purposes will be chlorinated with sodium hypochlorite before use. The portion will be used for the makeup of cooling water is subject to addition of chemicals for the treatment of scaling and to arrest bacterial and algal growth. The treated water from the domestic use will be stored in a clear water tank.

The waste water discharged from laboratories, canteens, hostels, and washrooms are significantly polluted, these wastes are collected and treated in septic tanks system and then ultimately disposed through soakage pits into the ground. This is well accepted technology and in keeping the topography and hydrological conditions of the area no adverse impacts is expected on the environment.

For plant cooling, the water after treatment shall be stored in a separate tank from where it is pumped into the recirculation system.

The subject project will construct check dams to harvest the rain water or storm water in the area that will be used for vegetation or for agricultural purposes.
Stored fuel, oil, and other substances may contaminate the area’s water resources if it rains and they get washed into surrounding areas. The storage and handling of fuels and lubricants may also contaminate surface and groundwater resources, if there are spillages that wash into surrounding areas or seep into the ground. However, the built-in mitigation measures in the project design will ensure that pollutant discharge through run-off is minimal and it may not be necessary to quantitatively determine the deterioration in surface water quality.

**Mitigation Measures:**
Mitigation measures to reduce the impact of waste effluents produced during project activities are listed below.

1. The proposed site is located at 512 m from the well and 4 km from the natural spring so there is no potential impact of proposed activity on the above mentioned water bodies.
2. Deep holes will not be located in the vicinity (i.e., within 512 m) of proposed site.
3. Tarpaulin sheets will be placed under generators, compressors, and oil tanks.
4. Vehicles and other equipment will not be serviced outside of the designated areas.
5. Vehicles and other equipment will not be repaired outside of the designated areas.
6. No contaminated effluents will be released into the environment without having been treated. Treatment plant will be installed prior to operation of the proposed cement plant and treated water will be used for plantation in the rehabilitated area.
7. Sewage and other waste effluents will be handled to avoid contaminating surface and groundwater.
8. Water from domestic and project related sources will be released into septic tanks.
9. An appropriately designed septic tank will be used to treat sewage and outlets will release treated effluent into drain. The integrity of the entire system will be maintained and monitored.
10. Septic tanks will be built at a safe distance from any water hole, stream, or dry streambed, to prevent the entry of surface water.
11. Solid waste will be segregated and disposed of as follows:
   a. Materials suitable for recycling will be stored separately and sold to approved recycling contractors
   b. Combustible waste will be disposed of properly.
   c. Non-combustible, non-recyclable rubbish will be disposed of properly
d. Solid residue from the septic tanks will be transported to municipal sewage treatment facilities in any nearby city.

14. Vehicle and equipment maintenance, including washing, will be allowed only in designated areas underlain with concrete slabs and a system to catch runoff.

15. Fuels, oils, and other hazardous substances will be handled and stored according to standard safety practices.

**Residual Impact:**
The residual impact of project activities on the soil and water quality of the area is expected to be insignificant once the suggested mitigation measures are put into effect.

The residual effects are summarized below:

**Nature of impact:** Indirect

**Timing:** Construction & Operation Phase

**Duration:** Medium to long term

**Reversibility:** Yes

**Likelihood:** Low, as the proposed mitigation measures will ensure that soil and water are not contaminated.

**Consequences:** Mild to moderate, as the effluents released into the environment will have been adequately treated

**Impact significance:** Low to medium, based upon low likelihood and mild to moderate consequence.

**Air Quality Potential Impact:**
Quarry for clay and limestone deposits will cause major impacts on air quality. The operation of the quarry cause dust emissions, in the quarry area, limestone quarrying involved blasting that will be source of dust and different gases. The area which is mined is stripped of vegetation and left barren this can be significant source of fugitive dust in the vicinity. The transportation of the quarried material to the crusher also cause dust pollution as the quarry roads are un-metaled and the trucks are not covered. In view of the above consideration it may be concluded that the Impacts of quarry operation on the environment are hardly of any significance.
Air emissions from project-related activities are likely to include:

- Dust due to proposed mining activity, construction and operation of the proposed cement plant.
- Dust raised on dirt tracks by project-related vehicles.
- Dust from drilling of deep holes.
- Dust due to drilling and blasting of the rocks.
- Combustion products from vehicles used for project-related activities.

**Assessment of Impact**

Dust emissions cause the amount of particulate matter in the air to increase, and thus become a health concern. Dust clouds also reduce road visibility, creating a traffic hazard.

**Gaseous Emissions:**

**Exhaust Fumes from Vehicles and Construction Machinery:**

Emissions produced by vehicles and equipment will be similar to those produced by diesel generators in terms of the resulting pollutants (SO2, NOX, PM, etc.). However, the extent to which they are produced will be considerably lower, since much smaller diesel engines are used in vehicles and construction machinery.

**Mitigation Measures**

None of the potential effects discussed above are expected to exceed acceptable limits. The mitigation measures given below will further reduce their impact, and ensure that they remain within acceptable limits.

- Water sprinkling on the site will minimize the dust pollution.
- The proposed site will be located at least minimum nearby settlement is at the distance of 400-500 meters.
- In the quarry area, concerted efforts will be made to keep the fugitive dust levels to a minimum. To achieve the objective, controlled blasting using millisecond delay electric detonators (blasting material) will be employed and as a result big piles of rocks and fragments will be pulled down in a single action preventing the formation of dust clouds.
- In proposed cement plant, emissions of dust and harmful gases are possible from numerous locations. To preserve the environment and to safeguard the health of workers and nearby residents, such emissions must be controlled.
Inside the factory even at a minor dust generation points elaborate arrangements to trap the dust will be made to keep the environment clean. In particular, instead of multi cyclones on the cement cooler, which are usually a source of dust, a heat exchanger and a bag collection system, will be installed.

At proposed cement plant of M/s Lucky Cement Limited, the bag filters will be employed to arrest the dust particles in the exhaust emissions. Bag filters are well known for their high removal efficiency under all operating conditions provided the filters are maintained properly.

Two types of dust collectors namely 7500 glass bag filters and plenum pulse fabric filters will be employed in the plant. The two high temperature glass bag filters will be installed to filter the dust in the exhaust gases from the kiln and preheater system. Glass bag filters are independent of any operational parameter and ensure perfect dust collection to a level of nil opacity. Unlike electrostatic precipitator these do not have to be switched off under certain unfavorable conditions. In the case of any breakdown, repairs can be easily made without shutting down the plant.

All equipment, generators, and vehicles used during the project will be properly tuned and maintained in good working condition in order to minimize exhaust emissions.

Vehicle speed will be reduced on track passing through or close to settlements.

Imposing speed limits and encouraging more efficient journey management will reduce the dust emissions produced by vehicular traffic. Water will be sprinkled where necessary to contain dust emissions.

All project vehicles will be checked regularly to ensure that engines are in sound working condition and are not emitting smoke.

Wet scrubbers will be installed at stacks of generator (if any) to avoid gaseous emission.

**Residual Impact:**
After implementing the mitigation measures listed above, the residual impact of the proposed activities on ambient air quality is expected to be insignificant, as shown below:

**Nature of impact:** Direct

**Duration:** Short term

**Timing:** construction & operation
Reversibility: Not applicable

Likelihood: Low (unlikely) as mitigation measures will ensure that air pollution remains within acceptable limits.

Consequences: Moderate to High (Moderate in case of mechanical extraction and high in case of blasting)

Impact significance: Low, based upon low likelihood and mild to moderate consequence.

Impact on Biological Environment

Natural Vegetation

Potential Issue:
Project activities that may affect the area’s natural vegetation include the proposed mining activity, access roads, and clearing of vegetation for the proposed site. Land in the study area for proposed mining activity is plain and barren and with little amount of flora. After the proposed mining activity the land in the study area will be restored and native plants will be planted there.

Assessment of Impact:
A significant impact will be interpreted if unnecessary or excessive removal and burning of plants for fuel wood is observed. The vegetation of the area is facing increasing pressure from live stock. Signs of habitat degradation caused low rain fall and by grazing are visible. No rare, sensitive or vulnerable species are recorded or reported in the project area. Most of the plants present in the area named PHULAI have the properties to grow in more than one habitat and have populations large enough to ensure their genetic diversity. The removal of a small portion of vegetation is not likely to harm the overall diversity of plant communities and the genetic diversity of species.

Mitigation Measures:
The following mitigation measures will reduce any adverse impact on vegetation:

1. Mostly the quarry area is barren while some of the area has scattered vegetation or few plantation but a shrub named Phulai is extensively present in the study area. Native species of the plants will be planted at the rehabilitation site while phulai have extensive population so there are no significant impacts on the ecological environment due to subject project.
2. Some of the area of land will be maintained for grazing because not whole area will undergo mining activity.
3. Open fires will not be allowed anywhere outside the proposed site.
4. Fuel-wood and shrubs will not be used as fuel during project activities.
5. Unnecessary damage to vegetation in will strictly be avoided.
6. Proposed site area will be fenced to avoid the any mishap within and outside of the proposed mining project.

*Residual Impact:*

Given the current state of the vegetation, and proper implementation of the proposed mitigation measures, no significant residual impact on the natural vegetation of the area is anticipated, as shown below:

**Nature of impact:** Direct

**Duration:** Short-to medium-term

**Timing:** Construction & Operation phase

**Reversibility:** Possible

**Likelihood:** Medium (unlikely)

**Consequences:** Mild, as no rare plant species are present in the area.

**Impact significance:** Low, based upon low likelihood and mild consequence

*Wildlife*

**Potential Issues:**
The project activities that may affect the wildlife of the area include the drilling, blasting, widening/construction of the access road, clearing of vegetation for proposed project. Rare species of Fauna were present in the study area; some of them have migrated to other areas due to population increase and some species have been vanished due to over hunting, so there is no such species or rare species of fauna exist in the area that can be impacted by this proposed mining project.

