

# NWFP Environmental Protection Agency

## Environmental Assessment Checklists and Guidelines

### Stone Crushing Units

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## 1. Introduction

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Stone crushing is an important component of the construction industry. The stone crushing units can be installed with moderate investment often with limited regulatory control. The units produce crushed stone that is used as raw material for various construction activities including buildings and roads.

### 1.1 Scope of the Guidelines

These guidelines are applicable to the future developments of stone crushing units in the province of NWFP having a total cost of less than Rupees ten million.

These guidelines will address stone crushing units set up in permanent location rather than the temporary crushing units set up at quarry mouths.

### 1.2 How to use these Guidelines

The project proponent (the local government, municipal government, city government or the cantonment board) is obliged to use these guidelines. The project proponent has to fill in an environmental impact assessment form. The following steps are to be taken in this regard:

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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 NWFP Environmental Protection Agency for evaluation. NWFP EPA may request for additional information or decide to undertake visit to the proposed project site in order to assess the environmental impact of the proposed project.

### 1.3 Glossary

**Act** means the Pakistan Environmental Protection Act, 1997

**Coagulation** means the use of 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** means 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** is the used water coming out of the stone crushing unit

**Lime** is the common name for oxides of calcium

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

**Noise** is defined as unwanted sound; sound that is loud, unpleasant or unexpected.

**Regulations** means the Pakistan Environmental Protection Agency Review of Initial Environmental Examination and Environment Impact Assessment Regulations, 2000

**Suspended Solids** are solid particles suspended in water that can be removed by filtration or settlement

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**Sedimentation** means settling of particles by gravity

## 2. Project Profile

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### 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.

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. A schematic of typical stone crusher units is given in **Exhibit 1**.

### 2.2 Environmental Aspects

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

#### ***Raw and Finished Material Transportation***

This activity can bring about significant increase in the noise levels in the vicinity of the crushing unit due to the heavy transport deployed to bring the raw material to the site. The loaded trucks are also slow moving vehicles and if the access roads are not wide enough they can cause overall traffic slowdowns and congestion during peak hours. Further the transport of crushed stones and fines in bulk through open trucks also causes the emission of dusts into the air and spattering of fine stones on vehicles and other users of the roads taken by the product truck.

#### ***Crushing and Screening***

The main aspects of these activities are generation of noise and dust. There are:

- ▶ Emissions during unloading of mined stones at crusher site
- ▶ Emissions during Crushing Operations
- ▶ Emissions during Material Movement and Transfer
- ▶ Emissions during Vibratory Screening Operation

Conveyors and crushers both generate mechanical sound as well as large amounts of dust. Water used for cooling purposes will also carry large load of suspended solids.

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**Product Storage**

- ▶ Products of screening are usually left in form of piles of crushed products in the open. There are:
  - ▷ Emissions during loading of crushed stone Products
  - ▷ Secondary emissions from Stock Piles

**2.3 Mitigation Options**

**Raw and Finished Material Transportation**

Location of plant has to be such that ingress of heavy vehicles does not block the traffic. Evening and late night operation is avoided if passage is through residential areas. Payload area is covered by tarpaulins when transporting crush to prevent fall out of fines and emissions of dust.

**Crushing and Screening**

- ▶ Dust and Noise Containment
 

In general enclosures provided for dust control in equipment and conveyors are inadequate. Dust containment enclosures are required for the purpose of containing the emissions within an enclosure and to prevent wind currents, which can spread the dust to larger areas. Such enclosures are recommended for following:

  - ▷ Primary Crusher discharge area
  - ▷ Vibratory screen
  - ▷ Product storage hoppers (optional)
  - ▷ Belt Conveyors (optional)

The enclosures should be, complete from all four sides and roof. There should not be open

windows/ openings etc. The gaps should be sealed using gaskets or wool type packing etc.

