



**GOVERNMENT OF THE PUNJAB
ENVIRONMENTAL PROTECTION AGENCY**



Environmental Assessment Checklists and Guidelines

Stone Crushing Units

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1. Introduction

1.1 Background

The stone crushing industry plays a vital role in supporting infrastructure and economic development in Punjab by producing aggregates required for construction projects. Stone crushing operations typically involve extraction, crushing, screening, storage, and transportation of raw materials. These activities may result in emissions of dust, noise, vibration, wastewater, and solid waste, as well as increased traffic and pressure on surrounding natural resources. Appropriate environmental planning and management are therefore essential to minimize adverse environmental and social impacts.

1.2 Purpose of Guidelines

These guidelines have been prepared to assist project proponents, environmental consultants, and regulatory authorities in identifying, assessing, and managing the potential environmental impacts associated with the planning, design, construction, operation, and maintenance of bus terminal projects. The guidelines provide practical guidance for the preparation of Initial Environmental Examination (IEE) reports, implementation of appropriate mitigation measures, environmental monitoring, and preparation of Environmental Management Plans (EMPs). They are intended to facilitate compliance with the applicable environmental legislation, regulations, and standards in Punjab while promoting environmentally sustainable development of stone crushing units.

1.3 Scope of the Guidelines

These guidelines apply to future developments of stone crushing units in Punjab. They address units set up in permanent locations rather than temporary units at quarry mouths.

1.4 How to Use these Guidelines

The project proponent is obliged to use these guidelines and fill out the environmental impact assessment forms provided.

Step 1: Provide information on project [use **Section I**]

Step 2: Determine Applicability (Are you sure that IEE or EIA is not required?)
[use **Section II**]

Step 3: Describe the physical, biological and social environment [use **Section III**]

Step 4: Assess potential impacts and applicable mitigation measures [use **Section IV**]

Step 5: Provide undertaking to the EPA on mitigation measures and compliance
[use **Section V**]

Completed form is to be submitted to the Environmental Protection Agency Punjab for evaluation. EPA Punjab may request for additional information or decide to undertake a visit to the proposed project site in order to assess the environmental impact of the proposed project.

1.5 Glossary

Act: The Punjab Environmental Protection Act 1997 (Amended 2017)

Coagulation: A process of the using chemicals (the coagulants) to make suspended solids to gather or group together to form larger masses or flocs, which can settle to the bottom.

Dust: are fine powdery material such as dry earth or pollen that can be blown about in the air

Environment: means (a) air, water and land; (b) all layers of the atmosphere; (c) all organic and inorganic matter and living organisms; (d) the ecosystem and ecological relationships; (e) buildings, structures, roads, facilities and works; (f) all social and economic conditions affecting community life; and (g) the inter-relationships between any of the factors in sub-clause (a) to (f).

Environmental Assessment: A technique and a process by which information about the environmental effects of a project is collected, both by the developer and from other sources, and taken into account by the planning authority in forming their judgments on whether the development should go ahead.

Filtration: A process of subjecting any effluent to pass through a membrane or a layer of sand or gravel to separate the suspended particles.

Impact on Environment: means any effect on land, water, air or any other component of the environment, as well as on wildlife harvesting, and includes any effect on the social and cultural environment or on heritage resources.

Liquid Effluent: The used water coming out of the flour mill unit.

Lime: is the common name for oxides of calcium

Mitigation Measure: A measure for the control, reduction or elimination of an adverse impact of a development on the environment, including a restorative measure.

Noise: Any unwanted sound; sound that is loud, unpleasant or unexpected.

Regulations: means The Punjab Environmental Protection (Review of IEE and EIA) Regulations, 2022

Suspended Solids: These are solid particles suspended in water that can be removed by filtration or coagulation.

Sedimentation: A process of settling down of particles by gravity

2. Project profile

2.1 Project Description

Stone crushing industry is an important industrial sector in the country engaged in producing crushed stone used as raw material for various construction activities such as construction of roads, bridges, buildings and canals. The stone crushing units can be seen in the vicinity of almost all major cities and towns. A stone crushing unit involves different processes including but not limited to following processes:

- Quarrying / Mining

- Transportation
- Crushing
- Grading (Segregation of crushed material through different sieves)
- Product transportation

Mining process, most of the times involves use of explosives material to destabilize the rocks and then dowel bars are used to remove large boulders.