The following aspects of these activities are expected to disturb the wildlife during these activities:

- Presence of people in the area.
- Drilling and blasting activity
- Noise and movement of project vehicles and machinery.
- Physical damage to the habitat
- Displacement of wildlife for a short time period.

**Assessment of Impacts**

**Mammals:**

There are no wild species of mammals in the study area so direct damage to the environment is expected to be insignificant.

**Birds:**

Birds, being highly mobile and therefore capable of avoiding project activity areas, are generally the least susceptible of an area’s wildlife to the long-term impacts of such temporary activities. As such there is no rare or endangered species of birds found in the study area.

**Reptiles and Amphibians:**

The project activities’ impacts on the reptiles of the study area will be insignificant. Though avoiding areas of dense vegetation will reduce this impact, a certain degree of residual effects are expected. However, in view of the abundance of these species in the area, the unmitigated residual impacts are considered insignificant.

**Mitigation Measures:**

The following mitigation measures will reduce the adverse impact of the project activities:

- Discharging firearms will be explicitly prohibited.
- Waste of any kind will not be discharged in open areas.
- Fencing will be done at the mining site to divert the exit route for reptiles to avoid the entrance in to nearby human settlements.
- A ‘no-hunting, no-trapping, no-harassing’ policy will be strictly enforced.
- The project staff’s movement will be strictly restricted to the work area.
- The project staff will be educated and instructed to avoid killing or chasing wild animals.
- Safe driving practices will be observed to minimize the accidental killing of reptiles or small mammals crossing the road.
- Camp waste will be disposed of in such a manner that animals are not attracted to it.
- Off-road driving will not be allowed.
- Unnecessary damage to the natural topography and landscape will be kept to a minimum to the extent possible.

**Residual Impact:**
Due to the proper implementation of the proposed mitigation measures, no significant residual impact on birds, mammals, reptiles, are anticipated, as shown below:

**Nature of impact:** Direct

**Duration:** Short- to medium-term

**Timing:** Operation & Construction phase

**Reversibility:** Possible

**Likelihood:** Low (unlikely)

**Consequences:** Mild, as the project area does not fall in any more sensitive habitat

**Impact significance:** Low, based upon low likelihood and mild consequences

**Noise & Vibration**
The major sources of the noise at proposed mining site are blasting, drilling, and vehicular and other project related machinery. The other source of noise will be operation of the proposed cement plant project.

Blasting operation at the quarry site is the main source of vibrations. Their effects on the plant site are minimal due to distant condition and no significance nuisance is experienced.

**Assessment of Impact:**
A significant impact will be interpreted by the drilling and blasting on workers, nearby community, fauna of the area. The present noise level at the site was 52.4-65.2 dB (A) which compliance with National and International Noise level Standards.

Vibration due to the blasting and other heavy machinery cause structural problems to the building and vary with the building age constructional material used and vibrational level.

- High noise level cause hearing loss, deafness, high blood pressure, headache, depression and mentally disturbance.
- Noise level will not exceed 75 dB(A) at the distance of 2 km radius, activity site is located at a safe distance from the nearest human settlement.
- Fauna of the study area will also disturb due to the blasting and extensive vehicular noise.
- Very little is known to the specific response of animals to vibration but based on human response some disturbance might be expected between 1 and 10 mm/S ppv (peak particle velocity).
- The maximum threshold level for the vibration is between 50 and 100 mm/S ppv have been suggested by Grimshaw (1971) as critical threshold level.

**Mitigation Measures:**
The following mitigation measures will reduce any adverse impact of noise on environment and human health:

- Personal Protective Equipments PPEs including Ear muffs, Ear plugs and other noise abating equipments will be provided to the workers and other staff of the subject project.
- The controlled blasting method ensures that noise less than 75 dB (A) at day time at the radius of 2 km distance. Man power involved during blasting activities will be provide safety equipments.
- Keeping in view above consideration it is concluded that vibrations generated in the quarry area have little effect on the nearby building structures.

**Residual Impact:**
Given the current state of the vegetation, and proper implementation of the proposed mitigation measures, no significant residual impact on the natural vegetation of the area is anticipated, as shown below:

**Nature of impact:** Direct

**Duration:** Short-to medium-term

**Timing:** Construction & Operation phase

**Reversibility:** Possible

**Likelihood:** low (unlikely)

**Consequences:** Mild
Impact significance: Low, based upon low likelihood and mild consequence

Impact on Social and Cultural Environment

Impact Assessment
Following parameters were adapted to assess’ social and cultural impacts.

Community Well-being Parameters:
Parameters for the assessment of the well-being of the poor people’s near the project site were used to assess the social, economic, and cultural impacts of the project.

Primary Health:
Health indicators, such as infant mortality rates, access to community health services (public and private), and the general life expectancy in a region represent the state of general well-being of a certain community. Health is also closely correlated with labor productivity and efficiency. Improving the overall health of a community enhances its income-earning potential.

Primary Education:
Education is also directly related to income-level; the higher the income level, the more likely the presence of educational facilities. People below the poverty line, on the other hand, are less likely to have access to education. In general, education strengthens human and social capital and enhances gender equality. In the long run, access to education is instrumental in enhancing the level of awareness that provides the intellectual tools to analyze evaluate and adapt to new situation with exit opportunities. It gives empowerment, increased political participation, and reduced birthrates, addressing the long-term needs of an entire community and particularly its women.

Availability of Drinking Water:
Groundwater is used in the area for irrigation as well as for drinking and sanitary purposes. Availability of fresh water for these purposes is important for the wellbeing of the primary stakeholders i.e., the villagers in the project area. The effect of project on the area’s water resources is important in measuring the impact of the project on the socioeconomic environment of the area.

Land Use:
Land in project area is used for agricultural and grazing purpose.
**Employment:**
The management of M/s Lucky Cement Limited is committed to provide Employment opportunities to the local people.

**Gender Equity:**
Gender equity, or the lack of it, reflects women’s access to and control of natural resources, public health, and education services, their participation in decision-making and political processes, and their ownership of productive assets in comparison with men will be considered.

**Residual Impact:**
Project will provide jobs to local community thus there will be improvement in all above mention parameters.

**Community Health and Safety**

**Health:**
People from the project area regularly travel to other cities, and thus cannot be considered isolated from the rest of the country. They are regularly exposed to illnesses common to urban populations, and have similar levels of immunity. The management will conduct medical examinations before being hired, and will be screened for communicable diseases. The project is therefore very unlikely to lead to an epidemic of any sort among local communities. M/S Lucky Cement Management committed to establish a medical center at the proposed mining and proposed cement plant site to facilitate his workers and local community. Following measures will be implemented:

1. Personal Protective Equipments will be provided to the workers and other staff.
2. Emergency services will be provided by the management of M/S Lucky Cement.
3. First aid box and other emergency practices will be provided at the site to cope with the dangerous situation of the proposed project.

**Safety:**
Project activities could become a hazard if conducted in populated areas where local people, especially children, are likely to gather around to watch the activity. The other safety issue is that of traffic, especially along access roads close to settlements. To reduce the hazards, the following mitigation measures will be implemented:

1. Local people will be informed in advance when work is about to start in an area.
This may result in people keeping young children away from work areas.

2. Machinery will never be left unattended.

3. Safe driving practices will be adopted, particularly while passing through settlements.

**Conclusion:**
Management of M/S Lucky Cement limited will achieve following goals.

- Identification of regulatory requirements that apply to the proposed activities in the context of environmental protection.
- Identification of the environmental features of the project area and the likely impact of the project on the environment,
- Recommendation of appropriate mitigation measures that management will incorporate into the project design to minimize all adverse environmental impacts.

Baseline environmental and socioeconomic information was collected from a variety of sources, including field surveys.

The impacts of M/S Lucky Cement Limited due to mining activity in area will be insignificant, provided the generic mitigation measures proposed in this report are implemented. In areas where proposed site may have a significant impact, additional mitigation measures are given to reduce impacts to as low as reasonably possible.

After assessing the proposed project activities and investigating the project area, the environmental consultants, PGEE, have concluded that, if the activities are undertaken as proposed and described in this report, and the recommended mitigation and environmental management measures are adopted, the project will not result in any long-term or significant impacts on the local community or the environment.

**Project Benefits:**

- Economic development
- Contribute to construction industry
- Create job opportunities to the local people
- Poverty reduction
- Contribute in the development of infrastructure
- Improve living standard of the area
- Contribute into national GDP
Employment opportunity will be provided to the 2000 local people

The project will provide employment to local community reducing immigration to big cities.

The local raw material will be consumed locally reducing its transport to other areas and in turn reduce the air pollution which might be produced if transported.

Environmental Monitoring Program and Institutional Requirements

It will be in the fitness of the things to operate this project under the Environmental Management Plan (EMP). The EMP will ensure that even all type of pollutants from project is within the prescribed limiting values of the NEQS. Thus the environment and human health around the project will be safeguarded.

Regular monitoring of all the significant environmental issues is essential to check the compliance status of EMP. The main objective of the monitoring will be;

- To verify the results of the environmental study with respects to the proposed project.
- To estimate the trends of concentrated values of the issues, which have been identified as critical and then planning the mitigating measures.
- To assess the efficiency of pollution control mechanism.
- To ensure that any additional parameters, other than those identified in the EIA report, do not turn critical after the commissioning of proposed project.