▶ **Dust Suppression**

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

**Liquid Effluent Treatment**

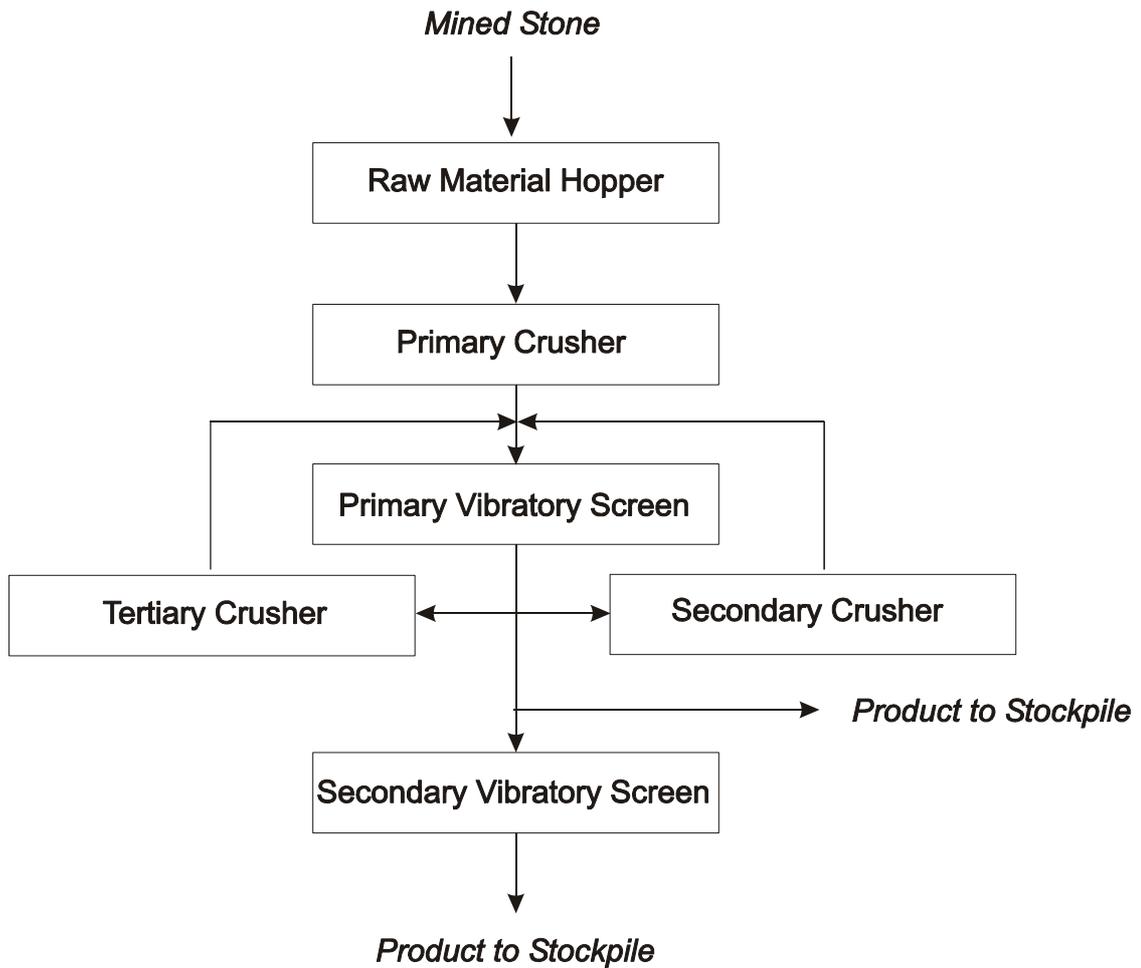
- ▶ Volume and strength reduction of the effluent is to be achieved by preventing mixing of waters from washing activities and processing activities
- ▶ Liquid effluent is to be treated by sedimentation process meaning subjecting the effluent to flow through settling tanks
- ▶ Effluent is to be treated by coagulation that is adding any coagulant to the settling tanks. Nevertheless, this treatment is expensive as compared to the sedimentation process yet it is more efficient.

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- ▶ Effluent is to be treated by coagulation and filtration. Treated effluent can be reused but the treatment process is expensive comparatively.

