# SCHEDULE G

## Rural Telecommunications and e-Services Project

# Environmental Assessment

**Ministry of Information Technology**
**Government of Pakistan**
**Islamabad**

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# Executive Summary

The World Bank (WB) is planning to fund the Rural Telecommunications and e-Services Project in various parts of Pakistan. In line with the WB safeguard policies and national regulations, an environmental assessment has been carried out for the proposed project. This document presents the process and outcome of this assessment.

The project's long-term development objectives are to foster private sector led growth within a competitive market environment, and promoting and accelerating widespread access to information and communication technology (ICT) services, particularly in rural areas. The project will focus primarily on accelerating access by using targeted subsidies for rural expansion, strengthening the legal, policy, regulatory and spectrum management and monitoring functions, and expansion of e-services.

The proposed project consists of three main components. The first component aims to increase access in rural areas, by expanding rural communications through assistance in setting up the Universal Service Fund Company (USFC), making the USFC operational, and delivery of targeted subsidies to private operators on a competitive basis. The second component will strengthen Ministry of Information Technology (MoIT) in policy making, legal issues, and capacity building of Pakistan Telecommunication Authority (PTA) and Frequency Allocation Board (FAB), including enhancement of radio frequency monitoring and management, which will result in further sector improvements. The third component will accelerate e-services development, including support for expanding and deployment of e-services under the USF Policy.

The Pakistan Environmental Protection Act of 1997 is the apex environmental legislation in the country, whereas the Operational Policy (OP) 4.01 provides the WB's safeguard framework relevant to the proposed project.

The environmental assessment of the proposed project was carried out using a screening matrix, which was tailor-made addressing the particular nature of the activities. The key adverse environmental impacts of the project thus identified included, water contamination, loss of agriculture, land acquisition issues, gender issues and health concerns during the project's construction and operation stages.

Though the significance of all of the potential impacts is expected to be low, an environmental management framework (EMF) has been developed to mitigate the adverse environmental impacts described above and to further improve the environmental performance of the project. The EMF proposes a two-tier organizational structure with the overall environmental management responsibility assigned to USFC, and the on-site implementation role given to the contractors/operators. EMF includes environmental guidelines which will need to be followed during different project phases. In addition, a Resettlement Policy Framework (RPF) has also been developed in accordance with OP 4.12, in order to address the involuntary resettlement issues that may arise during the project.

The present environmental assessment confirmed that the project would not result in any significant and/or lasting environmental impacts, provided that the guidelines given in this document are followed. It was also concluded that the present assessment was sufficient, and no further EA action would be needed, in accordance with the national regulatory requirements as well as WB OP 4.01.

# Acronyms

| | |
|---|---|
| AJK | Azad Jammu and Kashmir |
| EA | Environmental Assessment |
| EC | Environmental Coordinator |
| EM | Environmental Monitor |
| EIA | Environmental Impact Assessment |
| EMF | Environmental Management Framework |
| EPA | Environmental Protection Agency |
| FAB | Frequency Allocation Board |
| GoP | Government of Pakistan |
| ICT | Information and Communication Technology |
| IEE | Initial Environmental Examination |
| LAA | Land Acquisition Act |
| LDI | Long distance and international |
| MOIT | Ministry of Information Technology |
| NGO | Non Governmental Organization |
| NWFP | North Western Frontier Province |
| OP | Operational Policy |
| PAPs | Project affected people |
| PTA | Pakistan Telecommunication Authority |
| RPF | Resettlement Policy Framework |
| ToR | Terms of Reference |
| USF | Universal Service Fund |
| USFC | Universal Service Fund Company |
| VSAT | Very small aperture terminals |
| WB | World Bank |
| WLL | Wireless local loop |

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# 1. Introduction

The World Bank (WB) is planning to fund the Rural Telecommunications and e-Services Project in various parts of Pakistan. In line with the WB safeguard policies and national regulations, an environmental assessment has been carried out for the proposed project. This document presents the process and outcome of this assessment.

## 1.1 Background

Pakistan, like many other countries, recognizes the potential of information and communications technology (ICT) infrastructure, applications and services to enhance competitiveness, productivity, and improve the efficiency and capability of institutions.

Since 2003, the Government of Pakistan (GOP) has implemented significant telecommunications reforms which have led to effective liberalization of all market segments and privatization of the fixed line incumbent. The market structure has evolved into a multi-operator environment, with eight major operators, some twenty Wireless Local Loop (WLL) operators (4 of which have commenced operations), multiple very small aperture terminals (VSAT), Internet and other value-added-service providers. Sixteen long-distance and international (LDI) licenses have been issued of which all except two are operational. The regulatory environment has also evolved with the 1996 Telecommunication Reorganization Act and the establishment of an independent regulator in 1997, the Pakistan Telecommunication Authority (PTA), and subsequent amendment in 2005, the interconnection, tariff and licensing regimes are now conducive to competition. In addition, there are 4 major policies that have been introduced in the sector, i.e. deregulation, mobile, broadband and the universal service fund (USF) policy.

Despite some positive developments, operators are finding that there is still limited business profitability when it comes to providing services in rural areas, compared with the attractiveness of adding new subscribers in urban areas. The aggregate teledensity of fixed and mobile in rural areas is only about 1.4 percent compared with a national average teledensity of about 28 percent in 2006. Almost 30 percent of the rural population is still not covered and there is a significant unmet demand with about 33 million un-served people.

GOP intends to work as a catalyst to motivate and incentivize licensed operators to penetrate into rural areas which are currently perceived to be unprofitable. The effective utilization of the Universal Service Fund (USF) will aim to go beyond the provision of voice communications to include broadband and Internet access, as well as the provision of e-services to citizens through ICT access points such as telecenters. Improved rural access to ICTs would facilitate integration of rural areas into the formal economy by providing citizens and entrepreneurs with better tools for communication, obtaining information, and facilitating commerce.

The USF Policy, prepared by the Ministry of Information Technology and Telecommunications (MOIT), was finalized and approved in October 2006. In this document, the GOP has set an ambitious target to achieve 5 percent teledensity in rural areas by 2010 together with other targets, such as, 1.6 million broadband subscribers. Under the USF policy framework, it is planned that USF funded service providers will aim to achieve 5 percent teledensity in their coverage areas within three years. An autonomous company, the USF Company (USFC), has been established to manage the utilization of the USF.

The proposed project seeks to operationalize the USFC, in order to achieve the targets set by the USF Policy mentioned above.

## 1.2 Project Description

***Project Objectives***

The project's long-term development objective is to promote and accelerate widespread access to information and communication technology (ICT) services among the rural population through an incentive program designed to encourage participation of private operators in the rural market segment. The project will focus primarily on accelerating access by using targeted subsidies for rural expansion, and capacity-building in policy, regulatory and spectrum management and monitoring functions.

The expected benefits of the project include:

- Wider availability of and access to telephony and broadband services in rural and unserved areas. This will facilitate better communications, increase access to information for rural populations and extend opportunities to share in economic growth.
- Increased Internet access points, through the participation of private companies, for citizens in rural and unserved areas to access e-services.
- As a result of improved policies and regulatory framework, increased competition is expected which will result in the availability of high quality telecommunications infrastructure and services.
- Improvements in the management and monitoring of the radio spectrum, a valuable national resource, leading to increased and efficient use of new wireless technologies for communications.

***Project Components***

The proposed project would have three main interrelated components aimed at achieving the above project development objectives. The first component will increase access in rural areas, by expanding rural communications through assistance in setting up the Universal Service Fund (USF) as a Company, making the USF operational, and delivery of targeted subsidies to private operators on a competitive basis. The second component will strengthen MoIT in policy making, legal issues, and capacity building of PTA and Frequency Allocation Board (FAB), including enhancement of radio frequency monitoring and management, which will result in further sector improvements. The third component will accelerate e-services

development, including support for expanding and deployment of e-services under the USF Policy.

***Physical Interventions***

The following project activities are likely to involve physical interventions:

- Construction of buildings for the proposed facilities, such as telecentres, exchanges and monitoring stations
- Laying of underground cables
- Erection of pylons and towers
- Operation of the facilities.