The mined stone is transported to the crusher sites by road through tractor trolleys or pay-loaders. The pay-loaders unload the mined stones into storage hoppers located at elevated levels of the crusher sites. These stones are crushed in a Primary Crusher and sent to a vibratory screen. The oversize from the screen is sent for further size reduction in secondary and tertiary Crushers.

From the secondary and/or tertiary crushers, the crushed stones are sent for screening. In the screen, products of various sizes get separated which are stored in heaps. Movement of stones from crusher to screen to product piles is done through belt conveyors. The product is generally stored in open areas.

3. Environmental Impacts

The major environmental impacts, occurred during various processes of marble and stone crushing units are discussed for each of the process steps.

3.1 Impacts of Quarrying and Excavation

i. Land and Soil

- Permanent alteration of landform and topography.
- Removal of topsoil and overburden.
- Land degradation and loss of productive land.
- Soil erosion and slope instability.
- Increased risk of landslides in hilly areas.

ii. Biodiversity

- Clearing of vegetation and trees.
- Loss and fragmentation of wildlife habitat.
- Disturbance to flora and fauna.
- Reduction in biodiversity.

iii. Water Resources

- Alteration of natural drainage patterns.
- Increased surface runoff.
- Sedimentation of nearby streams and water bodies.
- Possible lowering of groundwater table due to excavation.

iv. Air Quality

- Dust emissions from excavation and earth-moving activities.
- Exhaust emissions from heavy machinery.
- v. Noise and Vibration**
- Noise from excavators, loaders, bulldozers, and other heavy equipment.
- Ground vibration affecting nearby structures and wildlife.
- vi. Landscape**
- Visual scarring of the landscape.
- Permanent alteration of natural scenery.

3.2 Impacts of Blasting Operations

- i. Air Quality**
 - Generation of large quantities of dust.
 - Release of gaseous pollutants such as NO_x and CO.
 - Temporary deterioration of ambient air quality.
- ii. Noise**
 - High noise levels during blasting.
 - Disturbance to nearby residents and wildlife.
- iv. Vibration**
 - Ground vibration affecting nearby buildings and infrastructure.
 - Potential structural damage to nearby properties.
 - Public complaints due to vibration.
- v. Safety**
 - Fly rock hazards.
 - Risk of accidents to workers and nearby communities.
 - Damage to utilities.
- vi. Biodiversity**
 - Disturbance to wildlife.
 - Displacement of birds and mammals.
 - Damage to nearby vegetation.

3.3 Impacts of Crushing, Screening (Sieving), and Grading

- i. Air Quality**
 - Emission of particulate matter (PM₁₀ and PM_{2.5}).
 - Dust from crushers, screens, conveyors, and stockpiles.
 - Fugitive dust from material handling.
- iii. Noise**
 - Continuous noise generated by crushers, screens, conveyors, and generators.

- Increased occupational noise exposure.

iv. Vibration

- Mechanical vibration from crushing equipment.

vii. Solid Waste

- Generation of fine stone dust.
- Waste lubricants and used machine parts.
- Scrap metal and packaging waste.

viii. Energy Consumption

- High electricity or diesel consumption.
- Greenhouse gas emissions associated with energy use.

3.4 Material Storage and Stockpiling

i. Air Quality

- Wind-blown dust from stockpiles.
- Dust during loading and unloading.

ii. Land

- Occupation of large land area.
- Soil contamination from oil leakage.

iii. Water

- Sediment-laden runoff from stockpiles during rainfall.
- Blockage of natural drainage.

3.5 Transportation of Raw Material and Finished Products

i. Air Quality

- Dust generated from haul roads.
- Vehicle exhaust emissions.
- Resuspension of road dust.

ii. Noise

- Traffic noise.
- Vehicle horns.

iii. Road Infrastructure

- Damage to local roads.
- Increased road maintenance requirements.

iv. Community Health and Safety

- Increased traffic accidents.
- Safety risks for pedestrians.
- Traffic congestion.

ix. Climate Change

- Greenhouse gas emissions from heavy vehicles.