**Exhibit 1:** Process Flow Diagram of Typical Stone Crusher Unit



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## Environmental 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 \_\_\_\_\_ m<sup>2</sup>
  - Proposed covered \_\_\_\_\_ m<sup>2</sup>
  - Open space \_\_\_\_\_ m<sup>2</sup>
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, units, etc.*

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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? \_\_\_\_\_ m<sup>3</sup>/d

20. What is the proposed source of water? \_\_\_\_\_

21. Where will the wastewater from the unit be disposed? \_\_\_\_\_

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 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 labors 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 the demolition waste will be disposed? \_\_\_\_\_

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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

Is the proposed project located in an ecologically sensitive area?

Yes  No

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 would require an initial environmental examination or an environment impact assessment. Refer to the Pakistan Environmental Protection Agency Review of Initial Environmental Examination and Environment Impact Assessment Regulations, 2000 for appropriate category.

### 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

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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, mohalla, 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 area 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

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on data collected, for both directions, on at least three typical working days.  
Use the following format:

Road \_\_\_\_\_ Count Location \_\_\_\_\_

	6:00 am-9:00 am	9:00 am-12:00 noon	12:00 noon-3:00 pm	3:00 pm-6:00 pm	6:00 pm-9:00 pm
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
Description					

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

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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 *kutch*a? \_\_\_\_\_

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? \_\_\_\_\_

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

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

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### Section IV: Impact Assessment

<i>Potential Negative Environmental Impacts</i>	<i>Tick, if relevant</i>	<i>Mitigation Measures</i>	<i>Tick, if proposed</i>	<i>Monitoring</i>
Siting	<input type="checkbox"/>	Station is not located within ___ m of any educational institution or health facility	<input type="checkbox"/>	
Traffic	<input type="checkbox"/>	Plant is located such that ingress of heavy vehicles does not block the traffic	<input type="checkbox"/>	
Noise and Dust	<input type="checkbox"/>	Dust containment enclosures will be provided for:		
		Primary Crusher discharge area	<input type="checkbox"/>	
		Vibratory screen	<input type="checkbox"/>	
		Product storage hoppers	<input type="checkbox"/>	
		Belt Conveyors	<input type="checkbox"/>	
	<input type="checkbox"/>	Dust suppression system will be installed for:		
		Spray on the stones while unloading from the truck/dumper	<input type="checkbox"/>	
		Spray at the primary crusher feeder chute	<input type="checkbox"/>	
		Spray at the secondary/tertiary crusher inlet chute/hoppers	<input type="checkbox"/>	
		Spray at the transfer points from one belt conveyor to another	<input type="checkbox"/>	
		Spray at crusher discharge points	<input type="checkbox"/>	

*Continued...*

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<i>Potential Negative Environmental Impacts</i>	<i>Tick, if relevant</i>	<i>Mitigation Measures</i>	<i>Tick, if proposed</i>	<i>Monitoring</i>
		Payload area of trucks will be covered by tarpaulins when transporting crush to prevent fall out of fines and emissions of dust	<input type="checkbox"/>	
		Noise wall will be built	<input type="checkbox"/>	
		Evening and late night operation of material and product trucks will be avoided	<input type="checkbox"/>	
Wastewater	<input type="checkbox"/>	Volume and strength reduction of the effluent is to be achieved by preventing mixing of waters from washing activities and processing activities	<input type="checkbox"/>	
		Liquid effluent is to be treated by sedimentation process meaning subjecting the effluent to flow through settling tanks	<input type="checkbox"/>	
		Effluent is to be treated by coagulation that is adding any coagulant to the settling tanks	<input type="checkbox"/>	
		Effluent is to be treated by coagulation and filtration	<input type="checkbox"/>	
Occupational safety	<input type="checkbox"/>	Workers will be provided with protective equipments	<input type="checkbox"/>	

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## **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.

Date \_\_\_\_\_

Signature \_\_\_\_\_

Name \_\_\_\_\_

Designation \_\_\_\_\_

(with official stamp/seal)

Witnesses:

Signature

Name

Address

1

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

2

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_