These interventions may interact with various aspects of the environment. The present study attempts to assess these interactions.

## 1.3 Project Location

The project will be located in the rural areas throughout Pakistan.

## 1.4 Document Structure

**Section 2** (*Regulatory Framework for Environmental Assessment*) introduces the national regulatory requirements with respect to the environmental aspects associated with the proposed project, as well as the WB safeguard policies which may be triggered by the proposed activities.

**Section 3** (*Environmental Assessment*) describes the environmental assessment methodology which was employed while conducting the present assignment. Also given in the section are the results of the assessment.

**Section 4** (*Environmental Management Framework*) provides the mechanism to manage the environmental issues that may arise during the proposed activities.

Finally, **Section 5** (*Conclusions*) summarizes the findings of the present assignment.

# 2. Regulatory Framework for Environmental Assessment

This Section briefly describes the regulatory and policy framework relevant to the proposed project.

## 2.1 National Legislation, Regulations and Policies

There are several laws in Pakistan addressing the environmental aspects directly or indirectly. The laws which are most relevant to the proposed project are briefly described below.

### 2.1.1 Pakistan Environmental Protection Act, 1997

Under the Pakistan Environmental Protection Act, 1997, no development project can be undertaken unless an initial environmental examination (IEE) or an environmental impact assessment (EIA) is conducted, and approval is received from the federal or relevant provincial EPA.

The present environmental assessment is being carried out in response to this Act.

### 2.1.2 Pakistan Environmental Protection Agency Review of IEE and EIA Regulations, 2000

The Regulations primarily categorize the projects in two groups. Project types listed in Schedule I are designated as potentially less damaging to the environment, and those listed in Schedule II as having potentially serious adverse effects. Schedule I projects require an IEE to be conducted, provided they are not located in environmentally sensitive areas. For the Schedule II projects, conducting an EIA is necessary.

### 2.1.3 Land Acquisition Act, 1894

The Land Acquisition Act (LAA) of 1894 amended from time to time has been the de-facto policy governing land acquisition and compensation in the country. The LAA is the most commonly used law for acquisition of land and other properties for development projects. It comprises of 55 sections pertaining to area notifications and surveys, acquisition, compensation and apportionment awards and disputes resolution, penalties and exemptions.

Land for the facilities under the proposed project may be acquired using this Act (alternatively, the land may be directly purchased or obtained on lease/rental basis).

### 2.1.4 Pakistan Telegraph Act, 1885

This law was enacted to define the authority and responsibility of the telegraph authority. The law covers among other activities installation and maintenance of telegraph lines and poles. The Act determines the mechanism to determine and

make payment of the compensation associated with the installation of telegraph lines and poles. Under this Act, the land under the pole is not acquired (or purchased) from the owner. The compensation is paid to the owner for any damage to structure, crop or tree that may exist at the location where pole is to be erected.

The proposed pylons can be erected in accordance with this Act. However, the land under the pylons will be acquired (in accordance with the LAA, directly purchased or leased) if there is loss of access, and productive use of the land by the landowners/affectees is impacted.

### 2.1.5 Provincial Wildlife Protection Acts/Ordinances

These provincial laws (for the four provinces of Pakistan) have been enacted to protect the wildlife resources directly and other natural resources indirectly. These classify wildlife by degree of protection, ie, animals that may be hunted on a permit or special license, and species that are protected and cannot be hunted under any circumstances. The Acts/Ordinances specify restrictions on hunting and trade in animals, trophies, or meat. The Acts/Ordinances also define various categories of wildlife protected areas, ie, National Parks, Wildlife Sanctuaries and Game Reserve.

The provisions of the Acts/Ordinances will be applicable to the proposed project.

### 2.1.6 Antiquity Act, 1975

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

The provisions of the Act will be applicable to the proposed project.

## 2.2 WB Safeguard Policies

The project has also been analyzed against the WB safeguard policies: OP 4.01 (environmental assessment), OP 4.04 (natural habitat), OP 4.36 (forestry), OP 4.09 (pest management), OP 4.11 (cultural property), OP 4.10 (indigenous people), OP 4.12 (involuntary resettlement), OP 4.37 (safety of dams), OP 7.50 (projects in international waters), and OP 7.60 (projects in disputed areas).

These policies are briefly introduced below (the applicability of these policies for the proposed project is discussed in **Section 3** of this document).

### 2.2.1 Environmental Assessment (OP 4.01)

The World Bank requires environmental assessment (EA) of projects proposed for Bank financing to help ensure that they are environmentally sound and sustainable,

and thus to improve decision making. The OP defines the EA process and various types of the EA instruments.

The Bank classifies the proposed project into one of four categories, depending on the type, location, sensitivity, and scale of the project and the nature and magnitude of its potential environmental impacts.

(a) *Category A*: A proposed project is classified as *Category A* if it is likely to have significant adverse environmental impacts that are sensitive, diverse, or unprecedented. For a *Category A* project, the borrower is responsible for preparing a report, normally an EIA (or a suitably comprehensive regional or sectoral EA).

(b) *Category B*: A proposed project is classified as *Category B* if its potential adverse environmental impacts on human populations or environmentally important areas—including wetlands, forests, grasslands, and other natural habitats—are less adverse than those of *Category A* projects. These impacts are site-specific; few if any of them are irreversible; and in most cases mitigatory measures can be designed more readily than for *Category A* projects. The scope of EA for a *Category B* project may vary from project to project, but it is narrower than that of *Category A* EA.

(c) *Category C*: A proposed project is classified as *Category C* if it is likely to have minimal or no adverse environmental impacts. Beyond screening, no further EA action is required for a *Category C* project.

(d) *Category FI*: A proposed project is classified as *Category FI* if it involves investment of Bank funds through a financial intermediary, in subprojects that may result in adverse environmental impacts.

### 2.2.2 Involuntary Resettlement (OP 4.12)

Involuntary resettlement under development projects, if unmitigated, often gives rise to severe economic, social, and environmental risks. OP 4.12 provides safeguards to address and mitigate these impoverishment risks.

### 2.2.3 Natural Habitat (OP 4.04)

The conservation of natural habitats, like other measures that protect and enhance the environment, is essential for long-term sustainable development. Through this OP, the Bank therefore supports the protection, maintenance, and rehabilitation of natural habitats and their functions.

### 2.2.4 Forestry (OP 4.36)

The objective of this Policy is to assist the WB's borrowers to harness the potential of forests to reduce poverty in a sustainable manner, integrate forests effectively into sustainable economic development, and protect the vital local and global environmental services and values of forests.

### 2.2.5 Pest Management (4.09)

Through this OP, the WB supports a strategy that promotes the use of biological or environmental control methods and reduces reliance on synthetic chemical pesticides.

### 2.2.6 Safety of Dams (OP 4.37)

The Policy seeks to ensure that appropriate measures are taken and sufficient resources provided for the safety of dams the WB finances.

### 2.2.7 Projects on International Waterways (OP 7.50)

This OP defines the procedure to be followed for projects the WB finances that are located on any water body that forms a boundary between, or flows through two or more states.

### 2.2.8 Indigenous People (OP 4.10)

This OP defines the process to be followed if the project affects the indigenous people. The policy requires that the proponents will develop an Indigenous People Development Plan and get it approved by the Bank, if such groups are identified during the project implementation.

### 2.2.9 Cultural Property (OP 4.11)

The World Bank's general policy regarding cultural properties is to assist in their preservation, and to seek to avoid their elimination. Under this OP, the Bank normally declines to finance projects that will significantly damage non-replicable cultural property, and will assist only those projects that are sited or designed so as to prevent such damage.

### 2.2.10 Projects in Disputed Areas (OP 7.60)

in accordance with this safeguard policy, the Bank may proceed with a project in a disputed area if the governments concerned agree that, pending the settlement of the dispute, the project proposed for country A should go forward without prejudice to the claims of country B.

# 3. Environmental Assessment

This Section provides the process as well as outcome of the environmental assessment carried out for the proposed project.