Potential Environmental Enhancement measures

M/s Lucky Cement Limited already running their cements plants in different districts which are well maintained, state of the Art, with installed pollution control devices as filter bags, wet scrubber etc., other pollution controlling technologies, and in compliance with NEQS. The proposed cement plant will also be installed in same manner like their other plants with all precautionary measures. Following necessary measures will be adopted during mining activity:

- Controlled blasting technique will be used to mined the limestone
- Mechanical extraction will be done for clay mining which is safe methodology to excavate the clay.
- Blasting and any mining activity will not be done in nights
- Proper fencing will be done when mining activity is about to start
- Proper SOPs will be followed with proper schedule along with the HSE conditions
- Sprinkling of water will be done on road, quarry area and tracks
- Area will be restored after completion of mining activity with native plants.
- Any possible measure will be adopted to make the project or mining safe and environmental friendly.

**Mitigation and Impact Assessment Criteria**

**Impact assessment criteria:**
The impacts were assessed in the light of criteria given as under:-

- Magnitude or degree of impact
- Time and duration of impact
- Likelihood of impact occurrence
- Sensitivity of impact
- Risk related to impact

**Mitigation assessment criteria:**
The Mitigation Hierarchy establishes a structure to guide development and application of measures to mitigate impacts on environmental values and associated components. The term “mitigation” applies to four steps, or levels, in the mitigation hierarchy

![Mitigation Hierarchy Diagram](image-url)
General principles

1. Maintaining the integrity and natural functions and processes of ecosystems, and the resilience of ecosystems, is prerequisite to sustainable use of natural resources, and essential to maintaining ecosystem goods and services over time.
2. The mitigation hierarchy is applied in order of priority as follows:
   a. Avoid
   b. Minimize
   c. Restore On-Site
   d. Offset (Off-Site or On-Site)
3. Generally, the “higher” the priority of the environmental value and associated component, the more protective the mitigation measures.
4. For an action or measure to be considered “mitigation”, a party must accept responsibility for implementation of appropriate mitigation measures, and there must be certainty that the mitigation measures will be carried out.
5. Implementing mitigation measures can help resolve issues that may delay or prevent a proposed project or activity.

Purpose of Mitigation measures
Purpose of mitigation measures should include:

- What is the problem i.e. in terms of “major environmental impacts” which may arise by the subject project activity?
- When the problem will occur and when it should be addressed
- Where the problem should be addressed
- And how the problem should be addressed

The major impacts may arise by the subject project are landscape disturbance, particulate matter, dust, noise, and disturbance of vegetation feature. Other impacts are of minor importance. These impacts will arise during the mining activity but precautionary measures will be adopted prior to start the activity, during the activity and post activity.

Any impact that would arise due to the subject project activity will be addressed on site. Trainings will be conducted on site prior to start work.
HSE manager/environmental manager along with site manager will be appointed to assess any impact that could be arisen during the mining activity. He would be responsible to address the problem and to mitigate it.

**Ways of achieving mitigation measures**

By adopting proper mitigation measures, any anticipated major or minor environmental impacts could be controlled or mitigated. The detail of impacts and mitigation measures have been discussed previous chapters.

Management of M/s Lucky Cement Limited shall take appropriate measures to provide pollution free and safe environment during the proposed mining project by implementing improved management practices and monitoring techniques suggested in EMP.

The land clearing/mining process will be very slow and time taking. Owners of the land will be allowed for land grazing after the leasing but that will be restricted at safe distance. Proper compensation will be given to stakeholders as per policy and negotiation.

The land will be restored with maximum plantation and patches for agricultural practices will be maintained. Some of the area of land will be maintained for grazing because not whole area will undergo mining activity.

M/s Lucky will develop Restoration and reclamation plan to restore the natural landscape of the area. Plant nursery, garden will be developed to rehabilitate the native plants of the area. After the proposed mining/extraction activity the Quarried/extracted area will be restored and reclaimed with maximum plantation.
CHAPTER 8

ENVIRONMENTAL MANAGEMENT & MONITORING PROGRAM

Purpose and Objectives of the EMP:

The primary objectives of the EMP are to:

- Facilitate the implementation of the mitigation measures identified in the EIA.
- Define the responsibilities of the HSE manager of M/S Luck Cement Limited at Buchal Kalan proposed project.

Define a monitoring mechanism and identify monitoring parameters in order to:

- Ensure the complete implementation of all mitigation measures
- Ensure the effectiveness of the mitigation measures
- Provide a mechanism for taking timely action in the face of unanticipated environmental situations
- Identify training requirements at various levels.

Management Approach:

The overall responsibility for compliance with the environmental management plan rests with the project proponent.

Institutional Responsibilities

Following functionaries will be involved in the implementation of EMP:

- Project Proponent
- HSE/Project Manager
- In-Charge Administration
- Supervisor of project
- Environmental Engineer

Training Schedules

Training for the management/contractors/engineers and workers on environmental aspects of the project will be arranged. It will be imparted by a team of experienced trainers.

- **Training of mining staff**

  Training of mining staff & workers will be the part of the ToRs regarding the subject project. The provisions given in EIA Report *Chapter 6 Screening of Potential Environmental Impacts & Their Mitigation Measures* will be followed.
ToRs will be including the training and submission of reports in the following area:

1. Handling of Machineries in a safe way
2. Proper fencing design
3. Proper blasting training and schedules
4. Use of PPEs
5. Maintenance of vehicles and submission of Environmental Monitoring Reports
6. Maintenance of Water Consumption records
7. Testing of water and waste water and submission of Environmental Monitoring Reports
8. Placement of safety signs/boards during construction
9. Sprinkling of water on the roads and dusty tracks
10. Monitoring of generator emissions

Training regarding all other aspects of HSE will be ensured by the contractor during the mining activity.

**Responsibility of EMP**

Overall responsibility for implementation of EMP will be that of Head of HSE department. He will be appoint a HSE/Project Manager of relevant qualification and will assist by other departmental incharge like SWM, gardening/nursery other related department. Head of HSE department will be responsible to the Project Proponent in all respects and will manage the all HSE condition at the NEQS. He will make liaison with all stakeholders and EPA Punjab.

*EMP has been discussed in next section.*

**Environmental Technical Assistance and Training Plan**

In order to raise the level of professional and managerial staff, there is a need to upgrade their knowledge in the related areas. HSE/Project Manager should play a key role in this respect and arrange the training programs.

HSE/Project Manager will provide training to staff and workers about the best environmental management practices at the site and affective implementation of the EMP.

The training modules will include air, noise and water pollution monitoring, social awareness, Environmental Laws, National Environmental Quality Standards (NEQS), Usage of personal protection equipments, and health and safety related issues on the construction site.
The HSE/Project Manager will train all workers & staff in basic sanitation and health care issues (e.g., how to avoid malaria and transmission of Sexually Transmitted Infections (STI) HIV/AIDS and in general health and safety matters, and on the specific hazards of their work. Training should also consist of basic hazard awareness, site specific hazards, safe work practices, and emergency procedures for fire, evacuation.

HSE/Project Manager will arrange Training on monthly or quarterly basis regarding health & safety, hygiene, firefighting and first aid.

**Monitoring Plan**

Following aspects need to be monitored regarding the subject project during pre-construction, during construction and post construction.

- Air quality
- Water quality
- Noise level
- Management of utility services including water supply, sewerage disposal, electric supply and solid wastes.

M/s Pak Green Laboratories has conducted the monitoring for ambient air quality, water quality, and noise on the proposed project site prior to start the project. Following methodology was used to conduct the monitoring. Also, monthly monitoring will be done at the time of functioning of the project and report will be submitted to EPA.

**Methodology adopted for the environmental monitoring:**

**Ambient Air Quality Monitoring**

Ambient air quality monitoring was conducted at advised locations to assess the concentration of priority pollutants (Carbon monoxide, Nitrogen dioxide, Sulphur dioxide and PM$_{10}$) in the air.

Reference method used for the measurements are included as Table No.1 while the description is provided in subsequent sections.
# Methodology of Ambient Air Quality Monitoring

<table>
<thead>
<tr>
<th>Air Pollutant</th>
<th>Monitoring Technique</th>
<th>Instrument Used</th>
<th>Reference Method</th>
<th>Measurement Range</th>
<th>Lowest Detection Limit</th>
<th>Sampling Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Carbon monoxide (CO)</strong></td>
<td>Non Dispersive Infrared Absorption (NDIR)</td>
<td>HORIBA APNA 360 CO Analyzer</td>
<td>40 CFR Part 50, App C (US-EPA)</td>
<td>0 – 100 ppm</td>
<td>0.02 ppm</td>
<td>24 &amp; 1 Hour</td>
</tr>
<tr>
<td><strong>Nitrogen Dioxide (NOₓ)</strong></td>
<td>Reduced Pressure Chemiluminescence (CLD)</td>
<td>HORIBA APNA 360 NOₓ Analyzer</td>
<td>40 CFR Part 50, App F (US-EPA)</td>
<td>0-0.5 ppm</td>
<td>0.5 ppb</td>
<td>24 &amp; 1 Hour</td>
</tr>
<tr>
<td><strong>Sulfur Dioxide (SO₂)</strong></td>
<td>UV fluorescence (UVF)</td>
<td>HORIBA APNA 360 SO₂ Analyzer</td>
<td>EQSA-0197-114 (US-EPA)</td>
<td>0-0.5 ppm</td>
<td>0.5 ppb</td>
<td>24 &amp; 1 Hour</td>
</tr>
<tr>
<td><strong>Hydrogen Sulphide (H₂S)</strong></td>
<td>UV fluorescence (UVF)</td>
<td>APNA-SO₂ &amp; H₂S Monitor (Combined Use)</td>
<td>EQSA-0197-114 (US-EPA)</td>
<td>0-1 ppm</td>
<td>0 ppm</td>
<td>24 &amp; 1 Hour</td>
</tr>
<tr>
<td><strong>Particulate Matter (PM₁₀)</strong></td>
<td>Integrated Sampling Technique</td>
<td>mini Volume Air Sampler</td>
<td>USEPA-EQPM-0798-122 USEPA-CFR-40 Appen J</td>
<td>0 – 1000 µg/m³</td>
<td>2 µg/m³</td>
<td>24 &amp; 1 Hour</td>
</tr>
<tr>
<td><strong>Noise level</strong></td>
<td>Digital processing method</td>
<td>TENMARS TM-102</td>
<td>IEC 61672-1: 2002 Class 1</td>
<td>25 dB-138 dB</td>
<td>25 dB</td>
<td>spot</td>
</tr>
</tbody>
</table>

**Carbon monoxide (CO)**

Carbon monoxide (CO) was monitored using HORIBA APNA 360 CO Analyzer. The APNA-360 CO analyzer measures CO concentration using a non-dispersive infrared absorption method that is based on the nature of CO in that it absorbs special infrared light. Measurement range of the analyzer is 0-100 ppm. Continuous data was recorded for duration of 1 hours at AA category point.