3.6 Plant Operation and Maintenance

i. Water Resources

- Wastewater from equipment washing.
- Oil-contaminated runoff.

ii. Soil

- Fuel and lubricant spills.
- Soil contamination.

iii. Hazardous Waste

- Used engine oil.
- Oil filters.
- Batteries.
- Grease containers.

iv. Occupational Health

- Exposure to silica dust.
- Excessive occupational noise.
- Heat stress.
- Risk of injuries from moving machinery.

3.7 Socio-economic Environment

i. Positive Impacts

- Employment generation.
- Local business development.
- Supply of construction materials.
- Government revenue.

ii. Negative Impacts

- Public nuisance due to dust and noise.
- Reduced agricultural productivity due to dust deposition.
- Community complaints.
- Increased pressure on local infrastructure.

3.8 Cumulative Environmental Impacts

- Progressive deterioration of ambient air quality.
- Regional increase in dust levels.
- Loss of vegetation cover.
- Degradation of scenic beauty.

- Increased traffic on local roads.
- Depletion of natural resources.
- Combined impacts of multiple stone crushing units on nearby communities and ecosystems.

4. Environmental Mitigation Measures

The major environmental aspects for marble and stone crushing units are discussed for each of the process steps.

4.1 Quarrying and Mining

Protocols /measures for types, storage and use of explosive materials, as required under the Punjab Explosives (Amendment) Act, 2014 be followed.

4.2 Transportation (Raw and Finished Materials)

Location of unit has to be such that ingress of heavy vehicles does not block the traffic. Ensure to avoid evening and late-night operation if passage is through residential areas. Control measures to prevent escape of dust into environment from unit premises and connecting routes may include but limited to paving, covering with stones and sprinkling etc. Ensure covering of the transportation vehicles with tarpaulins when transporting crush to prevent fall out of fines and emissions of dust.

4.3 Crushing and Screening

i. Dust and Noise Containment

Since most of the stone crushers are installed and operated in open with minimum containment, enclosures provided over crushing equipment and conveyors for control of dust emission are inadequate. Dust containment enclosures are required to adopt and implement any air emission control measures which may include containment, scrubbing the emissions with water and to prevent wind currents. Provision of leak proof enclosures be ensured for followings be ensured:

- Primary Crusher discharge area
- Vibratory screens (Sieves)
- Product storage hoppers (optional)
- Conveyors belts (optional)

ii. Dust Suppression system

The Dust Suppression System should comprise of a covered water storage tank, a pump, an online water filter, connecting GI pipes, spray nozzles each fitted with flow regulating valves. The recommended locations where sprays could be located are:

- Spray on the stones while Unloading from the truck/dumper
- Spray at the Primary crusher feeder chute

- Spray at the secondary/tertiary crusher inlet chute / hoppers
- Spray at the Transfer points from one belt conveyor to another
- Spray at Crusher discharge points

iii. Liquid Effluent Treatment

Sprinkled water, containing suppressed dust from aforementioned sources, be routed to sedimentation tanks to hold the generated sprinkled water. This water can be recycled, after addition of makeup water. The settled dust, when required, can be removed manually to dispose of properly.

In case of shortage of water or to obtain desired quality of water for recycling, the wastewater (scrubbed and sprinkled) be subjected to coagulation and sedimentation.

Table below describes the summary of Environmental Impacts and control measures for ready reference of proponents is given below:

Activity	Potential Environmental Impacts	Control / Mitigation Measures
Quarrying and Excavation	Loss of topsoil and land degradation	Strip, stockpile and reuse topsoil for site restoration and landscaping.
	Soil erosion and slope instability	Stabilize slopes through benching, terracing, retaining structures, and revegetation.
	Loss of vegetation and habitat	Minimize vegetation clearance and undertake compensatory plantation using native species.