## 3.1 Environmental Assessment Methodology

The present environmental assessment was carried out using a standard methodology, in line with the national regulations and WB safeguards described above. The assessment was initiated with review of the project information. Subsequently, meetings were held with some key stakeholders, including the officials from MOIT, WB's consultant for the proposed project, a civil society organization and the Pakistan Environmental Protection Agency (Pak-EPA).

Subsequent to the above, environmental assessment of the proposed project was carried out employing a screening matrix, which was tailor-made according to the specific needs of the project.

The screening matrix examined the interaction of project activities with various components of the environment. The project activities requiring physical intervention would include construction of buildings, laying of underground cables and erection of pylons; whereas the environmental parameters were broadly classified as physical, biological and social, and then each of these broad categories further divided into different aspects. The potential impacts thus predicted were characterized as follows:

- High negative (adverse) impact,
- Low negative impact,
- Insignificant impact,
- High positive (beneficial) impact,
- Low positive impact, and
- No impact.

The screening matrix for the proposed project is provided in **Exhibit 2.1**.

## 3.2 Findings of Environmental Assessment

Most of the proposed project activities do not involve physical interventions, which can potentially cause environmental degradation. The activities which are likely to interact with the environment include construction of buildings for telecenters, exchanges and monitoring stations, laying of cables, and erection of pylons. Operation of these facilities can also cause some environmental degradation.

The adverse impacts of the project activities are discussed below.

### 3.2.1 Concerns Associated with Siting of Telecentres/Exchanges and Pylons

The siting of the proposed facilities such as telecentres, exchanges and pylons may cause the following adverse impacts:

1. Loss of assets due to land take for the facility
2. Loss of natural vegetation and habitat
3. Damage or threat to any site of archeological, historical, cultural or religious significance
4. Health hazard associated with the electromagnetic radiation.

These concerns and their mitigation measures/strategies are discussed below.

***Loss of Assets***

These concerns can be adequately addressed by carefully selecting each site in consultation with the community, and following the procedure given below.

In case of direct purchase of the land for telecenters or any other facility, the transaction will be made on the basis of 'willing buyer – willing seller', on mutually agreed market-based price. The title of the land will be transferred in accordance with the relevant rules and regulations. The entire agreement will be documented and singed by all parties concerned.

In case the land for the proposed facilities is acquired under the Land Acquisition Act (**Section 2.1.3**), the emergency clause will not be used. The entire process will be documented and the title of the land will be duly transferred to the buyer.

The land or premises for the proposed facility may also be acquired on lease or rental basis. In such cases as well, the entire agreement will be documented.

The land under the towers/pylons can also be acquired according to the procedures described above. In case the land under the pylon or tower is acquired on lease/rental basis, the lease/rental amount will reflect the loss of income generating opportunities (whether one-time or permanent) associated with the affected land. For example, if crops will be damaged under the tower/pylon only during the construction phase, a one-time crop compensation will be paid to the owner/grower. However, In case the owner/cultivator cannot use that piece of land even after the construction phase, the lease/rental amount will reflect crop compensation for the entire lease/rental period. The compensation amount will correspond to the entire area affected, including any periphery fencing, if any.

An RPF has been developed for the proposed project and provided in **Appendix A**. RPF, developed in accordance with OP 4.12, provides resettlement principles and entitlement framework, in order to mitigate the potential impacts associated with land acquisition for the proposed activities.

***Loss of Natural Vegetation/Habitat***

This concern can be addressed by avoiding sites having significant natural vegetation, and planting trees around the proposed facilities in case any tree cutting is involved during the construction activities. Similarly areas protected by the wildlife protection acts should be avoided (see **Section 2.1.5**); in case this is not possible, a separate environmental study will be carried out for such facilities. List of such areas in the country is provided in **Exhibit B.1** of **Appendix B**. Furthermore, if the proposed activities are carried out in the vicinity of the protected areas, the works will be carried out in consultation with the relevant Wildlife or Forest department.

The trees that will need to be removed for establishing the proposed facilities will be counted and their type, age, size and approximate salvage price determined and documented. Photographic record will also be maintained. The trees planted at/around the proposed facilities will be at least five times the ones removed.

***Damage or Threat to Sites of Archeological, Historical, Cultural or Religious Significance***

This concern can also be addressed by avoiding sites of archeological, historical, cultural or religious significance (see **Section 2.1.6**). List of such sites in the country is provided in **Exhibit B.2** of **Appendix B**.

***Health Hazards of Radiation***

The health hazards associated with the electromagnetic radiation have been extensively studied. The best understood biological effect of electromagnetic fields is to cause dielectric heating. For example, touching an antenna while a transmitter is in operation can cause severe burns. Birds sitting on very high-power antennas when transmission begins can be instantly cooked by the radiation energy.

However, the consensus of the scientific community is that the power from the mobile phone base station antennas is far too low to produce health hazards as long as people are kept away from direct access to the antennas. (See excerpts from detailed ‘Questions and Answers’ on Electromagnetic Fields and Human Health, in **Appendix C**.) Hence, the potential health impacts of the antennas erected during the proposed project can be avoided by installing the antennas in such a way that people do not have direct access to the antenna.

### 3.2.2 Environmental Concerns during Construction Activities

Some negative environmental impacts (ie, low negative impacts) are expected to be experienced during the construction of the proposed facilities. These potential impacts may include:

- Dust and noise pollution caused by the construction activities
- Soil and water contamination caused by improper waste disposal
- Water scarcity due to water consumption during construction (in water scarce areas)
- Damage to agriculture in the adjacent areas.

However all of the above issues are temporary in nature and will disappear as soon as the construction is over. Furthermore, due to the smallness of the individual building[1], the magnitude of these impacts will be small. Hence these impacts have been characterized as 'low negative impacts' in **Exhibit 2.1**.

The probability and consequence severity of these impacts should further be decreased by employing basic house keeping techniques – such as waste collection and appropriate disposal (discussed in **Section 4.4**).

### 3.2.3 Environmental Concerns during Laying Underground Cable

Some negative environmental impacts (ie, low negative impacts) are expected to be experienced during laying of the underground cables – both for connecting the exchanges and telecentres with the existing telecom network in the country, as well as for providing connections to the residential and commercial users. These potential impacts may include:

- Dust and noise pollution caused by the excavation and backfilling activities
- Soil and water contamination caused by improper waste disposal
- Water scarcity due to water consumption during construction (in water scarce areas)
- Damage to agriculture during excavation and cable laying
- Damage to topsoil during excavation
- Blocked access.

However all of the above issues are temporary in nature and will disappear as soon as the cabling laying is over. Furthermore, due to the smallness of the individual cable laying activity[2], the magnitude of these impacts will be small. Hence these impacts have been characterized as 'low negative impacts' in **Exhibit 3.1**.

The probability and consequence severity of these impacts should further be decreased by employing basic house keeping techniques – such as waste collection and appropriate disposal, which are discussed in **Section 4.4**.

### 3.2.4 Concerns during Operation of Proposed Facilities

Following types of environmental and social concerns can potentially arise during operation of the proposed telecenters and exchanges:

- Health concerns associated with drinking water sanitation facilities
- Health concerns associated with radiation
- Gender issues.

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[1] The size of an average telecenter will be about 10 m × 10 m; and that of an average exchange will be about 3 m × 12 m.

[2] Extended lengths of cables are unlikely to be laid during the proposed project, since radio link will be a preferred option for long distances. Similarly, individual distribution networks within the villages (providing connections to individual subscribers) will be small.

These concerns are discussed below.

***Health Concerns Associated with Drinking Water and Sanitation***

Lack of access to clean drinking water and poor or no sanitation facilities at the telecenters and exchanges can pose a health risk to the employees, users of the facilities and the nearby community. It is therefore recommended that the design of each telecenter and exchange building includes provision of clean drinking water and adequate toileting facilities.

***Health Concerns Associated with Radiation***

The health concerns associated with the electromagnetic radiation have already been discussed in **Section 3.2.1** above. If the mobile phone/wireless base station antennas are located in accordance with the relevant guidelines[3], radiation generated by these antennas will not cause any significant health hazard for the population. (See excerpts from detailed 'Questions and Answers' on Electromagnetic Fields and Human Health, in **Appendix C**.)