**Oxides of Nitrogen (NOₓ)**

Oxides of Nitrogen (NOₓ) was monitored using HORIBA APNA 360 NOₓ Analyzer. The APNA-360 NOₓ analyzer measures NO, NO₂ and NOₓ using chemiluminescence (CLD) method with the help of chemical reaction between NO₂ and O₃. Measurement range of the analyzer is 0-0.5 ppm. Continuous data was recorded for duration of 1 hour at AA category point.
**Sulphur dioxide (SO₂)**

Sulphur Di-oxide (SO₂) was monitored using HORIBA APNA 360 SO₂ Analyzer. The APNA-360 SO₂ analyzer measures SO₂ using UV fluorescence method that operates on the principle that when the SO₂ molecules contained in the sample gas are excited by ultraviolet radiation they emit a characteristic fluorescence in the range of 220-240 nm. This fluorescence is measured and the SO₂ concentration is obtained from changes in the intensity of the fluorescence. Measurement range of the analyzer is 0-0.5 ppm. Continuous data was recorded for duration of 1 hour at AA category point.

**Hydrogen Sulphide (H₂S)**

Hydrogen Sulphide (H₂S) was monitored using HORIBA APNA 360 SO₂ & H₂S Monitor (Combined Use) Analyzer. The APNA-360 H₂S analyzer measures H₂S using UV fluorescence method that operates on the principle of combined use of the H₂S converter unit and the APNA- SO₂, Monitor makes H₂S measurement possible. The H₂S converter unit contains two types of catalyst: SOx scrubber and H₂S converter. SOx is removed by the SOx scrubber, and then the H₂S that has passed through is converted into SO₂ by the H₂S converter. This SO₂ is then measured by the APNA- SO₂ Monitor for display as H₂S concentration. Measurement range of the analyzer is 0-1 ppm. Continuous data was recorded for duration of 24 hours at AA-1 category point while the Monitoring duration at AA-2 point was 12 Hours.

**Particulate Matter (PM₁₀)**

For PM₁₀ mini volume air sampler was used. In PM₁₀ Sampler air is drawn into the omnidirectional inlet head at a flow rate of 16.67 LPM. The air is then accelerated toward the first impaction stage where particulate with aerodynamic diameters greater than 10mm are collected (filtered out). The air stream, carrying particulate 10 microns and smaller, continues down the inlet toward the second impaction stage where particles larger than 2.5 microns are collected. Finally, particulate 2.5mm and
smaller continue down the inlet where they are collected on a 46.2 mm diameter, ring supported filter media disc.

**Noise level**

A sound level meter or sound meter is an instrument that measures sound pressure level, commonly used in noise pollution studies for the quantification of different kinds of noise, especially for industrial, environmental and aircraft noise. Noise level was monitored by EPA certified method using standard noise level meter TENMARS TM-102. The current international standard that specifies sound level meter functionality and performance is the IEC 61672-1:2013.

**Weather Station**

A weather station was installed at Environmental monitoring site to measure some environmental parameters like Ambient Temperature, Relative Humidity, Wind Speed and direction and other weather conditions.

**Water sampling**

Following methodology was adopted for water sampling and analysis:

**Sample Collection:**

The water samples were collected from identified sampling points. The sampling was carried out in accordance to the SOP based on the recognized methods of United State Environmental Protection Agency (USEPA), World Health Organization (WHO) and American Public Health Administration (APHA) for water sampling and analysis.
Measurement of Field Parameters:
Parameters that quickly degrade after they were sampled must be tested in the field. Following parameters were measured in field that can significantly change during storage and transportation.

- pH
- Odor
- Color
- Clarity
- TDS
- Temperature

Preservation:
Preservation is important in order to minimize the changes in the sample. The collected water samples were preserved in appropriate containers as per APHA Guidelines.

Sample Identification and Chain of Custody:
The collected samples were labeled and assigned a unique sample identification number, sampling date and time of collection to collected samples. All the relevant information (sample location, time of collection, sample identification, temperature, pH, collected by, preservation techniques etc.) was recorded immediately on the Chain of Custody form signed by Pak Green field Analyst.
Transportation:

A shipping container (Ice box with eutectic cold packs instead of ice) with maintained temperature of 4°C ± 3°C was used for transporting the sample from the collection site to the environmental laboratory.

Methodology for Wastewater and Drinking Water

Methodology for waste water and drinking water is given below:
Table: waste Water Testing Methods

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Parameter</th>
<th>Method / Technique</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>TDS</td>
<td>Conductivity Method, TDS meter</td>
<td>APHA 2510 B</td>
</tr>
<tr>
<td>2.</td>
<td>pH</td>
<td>By pH meter</td>
<td>APHA-4500 H* B</td>
</tr>
<tr>
<td>3.</td>
<td>TSS</td>
<td>Photometric</td>
<td>HACH Method 8165</td>
</tr>
<tr>
<td>4.</td>
<td>Temperature</td>
<td>Celsius thermometer</td>
<td>APHA-2550 B</td>
</tr>
<tr>
<td>5.</td>
<td>BOD5</td>
<td>Respirometric Method</td>
<td>HACH Method 10099</td>
</tr>
<tr>
<td>6.</td>
<td>COD</td>
<td>Dichromate Reactor Digestion</td>
<td>HACH Method 8000</td>
</tr>
<tr>
<td>7.</td>
<td>DO</td>
<td>Membrane Electrode Method</td>
<td>4500-O G</td>
</tr>
<tr>
<td>8.</td>
<td>Taste and Odour</td>
<td>By Sensory</td>
<td>-</td>
</tr>
<tr>
<td>9.</td>
<td>Oil and Grease</td>
<td>Hexane Extractable Gravimetric Method</td>
<td>HACH Method 10056</td>
</tr>
<tr>
<td>10.</td>
<td>Phenolic Compounds as Phenols</td>
<td>4-Aminoantipyrine Method</td>
<td>HACH Method 8047</td>
</tr>
<tr>
<td>11.</td>
<td>Chloride Cl</td>
<td>Argentrometric Titration</td>
<td>APHA 4500 Cl- B</td>
</tr>
<tr>
<td>12.</td>
<td>Fluoride Fl</td>
<td>SPANS Method</td>
<td>HACH Method 8209</td>
</tr>
<tr>
<td>13.</td>
<td>Arsenic Ar</td>
<td>Silver Diethylthiocarbamate Method</td>
<td>HACH Method 8103</td>
</tr>
<tr>
<td>14.</td>
<td>Sulphate SO₄²⁻</td>
<td>Sulpha Ver 4 Method</td>
<td>HACH Method 8051</td>
</tr>
<tr>
<td>15.</td>
<td>Sulfide S</td>
<td>Methylene Blue Method</td>
<td>HACH Method 8131</td>
</tr>
<tr>
<td>16.</td>
<td>Ammonia NH₃</td>
<td>Salicylate Method</td>
<td>HACH Method 8155</td>
</tr>
<tr>
<td>17.</td>
<td>Pesticides</td>
<td>Micro Extraction and Gas Chromatography</td>
<td>ASTM-D5175</td>
</tr>
<tr>
<td>18.</td>
<td>Total Hardness</td>
<td>EDTA Titration</td>
<td>APHA-2340 C</td>
</tr>
<tr>
<td>19.</td>
<td>Nitrate NO₃⁻</td>
<td>Cadmium Reduction Method</td>
<td>APHA-4500-N0₃ B</td>
</tr>
<tr>
<td>20.</td>
<td>Turbidity</td>
<td>Nephometric Method</td>
<td>HACH Method 8219</td>
</tr>
<tr>
<td>21.</td>
<td>Iron as Fe³⁺</td>
<td>Ferrozine Method</td>
<td>HACH Method 8147</td>
</tr>
<tr>
<td>22.</td>
<td>Sodium Na⁺</td>
<td>Flame Emission Photometric</td>
<td>APHA-3500-Na- B</td>
</tr>
<tr>
<td>23.</td>
<td>Zinc as Zn₂⁺</td>
<td>Zincon Method</td>
<td>HACH Method 8009</td>
</tr>
<tr>
<td>24.</td>
<td>Cyanide as CN⁻</td>
<td>Pyridine-Pyrazalone Method</td>
<td>HACH Method 8027</td>
</tr>
<tr>
<td>25.</td>
<td>An Ionic detergent as MBAs</td>
<td>Methylene Blue Active Substance (MBAS) method</td>
<td>APHA 5540 C</td>
</tr>
<tr>
<td>26.</td>
<td>Total Coli forms</td>
<td>Microbiology</td>
<td>APH A - 9222 B</td>
</tr>
<tr>
<td>27.</td>
<td>Faecal Coli forms (E.Coli)</td>
<td>Microbiology</td>
<td>APHA - 9222 D</td>
</tr>
<tr>
<td>28.</td>
<td>Cadmium Cd</td>
<td>Dithizone Method</td>
<td>HACH Method 8107</td>
</tr>
<tr>
<td>29.</td>
<td>Chromium Trivalent and Hexavalent</td>
<td>1,5 Diphenyl carboxydrazide Method</td>
<td>HACH Method 8023</td>
</tr>
<tr>
<td>30.</td>
<td>Copper Cu²⁺</td>
<td>Porphyrin Method</td>
<td>HACH Method 8143</td>
</tr>
<tr>
<td>31.</td>
<td>Lead Pb⁺²</td>
<td>Dithizone Method</td>
<td>HACH Method 8033</td>
</tr>
<tr>
<td>32.</td>
<td>Mercury Hg</td>
<td>Mercury Extraction Method</td>
<td>HACH Method 10066</td>
</tr>
<tr>
<td>33.</td>
<td>Selenium Se</td>
<td>Diaminobenzidine Method</td>
<td>HACH Method 8194</td>
</tr>
<tr>
<td>34.</td>
<td>Nickle Ni</td>
<td>1-(2 Pyridilazo)-2-Nephtol PAN Method</td>
<td>HACH Method 8150</td>
</tr>
<tr>
<td>35.</td>
<td>Silver Ag</td>
<td>Colorimetric Method</td>
<td>HACH Method 8120</td>
</tr>
<tr>
<td>36.</td>
<td>Boron B</td>
<td>Carmine Method</td>
<td>HACH Method 8015</td>
</tr>
<tr>
<td>37.</td>
<td>Manganese Mn</td>
<td>PAN Method</td>
<td>HACH Method 8149</td>
</tr>
<tr>
<td>38.</td>
<td>Barium Ba</td>
<td>Turbidimetric Method</td>
<td>HACH Method 8014</td>
</tr>
</tbody>
</table>

