

# NWFP Environmental Protection Agency

## Environmental Assessment Checklists and Guidelines

### Non-Regulatory

## Construction and Lining of Watercourses

No:	Version: B	Date: 21 May 2004	Page 1 of 5
-----	------------	-------------------	-------------

### Contents

<b>1. Introduction</b> .....	<b>1</b>
<b>1.1 Scope of Guidelines</b> .....	<b>1</b>
<b>1.2 How to use These Guidelines</b> .....	<b>2</b>
<b>2. Sector Profile</b> .....	<b>3</b>
<b>2.1 Description</b> .....	<b>3</b>
<b>2.2 Environmental Aspects</b> .....	<b>3</b>
2.2.1 Potential Impact on Social Environment.....	3
2.2.2 Potential Impact on Physical Environment.....	3
2.2.3 Natural Habitats.....	4
<b>2.3 Mitigation Options</b> .....	<b>4</b>
2.3.1 Social Impacts .....	4
2.3.2 Physical Environment .....	5
2.3.3 Habitat.....	5

## 1. Introduction

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Lining of watercourses is one of the main on-farm water management measures. The lining results in reducing the seepage from the watercourse. Depending on the type of lining, the seepage can be reduced to less than 25% of the original. Reducing seepage results in conservation of water consequently more water is available for irrigation that can increase the yield and the cropped area. In areas of vast irrigation network, the seepage often

results in rise of water table that results in water-logging and loss of soil productivity. Lining has the added advantage, that the water table is lowered and the productivity of the land increases.

### 1.1 Scope of Guidelines

The scope of the guidelines is limited to small-scale construction of new watercourses and lining and renovation

No:	Version: <b>B</b>	Date: <b>21 May 2004</b>	Page 2 of 5
-----	-------------------	--------------------------	-------------

of existing watercourses. These guidelines are applicable only to those watercourses where water flow is five cusec (ft<sup>3</sup>/second) or less.

## 1.2 How to use These Guidelines

These guidelines will supplement all existing technical manual and donors' guidelines for the construction of watercourses. These guidelines will be used to assess potential impacts of irrigation channels on social, cultural, biological and physical environment. Most of the potential impacts are identified in this guideline. The user of this guideline will screen the identified potential impacts and extenuate measures through good engineering practices and mitigation measures.

These guidelines are produced for general information. No approval from the Environmental Protection Agency for lining of watercourses is required.

## 1.3 Glossary

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

**Contamination** introduction of impurities in the environment

**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.

**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.

**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.

**Pathogen** any disease-producing agent esp. a virus or bacterium or other microorganism

**Protected Species** a species that has been protected or being protected from becoming extinct

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

**Threatened Species** a species in danger of becoming extinct

**Waterlogging** the rising of water table over time, and soaking of soils, in areas where irrigated land is poorly drained. Waterlogging is often associated with salinization

**Wetland** a low area where the land is saturated with water or a standing water body such as lake, pond, etc

## 2. Sector Profile

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### 2.1 Description

The environmental issues associated with the lining and construction of watercourses relate to the size and duration of project and its ecological setting. In a typical project, the activities that are undertaken in such project are:

<i>Activity</i>	<i>Lining</i>	<i>New Channel</i>
Land acquisition		✓
Land clearance		✓
Removal of vegetation from the channel bed	✓	
Acquisition and transportation of material	✓	✓
Excavation of channel	✓	✓
Compaction channel bed	✓	✓
Preparation of concrete	✓	✓
Brick and concrete lining of the bed	✓	✓
Disposal of soils removed during construction	✓	✓
Restoration of area disturbed due to construction activity	✓	✓

### 2.2 Environmental Aspects

#### 2.2.1 Potential Impact on Social Environment

Following social issues can emerge in the construction or rehabilitation of watercourses

- ▶ Expectation for local employment from resident communities during construction phases
- ▶ Compensation for land taken voluntary or involuntary
- ▶ Cutting of trees, which are important boundary markers in Pakhtoon society. Cutting of tree without consent of communities can cause conflict.
- ▶ Participation of communities and vulnerable groups. In the absence of participation mechanism the social and technical sustainability of the water courses will jeopardized.
- ▶ Gender impacts in terms of women mobility and exposure to the village society to outsiders male.
- ▶ Marginalization of poorer segments and nomadic groups from the development process. This can hamper their access to water sources if they are depended on the water.