***Gender Sensitivities***

The gender sensitivities should be addressed during various phases of the project, in accordance with the local culture and customs. The project staff should be sensitized on these aspects, and the capacity building program should include gender-related components.

## 3.3 Review of Safeguard Policies

The following table provides the applicability of the WB safeguard policies discussed in **Section 2.2**.

| Operational Policy | Triggered | Notes |
|---|---|---|
| Environmental Assessment (OP 4.01) | Yes | The proposed project is classified as Category B project, since the proposed activities are likely to cause some low level adverse impacts as discussed in **Section 3.2**. |
| Involuntary Resettlement (OP 4.12) | Yes | To address the potential impacts associated with the involuntary resettlement during the proposed project, a Resettlement Policy Framework (RPF) has been prepared (see **Appendix A**). |
| Forestry (OP 4.36) | No | The proposed project is not likely to affect any forest resources. |
| Natural Habitat (OP 4.04) | No | The proposed project is not likely to affect any natural habitat. Further, the protected areas (listed in |

[3] MoIT is in the process of formulating the guidelines addressing the health impacts of electromagnetic radiation.

| Operational Policy | Triggered | Notes |
|---|---|---|
| | | **Exhibit B.1** of **Appendix B)** will be avoided while locating the proposed facilities. |
| Pest Management (OP 4.09) | No | The proposed activities do not involve use of pesticides. |
| Safety of Dams (OP 4.37) | No | The proposed activities do not involve construction of dams. |
| Projects in International Waters (OP 7.50) | No | The proposed activities do not involve any work on or in any water bodies. |
| Cultural Property (OP 4.11) | No | The proposed activities will not affect cultural sites. The notified sites (listed in **Exhibit B.2** of **Appendix B**) will be avoided while locating the project facilities. |
| Indigenous People (OP 4.10) | No | The project will avoid areas where the existence of indigenous people is known or expected. However if such groups are identified during the project implementation, the proponents will develop an Indigenous Peoples Plan or an Indigenous Peoples Planning Framework, in compliance with the OP and get it approved by the Bank. |
| Projects in Disputed Area (OP 7.60) | No | Since the proposed activities are to be carried out in Pakistan only and doesn't include the AJK and Northern Areas. |

**Exhibit 3.1: Screening Matrix**

| | ***Physical*** | | | | | ***Biological*** | | ***Social and Socioeconomic*** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *Soil Erosion / Contamination* | *Air Quality* | *Surface Water Quality* | *Groundwater Quality* | *Water Availability and Consumption* | *Natural Vegetation* | *Wildlife* | *Land Acquisition* | *Agriculture* | *Blocked Access* | *Noise and Vibration* | *Safety Hazard* | *Employment/Earning Opportunities* | *Infrastructure* | *Public Health (clean drinking water and sanitation)* | *Aesthetic Value* | *Gender Issues* | *Sites of Archeological, Historical or Cultural Significance* | *Impacts on Indigenous People* |
| Siting of Buildings such as Exchanges and Telecentres | N | N | N | N | N | -1 | N | -1 | -1 | 0 | -1 | -1 | N | N | N | N | N | -1 | N |
| Siting of Pylons | N | N | N | N | N | -1 | N | -1 | -1 | 0 | N | -1 | N | N | N | N | N | -1 | N |
| Construction of Buildings | -1 | -1 | -1 | -1 | -1 | 0 | N | N | -1 | 0 | -1 | -1 | +1 | 0 | -1 | N | -1 | N | N |
| Erection of Pylons | -1 | -1 | -1 | -1 | -1 | 0 | N | N | -1 | 0 | -1 | -1 | +1 | 0 | -1 | N | -1 | N | N |
| Laying of Underground Cables | -1 | -1 | -1 | -1 | -1 | -1 | 0 | N | -1 | -1 | -1 | -1 | +1 | -1 | -1 | N | -1 | -1 | N |
| Operation of facilities | N | N | -1 | -1 | -1 | N | N | N | N | N | N | -1 | +1 | N | -1 | N | -1 | N | N |

Key: -2: High negative impact; -1: Low negative impact; 0: insignificant/negligible impact; +1: low positive impact; +2: High positive impact, N: no impact.

# 4. Environmental Management Framework

In order to address the environmental concerns discussed in **Section 3** above, an environmental management framework has been developed, which will be implemented during various phases of the project. This framework will be made an integral part of the bidding documents, and will be included in the performance criteria of the contractors.

## 4.1 Objective

The objective of the environmental management framework (EMF) is to provide the mechanism to manage the environmental issues that may arise during the proposed activities. EMF defines the roles and responsibilities of various stakeholders and also provides guidelines to be followed during the project implementation in order to improve the environmental performance of the proposed activities.

## 4.2 Management Approach

The overall responsibility of EMF implementation and for the environmental performance of the project would rest with USFC. USFC would among its staff nominate an Environmental Coordinator (EC) who would be the focal point for all matters relating to the environmental issues during the project.

All the contractors working for USFC for the construction activities will also be required to nominate environmental monitors (EM) among their site staff. EM will be responsible for the implementation of EMF at the sites.

Compliance to EMF will be made a contractual requirement for all the contractors engaged for the proposed activities. For this purpose, a suitable clause can be added in the bidding document, such as: “Implementation of EMF (including the environmental guidelines provided in **Exhibits 4.2** to **4.5** of EMF, as well as **Appendices A** and **B** of the Environmental Assessment report), attached as **Annexure XX** of the bidding documents, will be an integral part of the contractor’s scope of work, and will be included in the performance criteria of the project”.

## 4.3 Roles and Responsibilities

***USFC’s Environmental Coordinator:*** The EC will facilitate compliance to the EMF, the environmental guidelines presented in this EMF, and RPF (provided in **Appendix A**). The EC will coordinate within USFC, with the contractors and the community for the implementation of the EMF. The EC will also coordinate with other stakeholders, such as PTA, EPA or any NGO, as and when required.

It is recommended that the General Manager Projects and Technology, USFC, be nominated as the Environmental Coordinator, who can delegate some of the functions – such as environmental monitoring – to other USFC staff.

***Contractor's EM:*** The EM would be responsible for the on-site implementation of the guidelines and RPF. The EM will coordinate with the EC and the community for the effective implementation of the EMF.

The roles and responsibilities are tabulated in **Exhibit 4.1**.

## 4.4 Environmental Guidelines

The environmental guidelines are the key component of the EMF. These guidelines list all the potential effects of each activity of the project and their associated mitigation measures. These guidelines should be followed during the design, construction and operation of the proposed facilities. The guidelines are presented in **Exhibits 4.2** to **4.5**.

## 4.5 Environmental Monitoring

The environmental monitoring will ensure that the guidelines discussed in **Section 4.4** above and RPF are being adequately followed during the project execution. The on-site monitoring will be conducted by the contractors' EM, whereas the periodic monitoring will be carried out by the USFC staff visiting the site to check the technical/contractual aspects.

## 4.6 Environmental Trainings

Environmental trainings will help enhance awareness level of the USFC staff and contractor staff on all matters relating to the environment. These trainings will ensure that the requirements of the EMF are clearly understood and followed by the USFC and contractors throughout the project period.

The primary responsibility for providing trainings to all project personnel will be that of the USFC. The environmental training program will be finalized during the design stage of the project, and will be implemented before any site works are commenced. The training will be provided to the USFC staff and contractor staff.

The environmental trainings will need to be provided on a regular basis, in order to inculcate environmental awareness and maintain clear understanding of EMF among the USFC staff and contractor staff. The training program mentioned above will determine the frequency of the trainings.

The scope of the training will cover environmental guidelines, RPF, general environmental and social awareness, waste disposal and effective house-keeping during the construction as well as operation activities, in order to minimize the environmental as well as social concerns of the project.

Cost of the environmental trainings will need to be estimated at two levels. Cost of the trainings to be provided by the USFC staff will need to be estimated at the project planning stage by USFC, whereas cost of the trainings to be provided by the EM should be estimated by each respective contractor, and included in his overall cost estimates.