**Note**: APHA=American Public Health Association, ASTM = American Society for Testing and Materials
Table: Drinking Water Testing Methods

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Parameters</th>
<th>Method / Technique</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>pH</td>
<td>APHA-4500-H+ B</td>
</tr>
<tr>
<td>2</td>
<td>Electrical Conductivity</td>
<td>Conductivity Method, TDS meter</td>
</tr>
<tr>
<td>3</td>
<td>TDS</td>
<td>APHA-2540 C</td>
</tr>
<tr>
<td>4</td>
<td>Turbidity</td>
<td>Nephelometric Method</td>
</tr>
<tr>
<td>5</td>
<td>Taste</td>
<td>By Sensory</td>
</tr>
<tr>
<td>6</td>
<td>Odor</td>
<td>By Sensory</td>
</tr>
<tr>
<td>7</td>
<td>Total Hardness</td>
<td>EDTA Titration</td>
</tr>
<tr>
<td>8</td>
<td>Arsenic</td>
<td>APHA-3120 B</td>
</tr>
<tr>
<td>9</td>
<td>Cadmium</td>
<td>APHA-3120 B</td>
</tr>
<tr>
<td>10</td>
<td>Chloride (Cl(^-))</td>
<td>APHA-4500-Cl B</td>
</tr>
<tr>
<td>11</td>
<td>Copper (Cu)</td>
<td>APHA-3111 B</td>
</tr>
<tr>
<td>12</td>
<td>Sulphate (SO(_4^{2-}))</td>
<td>APHA-4500-SO(_4) C</td>
</tr>
<tr>
<td>13</td>
<td>Nickel</td>
<td>APHA-3120 B</td>
</tr>
<tr>
<td>14</td>
<td>Sodium (Na)</td>
<td>APHA-3111 B</td>
</tr>
<tr>
<td>15</td>
<td>Lead (pb)</td>
<td>APHA-3120 B</td>
</tr>
<tr>
<td>16</td>
<td>Calcium (Ca)</td>
<td>Calcium - Titrimetric, EDTA</td>
</tr>
<tr>
<td>17</td>
<td>Magnesium</td>
<td>Titrimetric</td>
</tr>
<tr>
<td>18</td>
<td>Potassium</td>
<td>APHA-3111 B</td>
</tr>
<tr>
<td>19</td>
<td>Selenium</td>
<td>APHA-3120 B</td>
</tr>
<tr>
<td>20</td>
<td>Carbonate</td>
<td>Acid Titration</td>
</tr>
<tr>
<td>21</td>
<td>Bicarbonate</td>
<td>Acid Titration</td>
</tr>
<tr>
<td>22</td>
<td>Zinc (Zn+2)</td>
<td>APHA-3111 B</td>
</tr>
<tr>
<td>23</td>
<td>Boron (B)</td>
<td>HACH Method 8015</td>
</tr>
<tr>
<td>24</td>
<td>Barium (Ba)</td>
<td>HACH Method 8014</td>
</tr>
<tr>
<td>25</td>
<td>Aluminum (Al)</td>
<td>APHA-3120 B</td>
</tr>
<tr>
<td>26</td>
<td>Fluoride (F1-)</td>
<td>APHA-4500-F-C</td>
</tr>
<tr>
<td>27</td>
<td>Cyanide (CN1-)</td>
<td>APHA-4500-CN F</td>
</tr>
<tr>
<td>28</td>
<td>Chromium (Cr)</td>
<td>APHA-3111 B</td>
</tr>
<tr>
<td>29</td>
<td>Manganese (Mn2+)</td>
<td>APHA-3111 B</td>
</tr>
<tr>
<td>30</td>
<td>Phenolic Compound (As Phenol)</td>
<td>APHA-5530 D</td>
</tr>
<tr>
<td>31</td>
<td>Total Coli-form</td>
<td>MPN</td>
</tr>
<tr>
<td>32</td>
<td>E Coli</td>
<td>MPN</td>
</tr>
</tbody>
</table>
## Summary of Impacts and their mitigation measures

<table>
<thead>
<tr>
<th>Impacts</th>
<th>Mitigation Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land or Soil Erosion</td>
<td>Restoration of land by plantation</td>
</tr>
<tr>
<td></td>
<td>Maximum plantation will be done</td>
</tr>
<tr>
<td>Noise during mining activity &amp; by machinery</td>
<td>Use of PPEs</td>
</tr>
<tr>
<td>Noise by generator (if any)</td>
<td>Regular maintenance of machinery and vehicles</td>
</tr>
<tr>
<td></td>
<td>Monitoring</td>
</tr>
<tr>
<td></td>
<td>Noise level will not be exceeding above the radius of 2 km</td>
</tr>
<tr>
<td>Solid waste From mining activity, domestic and project process sources.</td>
<td>A solid waste management division should be formulated to deal with the proper disposal of solid waste, supervised by HSE Manager, SW Manager, and other related personnel.</td>
</tr>
<tr>
<td></td>
<td>Solid waste generated from the mining activity as loose rocks, stones, mines residues etc. that cannot be used for cement production should be utilized in restoration of the quarry area and during the construction of check dams whereas solid waste from the domestic sources should be disposed off properly.</td>
</tr>
<tr>
<td></td>
<td>Adopt proper solid waste management system</td>
</tr>
<tr>
<td>Waste water from domestic sources</td>
<td>Domestic Waste water generated from the mining activity should be used as sprinkling on the quarry area, on road or for restoration of the land.</td>
</tr>
<tr>
<td></td>
<td>Monitoring</td>
</tr>
<tr>
<td>Particulate Matter and fugitive dust Emissions</td>
<td>Quarry for clay and limestone deposits will cause major impacts on air quality.</td>
</tr>
<tr>
<td></td>
<td>The operation of the quarry cause dust emissions, in the quarry area, limestone quarrying involved blasting that will be source of dust and different gases.</td>
</tr>
<tr>
<td></td>
<td>The area which is mined is stripped of vegetation and left barren this can be significant source of fugitive dust in the vicinity.</td>
</tr>
<tr>
<td></td>
<td>The transportation of the quarried material to the crusher also may cause dust.</td>
</tr>
<tr>
<td></td>
<td>Air Pollution as the quarry roads are un-metaled and the trucks are not covered may cause dust.</td>
</tr>
<tr>
<td></td>
<td>Dust due to proposed mining/extraction activity.</td>
</tr>
<tr>
<td></td>
<td>Dust raised on dirt tracks by project-related vehicles.</td>
</tr>
<tr>
<td></td>
<td>Dust from drilling of deep holes.</td>
</tr>
<tr>
<td></td>
<td>Dust due to drilling and blasting of the rocks.</td>
</tr>
<tr>
<td></td>
<td>Combustion products from vehicles used for project-related activities.</td>
</tr>
<tr>
<td>Gaseous emissions</td>
<td>Air pollution due to site visiting vehicles/ transported trucks, hauled trucks, machinery &amp; generator (if any)</td>
</tr>
<tr>
<td>Health and safety issues will be arose during mining activity, by release of flue gases and heat, handling of explosive material, machinery and improper practices of work</td>
<td>Use of PPEs should be implemented at workplace. First aid measures/medical facility should be provided to project related employees. Safe drinking water must be provided to workers, staff,</td>
</tr>
</tbody>
</table>

---
poor people of the area.
Water consumption records should be maintained
Safety signs & boards should be placed at during mining activity.
Mining site should be fenced properly to avoid any damage to nearby settlements
Smoking or any drugs should be prohibited during working hours or performing work
Do not place any flammable or hazardous substance near the explosive material
At the time of mining, fencing will be ensured for the area under the exploration
At the time of extraction activity proper SOPs will be followed like pre-announcement in the loud speaker and others

Equipment Maintenance Detail
The subject project is the mining for limestone and clay deposits for the proposed cement plant. The company will maintain the records for Health Safety & Environment and will hire HSE manager to check and deal with the HSE issues. The company shall maintained PPEs, medical facilities, firefighting Equipments, SOPs, conduct trainings, develop schedule for blasting, design for proper fencing and records for their periodic fillings or replacement.