Environmental Assessment Checklists and Guidelines – Stone Crushing Units

Activity	Potential Environmental Impacts	Control / Mitigation Measures
	Habitat fragmentation and biodiversity loss	Avoid ecologically sensitive areas and maintain ecological corridors where feasible.
	Dust emissions	Sprinkle water on haul roads and exposed surfaces; cover trucks transporting materials.
	Noise from heavy machinery	Maintain equipment regularly and restrict operations to daytime hours.
	Visual impacts	Restore quarried areas progressively and establish green belts around the site.
Blasting Operations	Dust generation	Wet blast areas where practicable and sprinkle water before and after blasting.
	Air pollution from blasting gases	Use controlled blasting techniques and approved explosives.
	Excessive noise	Restrict blasting to specified daytime hours and provide advance public notification.
	Ground vibration	Adopt controlled blasting techniques and monitor vibration levels near sensitive receptors.
	Fly rock hazards	Maintain exclusion zones and use blast mats where necessary.
	Disturbance to wildlife	Avoid blasting during breeding seasons and near sensitive habitats.
	Public safety risks	Develop and implement a Blasting Management Plan and Emergency Response Plan.
Crushing, Screening and Grading	Dust emissions (PM ₁₀ and PM _{2.5})	Install water spray systems, enclose crushers and screens, and install dust extraction or suppression systems.
	Fugitive dust from conveyors	Cover conveyors and transfer points or install water misting systems.
	Noise from crushers and screens	Install acoustic enclosures where feasible and maintain equipment regularly.
	Occupational exposure to dust	Provide workers with appropriate respiratory protective equipment (PPE).
	Occupational noise exposure	Provide hearing protection and rotate workers where necessary.
	High energy consumption	Install energy-efficient motors and regularly maintain equipment.

Environmental Assessment Checklists and Guidelines – Stone Crushing Units

Activity	Potential Environmental Impacts	Control / Mitigation Measures
Material Storage and Stockpiling	Wind-blown dust	Cover stockpiles or regularly sprinkle water; establish windbreaks where appropriate.
	Sediment-laden runoff	Construct drainage channels and sediment traps around stockpiles.
	Soil contamination from oil leakage	Store machinery in designated impermeable areas with spill containment.
Transportation	Dust from haul roads	Regularly sprinkle water on haul roads and pave frequently used internal roads where feasible.
	Vehicle exhaust emissions	Maintain vehicles regularly and discourage unnecessary idling.
	Traffic congestion	Prepare and implement a Traffic Management Plan.
	Road safety risks	Install warning signs, enforce speed limits, and train drivers on safe driving practices.
	Damage to public roads	Repair roads damaged by project vehicles and avoid overloading trucks.
Plant Operation and Maintenance	Oil and fuel spills	Store fuels and lubricants in bunded areas and maintain spill response equipment on site.
	Hazardous waste generation	Collect, store, and dispose of used oil, filters, batteries, and hazardous waste through licensed contractors.
	Wastewater generation	Treat wastewater before discharge and prevent direct discharge into natural water bodies.
	Soil contamination	Regularly inspect storage tanks and pipelines for leaks.
	Occupational accidents	Implement an Occupational Health and Safety Plan and provide appropriate PPE.
General Site Activities	Solid waste generation	Segregate waste at source and dispose of it through approved waste disposal facilities.
	Poor housekeeping	Maintain clean work areas and remove waste regularly.
	Fire hazards	Install fire extinguishers, maintain emergency response equipment, and prohibit open burning.
	Community nuisance	Establish a grievance redress mechanism and maintain communication with nearby communities.

Environmental Assessment Checklists and Guidelines – Stone Crushing Units

Activity	Potential Environmental Impacts	Control / Mitigation Measures
	Visual impacts	Develop green belts around the facility and rehabilitate disturbed areas progressively.
Cumulative Impacts	Progressive deterioration of air quality	Maintain adequate buffer distances between crushing units and sensitive receptors; implement dust suppression measures.
	Depletion of natural resources	Adopt efficient resource utilization and progressive rehabilitation of quarry areas.
	Cumulative noise impacts	Coordinate operating hours where multiple crushing units exist in close proximity.
	Regional ecological degradation	Avoid establishing crushing units in environmentally sensitive areas and implement biodiversity conservation measures.