## 4.7 Documentation

The documentation requirements for the EMF implementation would also be simple. USFC would have the prime responsibility for generating various documents and maintaining their record. USFC would develop easy-to-fill checklists, on the basis of the environmental guidelines and RPF discussed above. The contractors would be required to fill these checklists and provide a copy to USFC, who would maintain a complete record of these filled checklists and any follow-up action taken on them.

USFC would also maintain a complete record of the training modules developed, training programs conducted and the attendees of these trainings.

## 4.8 EMF Budget

The EMF budget will have two distinct components: i) the cost associated with the activities to be carried out by USFC, such as providing environmental trainings to its own staff; and ii) the cost associated with the activities carried out by each contractor. These are discussed below.

The environmental management cost associated with the activities carried out by USFC will need to be estimated at the project planning phase. These costs will essentially correspond to the environmental trainings to be conducted by USFC, and documentation, mentioned in **Sections 4.6** and **4.7**, respectively. USFC should not incur any additional cost associated with other aspects of the environmental management, since these activities will not be carried out by staff dedicated for this purpose.

At the contractor level, the implementation cost of EMF will need to be estimated for each individual work package, which may comprise of a telecenter and its associated system/equipment such as pylon and underground cable. The cost estimate will include, where applicable, the following aspects:

- staff dedicated for environmental management, if any,
- environmental trainings,
- land acquisition in accordance with RPF,
- compensation for any affected structure in accordance with RPF,
- crop compensation in accordance with RPF,
- documentation,
- tree plantation,
- environmental monitoring.

The contractors will be responsible to include the above costs in their overall cost estimates.

**Exhibit 4.1: Roles and Responsibilities**

| *Organization* | *Responsibility* |
|---|---|
| USFC (through the Environmental Coordinator) | Overall responsible for the implementation of EMF and the environmental performance of the project. |
| | Prepare cost estimates for environmental management of the project. |
| | Develop environmental training modules and periodically conduct environmental trainings for the USFC staff, contractor staff and the community. |
| | Maintain a complete record of the trainings (training modules developed, trainings conducted and attendees) |
| | Prepare simple checklists on the basis of the environmental guidelines (**Exhibits 4.2** to **4.5**) |
| | Ensure that the contractors fill the checklists on regular basis. |
| | Review the filled checklists and determine any corrective action, if required. |
| | Maintain a record of all the filled checklists, and the corrective actions planned/undertaken. |
| | Periodically visit the construction sites, in order to monitor the filling of the checklists, and to determine their effectiveness. |
| | Maintain a complete record of the above mentioned field visits. |
| | Ensure that the environmental considerations for the building design/siting are adequately adhered (**Exhibit 4.2**). |
| | Ensure that RPF (**Appendix A**) is being implemented. |
| | Coordinate with any other stakeholder, such as the MOIT, PTA, any NGO, EPA or any other organization interested to know the environmental performance of the project. |
| Contractor (through its Environmental Monitor) | Prepare EMF cost estimates and include in the overall costing. |
| | Participate in the environmental trainings conducted by USFC. |
| | Implement the environmental guidelines in the field, during the construction activities. |

| *Organization* | *Responsibility* |
|---|---|
| | Fill the environmental checklists on regular basis, and provide copied to USFC. |
| | Provide feed back to USFC on the effectiveness of the checklists and EMF. |
| | Implement RPF. |
| | Increase the environmental awareness among the contractor staff. |

**Exhibit 4.2: Environmental Guidelines for Design Phase**

**Technical Aspects**

- Design of the proposed buildings/other installations should adhere to all standard technical requirements.
- Design of the proposed buildings and pylons should adhere to international best practice, in order to avoid adverse impacts on environment and human health.
- The design should cater to the earth quake classification of the area.
- The design should address the flood risks in the area.
- Design should address soil erosion risk particularly in hilly areas.
- Use of the local materials should be maximized.
- The design of telecentres should include provision of water supply and sanitation services.
- The design of telecentres should include adequate ventilation and illumination facilities.
- The toilet design should address the water scarcity in the water-scarce areas.

**Social and Gender Aspects**

- The building should have separate toilets for men and women, where appropriate.
-

## Exhibit 4.3: Environmental Guidelines for Construction of Buildings and Pylons

### Facility Location

- The location should be selected with consent of the community.
- The facilities should not be constructed over any disputed land.
- The wildlife protected areas should be avoided, when selecting the site for the telecentres and other project facilities. In case such facilities are to be located inside such areas, a separate, site specific environmental study should be carried out. Furthermore, if the proposed works are to be carried out in the vicinity of these sites, the relevant Wildlife or Forest deportment must be consulted before commencing the physical works. See **Exhibit B.1** in **Appendix B** for these areas in the country).
- The sites of archeological, historical, cultural or religious significance should be avoided. If unavoidable, a separate, site specific environmental study should be carried out. See **Exhibit B.2** in **Appendix B** for these areas in the country.
- The project will avoid areas where the existence of indigenous people is known or expected. However if such groups are identified during the project implementation, the proponents will develop an Indigenous People Development Plan, in compliance with the OP and get it approved by the Bank.
- The buildings should not be constructed on areas having any significant natural vegetation.
- The buildings should be constructed on flat land as far as possible.
- The pylons should be erected on flat land as far as possible.
- Buildings and pylons should not be located in any natural drainage.
- The health hazards of electromagnetic radiation associated with the mobile phone towers are negligible (see **Appendix C**). However, to be on the safe side, such towers/pylons will not be located adjacent to sensitive receptors, such as schools and hospitals. MOIT is in the process of formulating guidelines addressing the health hazards of the radiation. The proposed installations should adhere to these guidelines.

### Land Acquisition

- RPF should be implanted.
- In case of direct purchase of the land for telecenters or any other facility, the transaction will be made on the basis of ‘willing buyer – willing seller’, on mutually agreed market-based price. The title of the land will be transferred in accordance with the relevant rules and regulations. The entire agreement will be documented and singed by all parties concerned.
- In case the land for the proposed facilities is acquired under the Land Acquisition Act, the emergency clause will not be used. The entire process will be documented and the title of the land will be duly transferred to the buyer.

- Alternatively, the land/premises can also be obtained on rental basis. The entire process should be properly documented.
- Required documentation should be completed for the land purchase. These would include preparation of a transfer deed on court papers (*Stamp Paper*) which should be signed by the owner(s) of the land and endorsed by the *Patwari* (land record clerk). The transfer deed should then be registered by the Registrar. Involvement of the District Government is also recommended in this process.
- The land under the towers/pylons can also be acquired according to the procedures described above (ie, through direct purchase or in accordance with the Land Acquisition Act).
- In case the land under the pylon or tower is acquired on lease/rental basis, the lease/rental amount will include the loss of income generating opportunities (whether one-time or permanent) associated with the affected land. For example, if crops are damaged under the tower/pylon only during the construction phase, a one-time crop compensation will be paid to the owner/grower. However, In case the owner/cultivator cannot use the affected piece of land even after the construction phase, the lease/rental amount will include crop compensation for the entire lease/rental period. The compensation amount will correspond to the entire area affected, including any periphery fencing, if any. The crop compensation will be estimated on the basis of prevailing market price of the affected crop.
- In case the pylons are erected on the State land or in the existing right of way, requisite approvals from the concerned department/authority should be obtained. Complete documentation record should be maintained.

**Construction Activities**

- Slope stabilization and soil erosion control measures should be taken where required, particularly in hilly terrain.
- Damage to the adjacent property/crops/infrastructure should be avoided. Any such damage should be repaired by the contractor; otherwise, appropriate compensation should be paid to the affectees.
- Water should be procured in consultation with the community in water scarce areas.
- The community should be informed about the construction activities and associated safety hazards.
- Protective fencing should be used where necessary.
- Nighttime works should be avoided as far as possible.
- Use of local material and local labour should be maximized as much as possible.
- Local norms and customs should be respected. Gender sensitivities should be appropriately addressed through awareness raising among the construction crew.
- Should any archeological or historical sites or artifacts are discovered during the construction activities, the works will be stopped and the Department of Archeology, Government of Pakistan will be contacted for further advice.