Environmental Budget
The cost required to effectively implement the mitigation measures is important for the sustainability of the Project.
Lucky Cement has allocated the Environmental Cost or budget of Rs. 50 million/annum for recover any damages done by the project activities to environment which will include Environment, Health & Safety, for restoration, rehabilitation & landscaping of the area, for installing any pollution abating technology or equipment, for any maintenance and repair of safety devices, for the implementation of Environmental Management Plan and other environment related aspects. Environmental cost can be seen in Annexure-S of Total Project Cost.
## ENVIRONMENTAL MANAGEMENT PLAN FOR

The proposed Mining Project of M/s Lucky Cement Limited at Village Buchal Kalan District Chakwal

<table>
<thead>
<tr>
<th>Serial No.</th>
<th>Aspects</th>
<th>Impacts &amp; Mitigation Measure to be taken</th>
<th>Responsibility</th>
<th>Monitoring</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Land acquired for the lease for the proposed mining activity</td>
<td>The project proponent has applied for the lease of the 6331.43 Acres area for the proposed mining activity. The acquisition of the land for lease can raise conflict with stakeholders. Currently the land is used for grazing and very small patches are present for agricultural practices which are seasonal.</td>
<td><strong>Impacts</strong>&lt;br&gt;• The land clearing/mining process will be very slow and time taking. Owners of the land will be allowed for land grazing after the leasing but that will be restricted at safe distance.&lt;br&gt;• Proponent will follow the rules and guidelines of the concerned Government Departments specially Department of Mines and Mineral Punjab&lt;br&gt;• Land will be acquired after the consensus with stakeholders&lt;br&gt;• Land will not be acquired or possessed forcefully&lt;br&gt;• Gender equity, or the lack of it, reflects women’s access to and control of natural resources, public health, and education services, their participation in decision-making and political processes, and their ownership of productive assets in comparison with men will be considered.&lt;br&gt;• Proper compensation will be given to stakeholders as per policy and negotiation&lt;br&gt;• The land will be restored with maximum plantation and patches for agricultural practices will be maintained.</td>
<td><strong>Responsibility</strong>&lt;br&gt;Proponent Department of Mines &amp; Minerals Punjab and District local Government</td>
</tr>
</tbody>
</table>
- Aesthetic of the area will be maintained and not whole the land will be used for quarrying.
- Land will not be reclaimed on undulating surface. It will be making leveled for the agricultural practices.

### Land Use & Soil Erosion

<p>| No. | Land Use &amp; Soil | Particulate Matters (PM) pollution, degrading of aesthetic beauty of the land due to drilling and blasting and extraction/excation. Clearing of the vegetation Undulated patches. Scarring of the landscape and aesthetic beauty. Clearing of native plants will disturb the complexity of the ecosystem of the proposed area. Dust emissions will generate during the quarrying of clay and limestone. | Measures have been taken to avoid soil erosion and dust pollution. The mining activities will be very slow and spread over an estimated time period of 150 years. Restoration and reclamation plan will be developed to restore the natural landscape of the area. Plant nursery, garden will be developed to rehabilitate the native plants of the area. Mining site will be fenced in a way that the exit route for reptiles will be towards the natural habitat but not towards the any human settlements. Technique of controlled and time specific blasting will be ensured for “safe habitat of the animals”. Project proponent will make any possible efforts to limit the impact on flora and fauna. The management of M/s Lucky Cement has serious concern to preserve the environment and natural elevation beauty of the hills. | HSE department of M/s Lucky Cement Limited Environmental Consultants |</p>
<table>
<thead>
<tr>
<th>Flue gases will be generated due to the involvement of generators and other machinery.</th>
</tr>
</thead>
</table>

### Impacts on Ambient Air Quality

<table>
<thead>
<tr>
<th>3</th>
<th>Air Quality</th>
<th>Particulate Matter and fugitive dust Emissions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Querry for clay and limestone deposits will cause major impacts on air quality.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The operation of the quarry cause dust emissions, in the quarry area, limestone quarrying involved blasting that will be source of dust and different gases.</td>
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<td></td>
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<tr>
<td>The area which is mined is stripped of vegetation and left barren this can be significant source of</td>
<td></td>
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<tr>
<td>Generation of dust or PM at the time of mining activity.</td>
<td></td>
<td></td>
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<tr>
<td>Gaseous or air emissions from the vehicles &amp; transportation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air emissions controlled devices must be installed to control the air pollution</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sprinkling of water must be done to control the dust or PM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vehicle emissions inspection should be done on regular basis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sprinkling should be done on the unpaved area to avoid dust pollution/ particulate matter.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vehicles/ trucks should be serviced regularly</td>
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<td></td>
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<tr>
<td>The proposed site will be located at least minimum nearby settlement is at the distance of 400-500 meters.</td>
<td></td>
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<tr>
<td>In the quarry area.</td>
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</tbody>
</table>

HSE department of M/s Lucky Cement Limited

Proponent/ Environmental Consultants/ EPD
Fugitive dust in the vicinity.

- The transportation of the quarried material to the crusher will also cause dust.
- Pollution as the quarry roads are un-metalled and the trucks are not covered.
- Dust due to proposed mining/extractio n activity, Construction and operation of the proposed cement plant.
- Dust raised on dirt tracks by project-related vehicles.
- Dust from drilling of deep holes.
- Dust due to drilling and blasting of the rocks.
- Combustion products from vehicles used for project-related activities.

Gases emissions from the

Concerted efforts will be made to keep the fugitive dust levels to a minimum. To achieve the objective, controlled blasting using millisecond delay electric detonators (blasting material) will be employed and as a result big piles of rocks and fragments will be pulled down in a single action preventing the formation of dust clouds.

- In proposed cement plant, emissions of dust and harmful gases are possible from numerous locations. To preserve the environment and to safeguard the health of workers and nearby residents, such emissions must be controlled.
- Inside the factory even at a minor dust generation points elaborate arrangements to trap the dust will be made to keep the environment clean. In particular, instead of multi cyclones on the cement cooler, which are usually a source of dust, a heat exchanger and a bag collection
vehicles

- Air pollution due to site visiting vehicles/transported trucks, hauled trucks, machinery & generator (if any) system, will be installed.
- At proposed cement plant of M/s Lucky Cement Limited, the bag filters will be employed to arrest the dust particles in the exhaust emissions. Bag filters are well known for their high removal efficiency under all operating conditions provided the filters are maintained properly.
- Vehicle speed will be reduced on track passing through or close to settlements.
- Imposing speed limits and encouraging more efficient journey management will reduce the dust emissions produced by vehicular traffic. Water will be sprinkled where necessary to contain dust emissions.
- All project vehicles will be checked regularly to ensure that engines are in sound working condition and are not emitting smoke.
- Wet scrubbers will be installed at stacks of generator (if any) to avoid gaseous emission.
- Quarterly or monthly
<table>
<thead>
<tr>
<th>4</th>
<th>Noise</th>
<th>The major sources of the noise at proposed mining site are blasting, drilling, and vehicular and other project related machinery. The other source of noise will be operation of the proposed cement plant project. Blasting operation at the quarry site is the main source of vibrations. A significant impact will be interpreted by the drilling and blasting on workers, nearby community, fauna of the area. Vibration due to the blasting and</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>monitoring is recommended by EPA certified labs to check the compliance with NEQS as per EPA NEQS Rules 2001.</td>
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<tr>
<td></td>
<td></td>
<td>• Air quality was conducted by EPA certified lab and results are incorporated within this report.</td>
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<tr>
<td></td>
<td></td>
<td>• Personal Protective Equipments PPEs including Ear muffs, Ear plugs and other noise abating equipments will be provided to the workers and other staff of the subject project.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• The controlled blasting method ensures that noise will be less than 75 dB (A) at day time at the radius of 2 km distance. Man power involved during blasting activities will be provide safety equipments.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Keeping in view above consideration it is concluded that vibrations generated in the quarry area have little effect on the nearby building structures.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Proper maintenance and tuning of the vehicles</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>NOISE &amp; VIBRATION</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>HSE department of M/s lucky Cement Limited at Buchal Kalan village</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Proponent/Environmental Consultants/EPD</strong></td>
</tr>
</tbody>
</table>
other heavy machinery cause structural problems to the building and vary with the building age constructional material used and vibrational level. High noise level cause hearing loss, deafness, high blood pressure, headache, depression and mentally disturbance. Noise level will not exceed 75 dB(A) at the distance of 2 km radius, activity site is located at a safe distance from the nearest human settlement. Fauna of the study area will also disturb due to the blasting and extensive vehicular noise. Very little is known to the specific response of animals to vibration but based on human should be done.

- Sound proof room should be built for generator (if any) to control the noise.
- Quarterly or monthly monitoring is recommended by EPA certified labs to check the compliance with NEQS as per EPA NEQS Rules 2001.
- Noise level monitoring was conducted at different location and results are incorporated within the report.
response some disturbance might be expected between 1 and 10 mm/S ppv (peak particle velocity). The maximum threshold level for the vibration is between 50 and 100 mm/S ppv have been suggested by Grimshaw (1971) as critical threshold level.

