

NWFP Environmental Protection Agency

Environmental Assessment Checklists and Guidelines

Stone Crushing Units

No:	Version: B	Date: 21 May 2004	Page 1 of 15
-----	-------------------	--------------------------	--------------

Contents

1. Introduction	1
1.1 Scope of the Guidelines	1
1.2 How to use these Guidelines	1
1.3 Glossary	2
2. Project Profile	3
2.1 Project Description	3
2.2 Environmental Aspects	3
2.3 Mitigation Options	4
Environmental Assessment Checklist	6

1. Introduction

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:

Stone Crushing Units

No:	Version: B	Date: 21 May 2004	Page 2 of 15
-----	-------------------	--------------------------	--------------

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

No:	Version: B	Date: 21 May 2004	Page 3 of 15
-----	-------------------	--------------------------	----------------------------

Sedimentation means settling 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.

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.

No:	Version: B	Date: 21 May 2004	Page 4 of 15
-----	-------------------	--------------------------	--------------

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

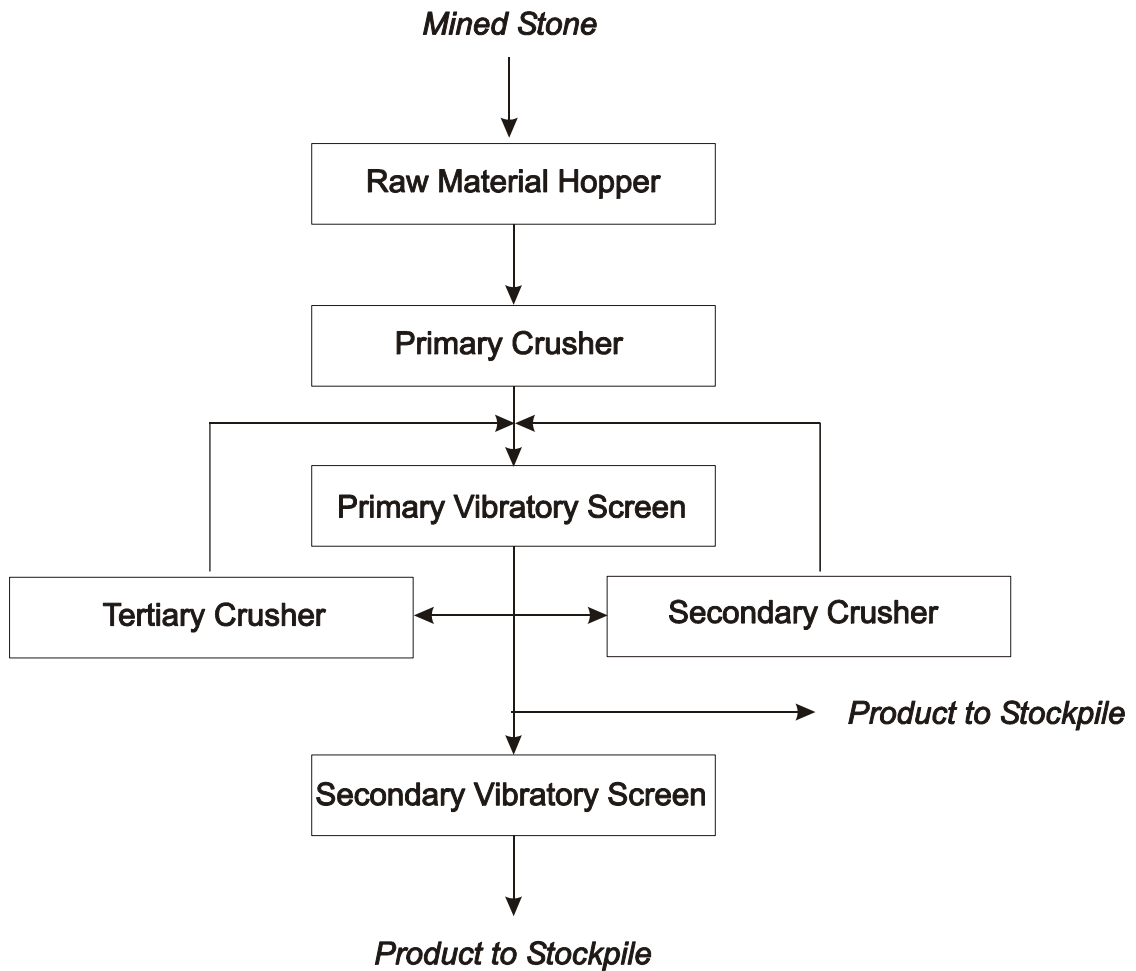
- ▶ Volume and strength reduction of the effluent is to be achieved by preventing mixing of waters from washing activities and processing activities
- ▶ Liquid effluent is to be treated by sedimentation process meaning subjecting the effluent to flow through settling tanks
- ▶ Effluent is to be treated 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.

Stone Crushing Units

No:	Version: B	Date: 21 May 2004	Page 5 of 15
-----	-------------------	--------------------------	----------------------------

- ▶ 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



No:	Version: B	Date: 21 May 2004	Page 6 of 15
-----	------------	-------------------	--------------

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 _____ 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, units, etc.

Stone Crushing Units

No:	Version: B	Date: 21 May 2004	Page 7 of 15
-----	-------------------	--------------------------	--------------

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? _____
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? _____

Stone Crushing Units

No:	Version: B	Date: 21 May 2004	Page 8 of 15
-----	-------------------	--------------------------	----------------------------

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

Stone Crushing Units

No:	Version: B	Date: 21 May 2004	Page 9 of 15
-----	-------------------	--------------------------	----------------------------

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

Stone Crushing Units

No:	Version: B	Date: 21 May 2004	Page 10 of 15
-----	-------------------	--------------------------	-----------------------------

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)

Stone Crushing Units

No:	Version: B	Date: 21 May 2004	Page 11 of 15
-----	-------------------	--------------------------	-----------------------------

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? _____

Stone Crushing Units

No:	Version: B	Date: 21 May 2004	Page 12 of 15
-----	-------------------	--------------------------	-----------------------------

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

Stone Crushing Units

No:	Version: B	Date: 21 May 2004	Page 13 of 15
-----	-------------------	--------------------------	-----------------------------

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...

Stone Crushing Units

No:	Version: B	Date: 21 May 2004	Page 14 of 15
-----	-------------------	--------------------------	-----------------------------

...Continues

<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"/>	

Stone Crushing Units

No:	Version: B	Date: 21 May 2004	Page 15 of 15
-----	-------------------	--------------------------	-----------------------------

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