- The trees that need to be removed for establishing the proposed facilities (telecenters, pylons and others) will be counted and their type, age, size and approximate salvage price determined and documented – before any physical work is carried out at the site. Photographic record will also be maintained for the pre-project conditions. The contractor will carry out tree plantation to compensate any such tree cutting during the project execution. The trees thus planted will be at least five times the ones removed. The trees will be planted at/around the proposed facilities, or at any other suitable location in consultation with USFC and community. The local tree species will be preferred.

**Waste Disposal**

- Appropriate waste disposal mechanism should be followed during the construction phase. The construction waste would be disposed in a manner that does not contaminate surface or groundwater.
- The recyclable waste should be sold to the recycling contractors; the biodegradable waste should be buried at an appropriate place; the left-over construction material should be sold to other users; and the remaining waste should be burnt at a place at a safe distance from the settlements.

## Exhibit 4.4: Environmental Guidelines for Underground Cable Laying

### Cable Route Selection

- The wildlife protected areas should be avoided. If unavoidable, a separate, site specific environmental study should be carried out. Furthermore, if the proposed works are to be carried out in the vicinity of these sites, the relevant Wildlife or Forest deportment must be consulted before commencing the physical works. See **Exhibit B.1** in **Appendix B** for these areas in the country).
- The sites of archeological, historical, cultural or religious significance should be avoided. If unavoidable, a separate, site specific environmental study should be carried out. See **Exhibit B.2** in **Appendix B** for these areas in the country.
- The project will avoid areas where the existence of indigenous people is known or expected. However if such groups are identified during the project implementation, the proponents will develop an Indigenous People Development Plan, in compliance with the OP and get it approved by the Bank.
- The route should avoid any significant natural vegetation.
- The trees that need to be removed for cable laying will be counted and their type, age, size and approximate salvage price determined and documented – before any physical work is carried out at the site. Photographic record will also be maintained for the pre-project conditions. The contractor will carry out tree plantation to compensate any such tree cutting during the project execution. The trees thus planted will be at least five times the ones removed. The trees will be planted at/around the proposed facilities, or at any other suitable location in consultation with USFC and community. The local tree species will be preferred.
- The route will be selected inside the State land as far as possible.

### Acquisition of Temporary Right of Way

- If the cable route passes through private land, the temporary right of way will be acquired from the owner(s) after paying the mutually agreed compensation. The compensation amount will include damage to crops or orchards, if any.
- The entire agreement for the compensation will be documented.

### Excavation and Backfilling Activities

- Soil erosion control measures should be taken where required during excavation, particularly in hilly terrain.
- The activities should not affect the natural drainage of the area.
- Damage to the property/crops/infrastructure along the route should be avoided. Any such damage should be repaired by the contractor; otherwise, appropriate compensation should be paid to the affectees.

- About 30 cm layer of topsoil in the cultivable areas should be stacked separately, and should be used as the top layer during backfilling, in consultation with the land owner/grower.
- The cable trench should not be left uncovered for extended period of time. The excavation should only be carried out when all the required materials and manpower are available for cable laying. Backfilling should be carried out as soon as possible.
- The community should be informed in advance about the cable laying activities and associated safety hazards.
- Access routes should not be blocked during the cable laying works. If unavoidable, alternate routes should be identified in consultation with the affected community. Also, the duration of such blockages should be minimized through astute planning.
- Nighttime works should be avoided as far as possible.
- Use of local material and local labour should be maximized as much as possible.
- Local norms and customs should be respected. Gender sensitivities should be appropriately addressed through awareness raising among the construction crew.
- Should any archeological or historical sites or artifacts are discovered during the excavation, the works will be stopped and the Department of Archeology, Government of Pakistan will be contacted for further advice.

**Waste Disposal**

- Appropriate waste disposal mechanism should be followed during the construction phase. The construction waste would be disposed in a manner that does not contaminate surface or groundwater.
- The recyclable waste should be sold to the recycling contractors; the biodegradable waste should be buried at an appropriate place; the left-over construction material should be sold to other users; and the remaining waste should be burnt at a place at a safe distance from the settlements.

**Exhibit 4.5: Environmental Guidelines for the Operation Phase**

**Health Concerns**

- The water supply at the facilities should be maintained hygienically.
- The toilets should be kept functional.
- Solid waste disposal system should be developed and maintained.
- Awareness level should be raised among the staff regarding communicable diseases and the associated precautionary measures.

**Gender Issues**

- Separate toilets should be maintained for men and women where practical.
- Awareness level should be developed on gender issues among the staff.

**General Issues**

- Environmental awareness should be enhanced among the staff.
- Attempts should be made to raise the environmental awareness of the community in general, particularly on issues such as waste disposal. Posters at the telecenters can be fixed for this purpose.

# 5. Conclusions

The project activities involving physical intervention and hence interaction with the environment include construction of buildings, erection of pylons and laying of underground cables. However, these installations will be spread all over the country, and the individual activity will be quite small, thus causing minimal of the environmental impacts, and even these impacts will be mostly temporary in nature.

In order to assess the above impacts, an environmental screening of the proposed project was carried out. The screening confirmed that the project would not result in any significant and lasting environmental impacts. The screening also concluded that the present assessment was sufficient, and no further EA action would be needed, in accordance with the national regulatory requirements as well as WB OP 4.01.

In order to address the potentially adverse impacts of the project, particularly during the construction phase, an EMF has been developed, which will further improve the environmental performance of the project. The EMF assigns roles and responsibilities, provides environmental guidelines, defines environmental training needs, and discusses cost budget for environmental management. In addition, an RPF has also been developed in accordance with the provisions of OP 4.12, which addresses the potential impacts associated with involuntary resettlement.

## Appendix A: Resettlement Policy Framework (RPF)

### Resettlement Principles

The basic resettlement principles and guidelines include the following:

- The project affected people (PAPs) are defined as those who stand to lose land, houses, structures, trees, crops, businesses, income, livelihood or access to assets/livelihood as a consequence of the proposed project activities.
- All PAPs are equally eligible for compensation and rehabilitation assistance, irrespective of land ownership status, to ensure that those affected by the project will be at least as well off, if not better off than they would have been without the Project.
- Absence of title will not be a bar for PAPs to receive compensation and rehab assistance except for compensation for land. Compensation for land will require a title.
- The compensation packages will reflect replacement costs for all losses (such as lands, crops, trees, structures, businesses, income, etc.).
- PAPs will be systematically informed and consulted about the project, and RPF will be made available to the affected persons and communities.
- For land acquired under the LAA (1894), section 17(4) the emergency/urgency clause, will not be used in the absence of an emergency/urgency situation
- For land purchased, the concept of willing buyer/willing seller at market price and with consensus of both parties will be used.
- For land located under the pylons, compensation will be paid for crops and only if the land becomes inaccessible and out of productive use, it will be purchased/acquired.
- All assets/infrastructure and livelihood negatively impacted will be compensated at replacement cost (salvage value will not be deducted).
- All community and religious sites affected by the project activities will be compensated or rebuilt.
- All public utilities affected/damaged by the project will be compensated.
- All trees affected by the project will be compensated and affectees allowed to salvage the trees.