<table>
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<tr>
<th>SOIL CONTAMINATION</th>
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<td>5</td>
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<tr>
<td>Soil Contamination</td>
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<tr>
<td>HSE</td>
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<tr>
<td>Proponent/</td>
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</tbody>
</table>

213
Tarpaulin sheets should be placed under generators and other leaching substances
Injection into the sub soil is illegal and it is not being done at existing unit.
Treated water will be used for planation
Proper storage of oil, fuel etc. is recommended under paved area

### Health & safety

<table>
<thead>
<tr>
<th>No.</th>
<th>Health &amp; safety</th>
<th>Health &amp; safety issues of workers and nearby community</th>
<th>Training of the workers is recommended for health &amp; safety, first aid and firefighting.</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Health &amp; safety</td>
<td>HSE department of M/s lucky Cement Limited</td>
<td>Proponent/Empirical Consultants</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Trainings of the workers is recommended for health &amp; safety, first aid and firefighting.</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Proponent must provide First aid facilities to workers in case of any injury or accident.</td>
</tr>
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<td></td>
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<td></td>
<td>Safe drinking water must be provided to workers, staff, poor people of the area.</td>
</tr>
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<td></td>
<td></td>
<td></td>
<td>Water consumption records should be maintained</td>
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<td></td>
<td></td>
<td></td>
<td>Provision of Proper PPEs must be ensured at workplace</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Assembly point and exit points must be available at workplace</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Electric wires, D.Bs must be kept covered &amp;</td>
</tr>
</tbody>
</table>

Proponent/Empirical Consultants
closed to avoid any electric hazards
- smoking or any drugs should be prohibited during working hours or performing work
- Do not place any flammable or hazardous substance near the explosive material and in the production hall to avoid any fire hazards
- Safety signs & boards will be placed at the time of mining activity
- Security guards will be appointed at the mining site
- At the time of mining or blasting, fencing will be ensured for the area under the exploration
- At the time of blasting proper SOPs will be followed like pre-announcement in the loud speaker and others
- Further proper housekeeping and safety arrangements must be ensured at the subject project

<table>
<thead>
<tr>
<th>Waste water</th>
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<tr>
<td>7</td>
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</tbody>
</table>

HSE department of M/s Lucky Cement Limited
Proponent/ Environmental Consultants/ EPD
Waste water will be generated from domestic sources, waste water pollution, spread of diseases, underground water contamination.

- Domestic waste water generated from the mining activity should be used as sprinkling on the quarry area, on road or for restoration of the land.
- Waste water monitoring is recommended on monthly or quarterly basis by EPA certified lab to check the compliance with NEQS and as per EPA NEQS Rules 2001.

### Solid Waste Generation

| 8 | Solid Waste Generation | Land & soil contamination, aesthetic degradation, foul smell etc. Solid waste generation from the mining activity, domestic and project process sources. Solid waste generated from the mining activity as loose rocks, stones, mines | Generation of construction/domestic solid waste during the subject project mining activity. A solid waste management division will be formulated to deal with the proper disposal of solid waste, supervised by HSE Manager, SW Manager, and other related personnel. Solid waste generated from the mining activity as loose rocks, stones, mines residues etc. that cannot be used for cement production will be | HSE department of M/s Lucky Cement Limited | Proponent/Environmental Consultants |
residues etc. utilized in restoration of the quarry area and during the construction of check dams whereas solid waste from the domestic and plant process sources will be disposed off if agreement is made with the contractors.

- Constructional waste must be utilized for road filling or maintenance purposes.
- Recycling of material should also be implemented up to possible extent within the existing unit.
- Existing Project related solid waste should be handed over to contractors.
- Sludge from the septic tank must be replaced on regular basis.
- It is recommended to ensure proper housing keeping.
- It is recommended to adopt proper waste management system.

<table>
<thead>
<tr>
<th>Odor</th>
<th>9</th>
<th>Odor</th>
<th>NIL</th>
<th>NIL</th>
<th>NIL</th>
<th>NIL</th>
</tr>
</thead>
</table>

**Energy requirement**

<table>
<thead>
<tr>
<th>10</th>
<th>Energy requirement</th>
<th>Resource depletion</th>
<th>Do not waste the energy/electricity when there is no need</th>
<th>HSE department of M/s lucky</th>
<th>Proponent/ Environmental Consultants</th>
</tr>
</thead>
</table>
of it.
- Use energy efficient machinery and equipment
- Use energy saving products
- Conduct and maintain records for energy audits
- Do not leave the machinery in running form when there is no working being done
- Machinery must never be left unattended
- It is recommended to save and conserve the energy and adopt energy efficient technologies.

<table>
<thead>
<tr>
<th>Socioeconomic Impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>11 a</strong> Resettlement</td>
</tr>
<tr>
<td><strong>11 b</strong> Language</td>
</tr>
<tr>
<td><strong>11 c</strong> Education</td>
</tr>
</tbody>
</table>
### Need for Disaster Management and Emergency Response System

In order to cope up with the possible hazards it is imperative to prepare the Disaster Management Plan and rehearse it frequently. To evaluate effectiveness of the system preparedness exercises and drills will be undertaken frequently. Small courses will be run to train the relevant persons about their actions during emergency. The administration staff need be familiar with the firefighting procedures and equipment.

#### Communication System for Declaring Disaster and Emergency Situation

On immediately on occurrence of emergency situation all employees will be informed through disaster Alarm System. The emergency siren means that all employees will assemble at the previously designated assembly areas. At this place the Head of HSE department will instruct the workers regarding their respective duties.

<table>
<thead>
<tr>
<th>11 d</th>
<th>Health</th>
<th>Social performance of the individuals in the area</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>• Heath facilities already exist in the project site.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• The project proponent will assist the local impacted community for the improvement of health services</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Health clinic must be established for the project workers.</td>
</tr>
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<td></td>
<td></td>
<td>Proponent</td>
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<td></td>
<td></td>
<td>proponent</td>
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<table>
<thead>
<tr>
<th>11 e</th>
<th>Culture, Norms of the area</th>
<th>Change in culture by the influx of nomadic people</th>
</tr>
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<tbody>
<tr>
<td></td>
<td></td>
<td>• Maximum local employment should be ensured to preserve the culture of the area</td>
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<td></td>
<td></td>
<td>Proponent</td>
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<tr>
<td></td>
<td></td>
<td>NGO survey</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>11 f</th>
<th>Women Empowerment</th>
<th>Gender inequality</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>• Women involvement in decision making process should be ensured</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Equal employment opportunity in suitable department of the proposed project should be ensured</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Proponent</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NGO survey</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>11 g</th>
<th>Sewage &amp; waste disposal</th>
<th>Diseases caused by improper sanitation</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>• Subject project will uplift the economic status of the nearest human settlements.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Awareness program will be initiated regarding the disposal of waste</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Proponent/ local NGO</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NGO survey</td>
</tr>
</tbody>
</table>
Identification of Risks/Possible Threats

The project and other occupants may come across untoward incidents on account of human interventions and natural catastrophes. Human induced risks may include the placing of an explosive device for causing damage to building and burning of essential office/documentary records. Improper use of electrical, heating and cooking gadgets may lead to outbreak of fires. Similarly the smokers may create large-scale burnings. The natural hazards consist of the possible damage to of the building due to an earthquake or windstorm. Thus there is need of carrying out risk assessment for such eventualities.

According to public Consultation natural disaster are very rare in the area. After the operation of the project proper SOPs will be developed to cope with emergency situation.

Risk Management

Definition of Risk

Risk may be minor, serious or fatal. It may be rare, often or frequent.

Risk = Damage X Rate of Occurrence.

Risks are broadly acceptable, tolerable, unacceptable and residual.

Elements of Occupational Health and Safety Management System (OHMS)

For an effective OHMS, the management of the project will implement the following elements:

- Formulation of OHS Policy
- Identification of risks, hazards and countermeasures
- Adoption of OHS targets based on OHS policy
- Formulation of OHS plans.
- Incorporation of opinions of stakeholders in OHS measures
- Implementation and operation of OHS plans
- Establishing an organization
- Documentation
- Emergency situation
- Routine inspections and improvements
- System audits
- Revision of OSHMS
- OHS education
Post Disaster Rehabilitation

On close of the disaster the management will immediately undertake activities for restoring the normalcy at the site. Efforts will be made to carry on with the operations.
CHAPTER 9

STAKEHOLDERS PARTICIPATION

Public discussions were held with the inhabitant of the surrounding area. They are quite positive to the project and see the project as growing business. The people observe strong positive impacts regarding employment, business and structural development due to this project. EIA findings depict that people perceive overall positive social and economic impacts by the project. Their attitude towards the project installation is highly optimistic. Majority of the people are convinced for development in the area and they correlate this progress with the pace of their social mobility but they were also concerned with scenic beauty of the area and employment which the proponent has ensured to maintain the aesthetics of the area, reclaim the land and also to provide jobs/employment during construction and at the time of functioning of the project. Moreover project proponent admitted to adopt all the mitigation measures to control any impacts resulting from the subject project.

Methodology of consultation:
The EIA team carried out public consultations at various locations around the Project Site and conducting group meetings with different group of stakeholders. The stakeholder’s consultation during this phase of the work targeted the project area, administrative and private offices, Govt. offices, shops, etc. near the Project area:

- Selection of the stakeholders for consultation, reconnaissance of the project site and initial discussions with the local community, residents, education institutes, health institutes, hospital and NGOs, shopkeepers, drivers etc.

- Environmental consultants and social specialists and documenting the opinions of the stakeholders expressed during the meetings etc.