#### 2.2.2 Potential Impact on Physical Environment

- ▶ Disposal of soil excavated from the channel bed nearby during rehabilitation or lining of channel. As a result of improper silt deposition discharge capacity of channel will be affected.
- ▶ Cutting of trees in the alignment of new water courses may lead to loss of sensitive vegetation and increase in soil erosion.

No:	Version: <b>B</b>	Date: <b>21 May 2004</b>	Page <b>4</b> of <b>5</b>
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- ▶ Poor or unacceptable quality of borrowed soil for strengthening of channel embankments may result in deterioration of quality of existing soil or introduce pathogens in the existing land use system
- ▶ Over irrigation after improved availability of water can cause waterlogging in the channel command area. This can further impact the immediate periphery of the water channel
- ▶ Potential contamination of water and soil resources due to increase in use of pesticide by farmers. The increase in use of pesticide is possible after improvement in water availability.
- ▶ The flow regime could change due to increase in velocity of water after rehabilitation or construction of new channel prism. The earthen portion of the channel down stream will face scouring and then deposition of silt.
- ▶ Increase in silt content in the channel due to construction activity
- ▶ Increase in drainage surplus or after increase in the discharge flow of water. Risk of overflow of the channel due to rainfall, which can damage physical and biological resources

### 2.2.3 Natural Habitats

The proposed project may affect natural habitats through change in hydrological regime and increase in pesticide use.

The potential impact include:

- ▶ Threatened and protected species and their habitat in the project area can be disturbed
- ▶ Home ranges of important populations of the project area are disturbed

- ▶ Social and breeding corridors among population of the project area and neighboring areas are disturbed
- ▶ Impacting possible migration corridors that animals normally use or may use in the case of displacement
- ▶ Potential impacts to wetlands and sensitive species.

## 2.3 Mitigation Options

### 2.3.1 Social Impacts

- ▶ In order to avoid community conflicts, the contractor should be encouraged to employ local labor resident in nearby villages, for unskilled and semi skilled jobs. This improves community well-being and also enhances the social viability of the project.
- ▶ Proper and written record of land acquisition from the community, if any, for this purpose should be maintained
- ▶ Involvement and participation of village elders and communities including vulnerable groups in the project should be mandatory. This will result in agreement on all project activities and potential conflicts in the village are resolved. Formation of a village committee in this regard will be useful forum to solve the project related conflicts
- ▶ The gender impacts should be addressed through active involvement of village elders, communities and sensitization of contractors.

No:	Version: <b>B</b>	Date: <b>21 May 2004</b>	Page <b>5</b> of <b>5</b>
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### 2.3.2 Physical Environment

- ▶ Disposal plan for the soil and construction waste should be prepared.
  - ▶ The excess soil may be given to an individual, with the consent of villagers
  - ▶ Inventory and identification of trees should be prepared, so no ecological sensitive vegetation is disturbed. In case of significance disturbances, realignment of the watercourse should be considered.
  - ▶ Integrate water management and conservation practices through capacity building of farmers and irrigators.
  - ▶ Awareness program on the use of pesticide and its impacts should be initiated. Access should be provided to information related to Integrated Pest Management.
  - ▶ Engineering design should ensure that scouring and deposition of silt in the watercourse is prevented
  - ▶ Good engineering practices to avoid depositions of silt in the channel during construction of channel should be ensured.
  - ▶ Provide appropriate freeboard and engineering design to avoid overtopping and failure of structure.
- ▷ Avoiding social and breeding corridors
  - ▶ Avoid wetlands by
    - ▷ Realignment
    - ▷ Avoiding disposal of waste materials
    - ▷ Dewatering
    - ▷ Using water for project activities from wetlands

### 2.3.3 Habitat

- ▶ Identify threaten species and their habitats in the right of way of water course
- ▶ Avoid disturbing species and habitats through
  - ▷ Realignment