### Entitlement Framework

The entitlement framework for the proposed project is provided below.

| Type of Loss | Definition of Entitled Persons | Entitlement Policy | Responsibility |
|---|---|---|---|
| Loss of agriculture | Legal users with valid title, customary or | Project affected people (PAPs) will be entitled to: | Contractor through |

| Type of Loss | Definition of Entitled Persons | Entitlement Policy | Responsibility |
|---|---|---|---|
| land[4] | usufruct rights. | o Cash compensation for acquired land at market value.<br>If LAA is used, an amount of 15% will be added to the market price, in accordance with the LAA 1894. | Environmental Monitor (EM). |
| | Tenant, leaseholder and sharecropper | PAPs will be entitled to:<br>o Reimbursement for un-expired lease. | Contractor through EM. |
| | PAPs without valid title (vulnerable[5] encroachers or squatters) | PAPs will be entitled to:<br>o Cash compensation for affected structures at replacement value. | Contractor through EM. |
| Loss of residential, commercial, industrial or institutional land | Legal users with valid title, customary or usufruct rights. | PAPs will be entitled to:<br>o Cash compensation for acquired land at market value.<br>If LAA is used, an amount of 15% will be added to the market price, in accordance with the LAA 1894. | Contractor through EM. |
| | Tenant and leaseholder | PAPs will be entitled to:<br>o Reimbursement for un-expired lease. | Contractor through EM. |
| | PAPs without valid title (vulnerable encroachers or squatters) | PAPs will be entitled to:<br>o Cash compensation for affected structures at replacement value. | Contractor through EM. |
| Structures (residential, commercial, industrial or institutional) | Owners of affected structure, with or without legal title, customary or usufruct rights | PAPs will be entitled to:<br>o Cash compensation for affected structures, or portion of the structure, at replacement value.<br>o Allowance to cover the repair cost of the remaining structure. | Contractor through EM. |

4 In case of land acquisition, Section 17 of the LAA will not be used, in the absence of the emergency/urgency.

5 Vulnerable: below poverty line.

| Type of Loss | Definition of Entitled Persons | Entitlement Policy | Responsibility |
|---|---|---|---|
| Loss of common resources and facilities | Communities/households | o Replacement of the common property resources/facilities, in consultation with the affectees.<br>o Access to equivalent resources/facilities. | Contractor through EM. |
| Loss of standing crops | Households who cultivate the land | PAPs will be entitled to:<br>o Cash compensation equivalent to the market value of damaged crops. | Contractor through EM. |
| Loss of trees | Owners of the affected trees (irrespective of the land title) | PAPs will be entitled to:<br>o Cash compensation equivalent to the market value of trees on the basis of type, age and productivity. | Contractor through EM. |
| Loss of public infrastructure | Relevant agencies | Compensation in cash at replacement cost to respective agencies, or<br>Restoration/repair of the damaged infrastructure in a similar or better condition as before. | Contractor through EM. |
| Loss of or damage to religious sites (eg, mosques, graveyards, shrines) | Community and affected households | Replacement cost for religious sites. Cost of removal of graves and all related costs for its relocation. | Contractor through EM. |

# Appendix B

**Exhibit B.1: Wildlife Protected Areas**

| Protected Area Name | Area (ha) | Classification | Coordinates |
|---|---|---|---|
| **Balochistan** | | | |
| Astola Island (Haft Talar) | Not recorded | Unclassified | 25/17 N. 63/50 E. |
| Bund Khush Dil Khan | 1,296 | Wildlife Sanctuary | 30/36 N. 66/45 E. |
| Buzi Makola | 145,101 | Wildlife Sanctuary | Not Recorded |
| Chagai-Seistan Desert | Not recorded | Unclassified | 29/18 N. 64/44 E. |
| Chorani | 19,433 | Wildlife Sanctuary | Not Recorded |
| Dhrun | 167,700 | National Park | Not Recorded |
| Dureji | 178,259 | Wildlife Sanctuary | Not Recorded |
| Ghurnzadi | 6,649 | Game Reserve | 33/22 - 33/25 N. 71/03 - 71/15 |
| Gogi | 7,773 | Game Reserve | Not Recorded |
| Goth Raisani Game Reserve | Not recorded | Unclassified | Not Recorded |
| Gut | 165,992 | Wildlife Sanctuary | Not Recorded |
| Hazar Ganji-Chilttan | 15,555 | National Park | 29/59 - 30/09 N. 66/24 - 66/54 |
| Hingot | 165,004 | National Park | Not Recorded |
| Jawani Beaches | Not recorded | Unclassified | 25/02 N. 61/45 E. |
| Kachai Marai | 6,143 | Game Reserve | 33/34 - 33/41 N. 71/09 - 71/17 |
| Kachau | 21,660 | Wildlife Sanctuary | Not Recorded |
| Kambran | 211,433 | ha Game Reserve | Not Recorded |
| Karkhasa | 4,049 | Game Reserve | Not Recorded |
| Kho-e-Geish | 24,356 | Wildlife Sanctuary | Not Recorded |
| Khurkhera | 18,345 | Wildlife Sanctuary | Not Recorded |
| Kolwah Kap | 33,198 | Wildlife Sanctuary | 26/02 N 64/39 E. |
| Pasni Coastline | Not Recorded | Unclassified | 25/15 N. 63/28 E. |
| Raghai Rakhshan | 125,425 | Wildlife Sanctuary | 27/20 N. 65/20 E. |
| Ras Koh | 99,498 | Wildlife Sanctuary | 28/50 N. 65/06 E. |
| Sasnamana | 6,607 | Wildlife Sanctuary | Not Recorded |
| Serajabad Game Reserve | Not | Unclassified | Not Recorded |

| Protected Area Name | Area (ha) | Classification | Coordinates |
|---|---|---|---|
| | Recorded | | |
| Shashan | 29,555 | Wildlife Sanctuary | Not Recorded |
| Shinawari | 5,360 | Game Reserve | 33/29 - 33/25 N. 70/44 - 70/49 |
| Wam | 10,364 | Game Reserve | 30/27 N. 67/43 E. |
| Zangi Nawar | 1,060 | Game Reserve | 29/27 N. 65/47 E. |
| Zawar Khan | 3,887 | Game Reserve | Not Recorded |
| Ziarat Juniper | 37,247 | Wildlife Sanctuary | 30/24 N. 67/44 E. |
| **Federal Territory** | | | |
| Islamabad | 69,800 | Game Reserve | 33/43 N. 73/05 E. |
| Islamabad | 7,000 | Wildlife Sanctuary | 34/43 N. 73/05 E. |
| Margalla Hills | 17,386 | National Park | 33/48 N.73/10 E. |
| **NWFP** | | | |
| Agram Basti | 29,866 | Wildlife Sanctuary | 36/06 - 36/19 N. 71/25 - 71/38 |
| Ayubia | 1,684 | National Park | 34/01 - 34/03 N. 73/22 - 73/27 |
| Bagra | 2,560 | Game Reserve | 33/56 - 33/59 N. 73/00 - 73/05 |
| Bilyamin | 7,090 | Game Reserve | 33/28 - 33/31 N. 71/11 - 71/19 |
| Borraka | 2,205 | Wildlife Sanctuary | 33/13 - 33/33 N. 71/11 - 71/19 |
| Chitral Gol | 7,750 | National Park | 33/51 - 33/56 N. 71/38 - 71/46 |
| Darmalak | 9,788 | Game Reserve | 33/24 - 33/27 N. 71/06 - 71/19 |
| Drosh Gol | 2,060 | Game Reserve | 35/30 - 35/32 N. 71/48 - 71/51 |
| Gehrait Gol | 4,800 | Game Reserve | 35/40 - 35/46 N. 71/45 - 71/53 |
| Ghoranzadi | 6,649 | Game Reserve | Not Recorded |
| Goleen Gol | 49,750 | Game Reserve | 33/49 - 34/17 N. 71/57 - 72/21 |
| Jabbar | 13,288 | Game Reserve | 33/32 - 33/37 N. 71/47 - 71/55 |
| Kacha Marai | 5,300 | Game Reserve | Not Recorded |
| Kandar Dam | 251 | Unassigned (RW) | Not Recorded |