Stakeholder identification:

Stakeholders must be considered at all levels according to the importance of the project. They may be at provincial, district and village level. The process of consultation is an ongoing process which continues during the project life cycle and even after the submission of this environmental assessment report and so on. Therefore, three-tier approach was adopted. Stakeholders were identified, categorized and consulted at provincial (EPD Punjab, Irrigation
Consultations with government, provincial and district level departments were carried out through meetings and visits while consultations with locals, villagers, neighbors and directly affected peoples were undertaken during baseline study of the area.

Consultations were held with the followings:

**Provincial Level:**
1. Environmental protection department, Punjab
2. Agriculture department, Punjab
3. Forest Department, Punjab
4. Wildlife department, Punjab
5. Irrigation Department, Punjab
6. Mines and Mineral department
7. Metrological department

**District Level:**
1. Environmental protection department, Punjab
2. Agriculture department, Punjab
3. Forest Department, Punjab
4. Wildlife department, Punjab
5. Irrigation Department, Punjab

**Village Level:**
1. Project Affected Peoples (PAPs) & local community
2. Neighboring workers
3. Shopkeepers
4. Traders
5. Drivers
6. Buchal Village
7. Gufanwala Village
8. Makhial Village
9. Sarkalan Village
10. Lafi Village

**Proponent**
Possible impacts and mitigation measures related to the subject mining project were discussed with the project proponent and management. They assured to take all suggested
mitigation measures to control any discrepancy arose by the project and to make the project environmental friendly.

**Responsible Authority**
Management of M/s Lucky Cement is the responsible authority to take all measures prior to the mining activity.

**Other departments and agencies**
For the impact analysis detailed meetings were held with the management of M/s Lucky Cement, local community, education institutes, health institutes, hospital and NGOs. Issues were discussed that may affect the environment and also the implementation of proposed project. All possible mitigation measures were considered and incorporated in the Environmental Management Plan.

Scoping sessions, focused group discussion and way side consultations were held with the relevant stakeholders in the area. The purpose of such consultations is to obtain the feedback from the relevant persons.

**Environmental Practitioners and Experts**
Team of M/s Pak Green Enviro-Engineering (Pvt.) Ltd. visited the project site, had discussions with stakeholders and consulted with the local people of nearby and other villages to evaluate the project socio-economic impacts. People of the area belong to different professions like mostly belong to employment, own businesses, doctors, some in abroad, in Army, teaching, in agriculture, etc. Women were also consulted for their point of view regarding the betterment of the area by this project, some of them communicated but according to social value of the area they mostly hesitate to communicate comfortably and get pictured. People provide the massive information about the project and have positive remarks regarding the project development. *Detail is given in Chapter 1 “Introduction.”*

**Affected & Wider Community**
There is no affected community present in the radius of our study area. PGEE team has consulted with the inhabitants of the different villages. They provided positive remarks regarding the subject project and in the favor of the subject mining activity for the proposed cement plant. Stakeholders participation Performa’s and socioeconomic questionnaire were get filled by the inhabitants to evaluate the project socio-economic impacts. Stakeholders’ participation Performa & socioeconomic questionnaire annexed in Annexure-T.
# List of Respondents of different villages

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Name</th>
<th>Qualification</th>
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<th>Residency</th>
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<td>1</td>
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<td>9</td>
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</table>
Sample size
48-50 sample size was selected by the Team of consultants for conducting the socioeconomic survey. Women were also consulted for the said survey; some of their names are mentioned in the above list of respondents while most of them were not willing to give personal information.

Statistical Analysis
SPSS 19.0 has been used for the statistical analysis of the data collected during the visit of study site villages through questionnaires.

Results & Discussion

![Pie Chart]

Discussion:
According to graphical representation, 78% respondents were male while 22% respondents were female. The number of female respondents is less as compared to male respondents because according to the social binding female hesitates to respond or communicate comfortably.
Discussion:
According to above graphical representation, 70% respondents were educated while 30% were uneducated. So, according to the survey overall education status of the area is good.

Discussion:
According to above graphical representation, source of income of majority of the respondents in the area was mainly employee in the private and government sectors while all other respondents’ source of income was business man, farmers, students, doctors and teachers.
Discussion:
As per survey, 81% people were in favor of the mining project and they gave positive remarks regarding the subject project while 16% respondents were have no opinion regarding the project and only 3% respondents were not in favor of the subject project due to their concern regarding the aesthetic degradation of the area and no preference to local people for jobs.
As per survey, 64% respondents remarked that there will be less effect caused by the mining activity on the area environment while 14% respondents had no point of view regarding the mining activity, 13% respondents remarked that subject activity will cause greater effect on the environment of area and only 9% remarked that mining activity will have no effect on the environment of the area.

Discussion:
As per survey, 86% respondents said that mining activity will enhance the living standard and income level of the area, 8% said that there will be no effect on the living standard and income level while only 6% respondents had no remarks regarding the subject project.
Discussion:
As per survey of the area and graph indicates, some people gave remarks that there will be higher air pollution (i.e. 34%) by the subject mining activity, some people said that there will be soil pollution (i.e. 31%) by the subject activity, some people said that there will be no pollution caused by the subject project while some people said that there will be water pollution (i.e. 23%) caused by the subject activity.

Discussion:
As above graph indicates, 36% of the respondents remarked that there will be less effect caused on the plants species by the mining activity, 28% said that there will be no effect caused on the plants species by the subject activity and 23% said that greater impact will be caused by the subject project on the plants species while 13% respondents had no remarks regarding the subject project effect on the plants species.
View of the stakeholders’ participation through groups meetings, discussion and through filling of survey form
CHAPTER 10

CONCLUSION AND RECOMMENDATIONS

Conclusions

Proposed Project is the intention of the M/S Lucky Cement Limited for the proposed mining activity for the proposed cement plant located at Buchal Kalan, Tehsil Kallar Kahar, District Chakwal.

The purpose of this project is to obtain the Environmental approval for limestone and clay mining by submitting the Environmental Impact Assessment EIA report to Environment department for the compliance of section 12, PEPA, 1997 (Amended 2012). The proposed total area for the mining activity for both limestone and clay is 6331.43 Acres.

After obtaining the environmental approval for the mining activity for both minerals the proponent will submit full scale EIA of proposed Cement Plant Project to EPA Punjab for the compliance of section 12 of PEPA 1997 (Amended 2012). Project proponent has obtained grant of lease for limestone mining from Department of Mines & Minerals Punjab vide letter no. D (M&M)/LSM-APP-CKL-1-Limestone (18) dated 13-08-15 while for the grant of lease for clay mining it has been applied to Department of Mines & Minerals Punjab. Proponent will also get other approvals from other relevant departments.

Proposed project Mining activity includes the surface mining for the limestone and mechanical mining for the clay. Control blasting will be used only for hard rocks. Drilling and open pit mining will also be used. Control blasting will be safe for the environment and have impacts within the radius of 2 km. proper measures will be taken by management of M/S Lucky Cement limited before the blasting and inform the local people prior to the blasting by loud speaker. Blasting not done in the night time and specific time of blasting will be mentioned in the schedule table that will be display at the Gate of proposed unit site.

Mechanical extraction for the clay is safe and environment friendly methodology with no or few impacts like major impact is PM/dust which will be controlled through water sprays on dusty tracks and during excavation/extraction. Other impacts will also be controlled through adopting proper mitigation measures. Activity site will also be restored with native plants to reclaim the land, proper measures will be taken by management of M/S Lucky Cement limited before the extraction and inform the local people prior to start work by loud speaker.
This single stage EIA reveal that this project

- The EIA study reveals that the project is economically viable, socially acceptable and environment friendly.
- On completion of the project M/S Lucky Cement Limited, it will serve the people of District Chakwal especially nearby villages including the Buchal Kalan, Makhial, Laafi Sir Kalan Village and other people throughout the country.
- It will generate additional jobs during construction and operation phases.
- The proponent has committed to implement the project in the environment friendly manner.
- Project proponent intends to register the project with local Government.
- M/S Lucky Cement will be prepared and implemented very comprehensive Emergency Preparedness and Response Standard Operating Procedures after the leasing approval of the mentioned area.

Main environmental issues are as under:

- Dust emission during extraction/mining process
- Land & soil disturbance
- Noise from generator
- Production of Solid Waste
- Emission from generator
- Generation of waste water
- Health & safety issue

Recommendations

- In view of the comprehensive screening process and findings of the present study there is no need of conducting further investigations.
- Sprinkling of water must be done during mining/excavation activity and on dusty roads
- PPEs as mask will be provided to workers during working
- Solid waste will be managed properly.
- Local people will be preferred for mining activity and during construction & operation of the proposed cement plant for jobs.
- Tree plantation is recommended.
- Land Restoration/reclamation is recommended
- Safety rules, SOPS must be followed to carry out the mining activity
- Fencing must be done at mining site to avoid any mishap
- Mining activity will not be done at night time.
- People of the nearby area will be informed prior to start mining activity.
- Energy efficient system will be installed at proposed cement plant.
- The untreated wastewater will not be reused for irrigating the vegetation and lawns at proposed cement plant.
- Waste water treatment plant will be installed with the approval of the project at proposed cement plant
- R.O Plant will be established in future for the purpose of drinking water.
- PPEs will be provided to workers during mining activity and at proposed cement plant.
- Sound proof room will be constructed to lessen the noise from generator.
- High standards of bio-security and safety will be enforced during operation stage. Safety of the workers will be top priority for the management.
- The project manager will continue to assist the local communities as a corporate/social responsibility.

The present EIA report is single stage EIA for the mining activity, after the mining project approval M/S Lucky Cement Limited will submit the full life cycle EIA for the whole project to meet the sustainability, mitigations, administrative and legal framework. Therefore, the environmental approval may be accorded for the present project.
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