Environment Assessment Checklist

Section I: Project Description

File No _____ (To be filled by EPA)

Date _____

General Information

1. Project Name or Title

2. Project Proponent (Department or Organization)

3. Address _____
4. Telephone _____
5. Fax _____
6. E-mail _____
7. Representative of the Proponent

8. Designation _____
9. Name of the person who conducted this assessment

10. Designation _____
11. Qualification _____

Project Information

12. Project Location _____
13. Cost of the Project _____
14. Area of the proposed land for the plant
Total _____ m²
Proposed covered _____ m²
Open space _____ m²
15. Brief description of the plant

Please attach a plot plan of the proposed project site showing the location of the key structures, access, utilities, **explosive storage area**, etc.

16. List key equipment of the plant

17. Design production capacity of the unit _____
18. Number and qualification of required staff to run the unit? _____
19. What will be the expected water requirement for the unit? _____ m³/d
20. What is the proposed source of water? _____
21. Where will the wastewater from the unit be disposed of? _____

22. Describe the type of material that will be discharged with the wastewater?

23. Please describe any treatment system for the wastewater planned?

24. Type and quantity of raw material for the unit? _____

25. What is the expected source of the raw material?

26. What are the expected operating hours? _____

27. Is the night shift planned?

28. How many vehicles carrying raw material and finished product are likely to enter or leave the unit daily?

29. What measures will be employed to protect the laborers from occupational safety hazards?

Construction

30. Who owns the proposed land for the project? _____

31. What is the present use of the land? _____

32. Are there any squatter settlements on the land? _____

If yes, please specify

- Number of settlements _____
- Will any compensation be paid to them? _____

33. Are there any structures on the proposed site now? ☐ Yes ☐ No

34. If yes, will any structure be demolished? ☐ Yes ☐ No

35. If yes, where will the demolition waste be disposed of? _____

36. Are there any trees on the proposed site? ☐ Yes ☐ No

37. Will any tree be removed? ☐ Yes ☐ No

If yes, how many? _____

38. Period of construction (start and end dates) _____

39. What major construction equipment (dozer, grader, crane, etc.) will be used?

40. Is construction work during the night planned? ☐ Yes ☐ No

Section II: Screening

1. Is the proposed project located in an ecologically sensitive area? ☐ Yes ☐ No
2. Is the total cost of the proposed project Rupees 10 million or more? ☐ Yes ☐ No

If the answer to any of the above questions is **Yes**, then the project shall require either an **Initial Environmental Examination (IEE)** or an **Environmental Impact Assessment (EIA)**. Proponents must refer to the **Punjab Environmental Protection (Review of IEE and EIA) Regulations, 2022**, specifically **Schedule I** or **Schedule II**, to determine the appropriate category for their project.

Section III: Environmental Profile

1. Describe the terrain of the project area:
☐ Flat or Level (Slope < 3%)
☐ Level to moderately steep (Slope 3%-30%)
☐ Moderately steep to mountainous (Slope > 30%)
2. Are there signs of soil erosion or landslide anywhere within 500 m of the proposed site?
☐ Yes ☐ No
If yes, please describe (where, nature) _____
3. Is there any surface water body (river, canal, stream, lake, wetland) within 1,000 m of the proposed site?
☐ Yes ☐ No

If yes, describe each water body:

Name (including type, ie, river, canal or stream)	Dimensions	Status and Uses (Is it polluted? Is domestic or other wastewater discharged to it? What are its uses, eg, agriculture, domestic, industrial, washing, fishery)

4. Is there any groundwater well on the proposed site or within 500 m of the proposed site?

☐ Yes ☐ No

If yes, describe each well:

Type (Dug well, tube well, hand pump)	Location (Village, road, mohallah, etc. and distance from the site)	Depth and Yield	Uses (Drinking, agriculture, domestic, industrial, washing, livestock)

5. Based on the interview of the surrounding population or a wildlife expert, is any form of wildlife found on, or around the proposed site of the project?

☐ Yes ☐ No

If yes, please describe _____

6. Are there any existing trees or vegetation on the proposed site?

☐ Yes ☐ No

If yes, how many? _____

7. Are there any reserved forest or protected areas within 1,000 m of the proposed site?

☐ Yes ☐ No

If yes, please describe? _____

8. Please provide the traffic count for all main roads adjacent to the proposed site or roads that will provide access to the site. The count should be based on data collected, for both directions, on at least three typical working days. Use the following format:

Road _____ Count Location _____

	<u>6:00 am- 9:00 am</u>	<u>9:00 am- 12:00 noon</u>	<u>12:00 noon- 3:00 pm</u>	<u>3:00 pm- 6:00 pm</u>	<u>6:00 pm- 9:00 pm</u>
Large vehicles (trucks, buses, tractor trolleys, Minibuses)					
Medium sized vehicles (Suzuki pickups, cars, jeeps, taxis)					
Small vehicles (Rickshaws, motorcycles, scooters)					
Slow vehicles (animal-driven carts, tongas)					
Others					

(Please add additional sheets for every road)

9. What is the present land use in the vicinity (roughly a radius of 500 m) of the proposed site?

	Residential (Thick, Moderate, Sparse)	Commercial (Office, Shops, Fuel Stations)	Open Land (Parks, Farmlands, unutilized plots, barren land)	Sensitive Receptors and Sites of Cultural Importance	Other

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Description					

(Please attach a map of the proposed project site and indicate roughly the area that you have considered for this evaluation)

10. For any agricultural farmland on the proposed site and a radius of 500 m around it, provide the following information:

- Main crop(s) and average yield_____
- Source of irrigation water_____
- Area affected by salinity or water logging_____

11. Please describe all the sensitive receptors within 500 m of the proposed site:

Type (schools, Colleges, hospitals, and clinics)	Name	Size (Number of students or number of beds)	Location (Village, road, mohalla, etc.)	Distance from Site

12. Roughly, how many houses are within a radius of 500 m of the proposed site?

13. What proportion of the houses in the area are *pukka*, *semi-pukka*, and *kutcha*?_____

14. How are the general hygienic conditions of the project area?

- ☐ Generally clean
- ☐ Fair

☐ Poor

15. Is there any bad odor in the project area?

☐ Yes ☐ No

What is the source of the odor? _____

16. What are the main sources of income of the surrounding community?

17. Is there any site of cultural importance (graveyard, shrine, mosque, archeological site) within 1,000 m of the proposed scheme:

☐ Yes ☐ No

If yes, please describe? _____

18. What other main sources of pollution exist within a radius of 500 m of the proposed site:

Name of the Source	Type of Pollution (Noise, air water)	Location (Village, road, mohalla, etc.)	Distance from Site

Section IV: Impact Assessment

Potential Negative Environmental Impacts		Mitigation Measures	Tick if proposed	Monitoring
Siting	☐	Station is not located within _____ m of any educational institution or health facility.	☐	

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Traffic	☐	Plant is located such that ingress of heavy vehicles does not block the traffic.	☐	
Noise and Dust	☐	Dust containment enclosures provided for: • Primary Crusher discharge area • Vibratory screen • Product storage hoppers • Belt Conveyors	☐ ☐ ☐ ☐	

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[illegible]

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		Evening and late-night operation of material and product trucks will be avoided.	☐	
Wastewater	☐	Volume and strength reduction achieved by preventing mixing of washing and processing waters.	☐	
		Effluent treated via sedimentation (settling tanks).	☐	
		Effluent treated via coagulation (adding coagulants to settling tanks).	☐	
		Effluent treated via coagulation and filtration .	☐	
Occupational Safety	☐	Workers will be provided with protective equipment (PPE).	☐	
	☐	Will there be any use of explosive during quarrying/mining	☐	
	☐	Have measures to protect workers and trespassers been proposed in accordance with Punjab Explosives (Amendment) Act, 2014	☐	

Section V: Undertaking

I, _____ (*full name and address*) as proponent for
_____ (*name, description and location of project*) do hereby solemnly affirm and
declare:

1. The information on the proposed project and the environment provided in
Forms I, II and III are correct to the best of my knowledge
2. I fully understand and accept the conditions contained in the Guidelines for
____ (*name, number and version of the guidelines*)
3. I undertake to design, construct and operate the project strictly in
accordance with the project described in Form I, submitted with this
undertaking.
4. I undertake to implement all mitigation measures and undertake
monitoring stated in Form IV, submitted with this undertaking.

Signature _____

Date _____

Name _____

Designation _____

(with official stamp/seal)

Witnesses:

Signature

Name

Address

1. _____
2. _____