| Protected Area Name | Area (ha) | Classification | Coordinates |
|---|---|---|---|
| Kheshki Reservior | 263 | Unassigned (RW) | Not Recorded |
| Makhnial | 4,148 | Game Reserve | 33/46 - 35/49 n. 73/03 - 73/09 |
| Malugul Dhand | 405 | Unassigned (RW) | Not Recorded |
| Manglot | 715 | Wildlife Sanctuary | Not Recorded |
| Manshi | 2,321 | Game Reserve | 34/41 N. 73/25 E. |
| Maraiwan | 5,300 | Game Reserve | Not Recorded |
| Nizampur | 780 | Game Reserve | 33/44 - 33/46 N. 71/59 - 72/02 |
| Purit Gol/Chitral Chinar Gol | 6,446 | Game Reserve | 35/27 - 35/35 N. 71/51 - 71/55 |
| Qalandar Abad | 8,490 | Game Reserve | 33/56 - 33/59 N. 71/12 - 73/17 |
| Rakh Sardaran | 4,200 | Game Reserve | 33/54 - 34/01 N. 72/44 - 72/51 |
| Rakh Topi | 17,600 | Game Reserve | 33/03 - 33/17 N. 71/35 - 71/45 |
| Resi/Toibanda | 5,908 | Game Reserve | 33/23 - 33/29 N. 71/47 - 71/54 |
| Sewagali | 1,820 | Game Reserve | 34/43 - 34/47 N. 71/12 - 72/16 |
| Sheikh Buddin | 15,540 | National Park | 32/15 - 32/25 N. 70/45 - 71/10 |
| Shekwaki-Chukhtoo | 11,379 | Game Reserve | 33/15 - 33/20 N. 71/17 - 71/30 |
| Shina-Wari Chapri | 1,000 | Game Reserve | Not Recorded |
| Sudham | 11,500 | Game Reserve | 34/20 - 34/27 N. 72/06 - 72/20 |
| Tanda Dam | 405 | Game Reserve | Not Recorded |
| Ten/lsak Khumari | 18,966 | Game Reserve | 33/14 - 33/21 N. 70/53 - 71/07 |
| Thanadarwala | 4,050 | Game Reserve | 32/14 - 32/18 N. 70/44 - 70/53 |
| Toshi | 1,545 | Game Reserve | 35/56 - 35/59 N. 72/25 - 72/39 |
| Totalai | 17,000 | Game Reserve | 34/09 - 34/21 N. 72/25 - 72/39 |
| Zarkani | 12,800 | Game Reserve | 31/44 - 31/57 N. 70/11 - 70/21 |
| Askor Nallah | 12,955 | Game Reserve | Not Recorded |
| | | | |

| Protected Area Name | Area (ha) | Classification | Coordinates |
|---|---|---|---|
| **Punjab** | | | |
| Abbasia Reserve Forest | 2,731 | Wildlife Sanctuary | Not Recorded |
| Bahawalpur R. F. Plantation | 547 | Wildlife Sanctuary | 29/23 N. 71/39 E. |
| Bajwat | 5,795 | Game Reserve | Not Recorded |
| Bhagat Reserve Forest | 251 | Wildlife Sanctuary | Not Recorded |
| Bhakkar Forest Plantation | 2,124 | Wildlife Sanctuary | 31/37 N. 71/03 E. |
| Bheni | 2,068 | Wildlife Sanctuary | Not Recorded |
| Bhon Fazil | 1,062 | Game Reserve | Not Recorded |
| Chak katora Reserve Forest | 535 | Wildlife Sanctuary | Not Recorded |
| Chak Reserve Forest | 2,158 | Wildlife Sanctuary | Not Recorded |
| Changa manga Plantation | 5,063 | Wildlife Sanctuary | 31/05 N. 73/59 E. |
| Chashma Barrage | 33,082 | Wildlife Sanctuary | 32/27 N. 71/19 E. |
| Chashma Lake | Not Recorded | Unclassified | 32/27 N. 71/19 E. |
| Chaupalia | 9,857 | Game Reserve | Not Recorded |
| Chichawatni Forest Plantation | 4,666 | Wildlife Sanctuary | 30/32 N. 72/42 E. |
| Chinji | 6,070 | National Park | 32/42 N. 72/22 E. |
| Cholistan | 660,921 | Wildlife Sanctuary | 29/59 N. 73/16 E. |
| Cholistan | 2,032,6 | Game Reserve | 29/23 N. 71/39 E. |
| Chumbi-Surla | 55,943 | Wildlife Sanctuary | 32/50 N. 72/46 E. |
| Daluana | 2,314 | Game Reserve | Not Recorded |
| Daman Reserve Forest | 2,270 | Wildlife Sanctuary | Not Recorded |
| Daphar Reserve Forest | 2,897 | Wildlife Sanctuary | 32/24 N. 73/08 E. |
| Depalpur Plantation | 2,928 | Wildlife Sanctuary | 30/40 N. 73/39 E. |
| Diljabba-Domeli | 118,101 | Game Reserve | Not Recorded |
| Fateh Major Forest Plantation | 1,255 | Wildlife Sanctuary | Not Recorded |
| Gatwala | 5,883 | Game Reserve | Not Recorded |
| Hamot Reserve Forest | 889 | Wildlife Sanctuary | Not Recorded |
| Head Islam/Chak Kotora | 3,132 | Game Reserve | 29/49 N. 72/33 E. |
| Head Qadirabad | 2,850 | Game Reserve | 32/18 N. 73/29 E. |
| Inayat Reserve Forest | 4,211 | Wildlife Sanctuary | Not Recorded |
| Indo/Pak Border Belt | Not Recorded | Game Reserve | Not Recorded |
| Jalalpur Lake | 42 | Wildlife Sanctuary | 32/32 N. 72/14 E. |

| Protected Area Name | Area (ha) | Classification | Coordinates |
|---|---|---|---|
| Jalalpur Sharif Forest | 2,263 | Wildlife Sanctuary | 32/41 N. 73/32 E. |
| Jauharabad Reserve Forest | 399 | Wildlife Sanctuary | 32/17 N. 72/21 E. |
| Kala Chitta | 132,605 | Game Reserve | N. 72/20 E. |
| Kalabagh Game Reserve | 1,550 | Unclassified | 34/04 N. 71/36 E. |
| Kamalia Plantation | 4,396 | Wildlife Sanctuary | 30/43 N. 72/43 E. |
| Kathar | 1,141 | Game Reserve | 33/45 N. 73/07 E. |
| Khabbeke Lake | 285 | Wildlife Sanctuary | 32/37 N. 72/14 E. |
| Khanewal Plantation | 7,217 | Wildlife Sanctuary | 30/18 N. 71/56 E. |
| Kharar lake | 235 | Wildlife Sanctuary | 30/52 N. 73/13 E. |
| Kheri Murat | 5,616 | Game Reserve | Not Recorded |
| Kot Zabzal | 10,117 | Game Reserve | Not Recorded |
| Kotla issan Reserve Forest | 2,178 | Wildlife Sanctuary | Not Recorded |
| Kundal Rakh | 2,999 | Wildlife Sanctuary | Not Recorded |
| Kundian plantation | 7,800 | Wildlife Sanctuary | 32/27 N. 71/29 E. |
| Lal Suhanra | 51,588 | National Park (WHS) | 29/21 N. 71/58 E. |
| Lohi Bher Forest | 887 | Wildlife Sanctuary | 33/43 N. 73/05 E. |
| Machu Plantation | 4,109 | Wildlife Sanctuary | Not Recorded |
| Miranpur Reserve Forest | 768 | Wildlife Sanctuary | Not Recorded |
| Mitha Tiwana Plantation | 1,116 | Wildlife Sanctuary | Not Recorded |
| Namal lake | 482 | Game Reserve | 32/40 N. 71/49 E. |
| Pirawala kikarwala | 506 | Game Reserve | 30/21 N. 72/02 E. |
| Qadirabad Head Works | 2,849 | Game Reserve | 32/18 N. 73/29 E. |
| Rahri Bungalow | 5,463 | Game Reserve | Not Recorded |
| Rajan Shah Plantation | 2,110 | Wildlife Sanctuary | Not Recorded |
| Rakh Ghulaman | 4,356 | Wildlife Sanctuary | Not Recorded |
| Rasool Barrage | 1,138 | Game Reserve | 32/42 N. 73/33 E. |
| Shorkot Forest Plantation | 4,079 | Wildlife Sanctuary | 30/50 N. 72/04 E. |
| Sodhi I | 5,817 | Wildlife Sanctuary | 32/35 N. 72/17 E. |
| Taunsa Barrage | 6,566 | Wildlife Sanctuary | 30/42 N. 70/46 E. |
| Tehra Plantation | 339 | Wildlife Sanctuary | Not Recorded |
| Thal | 71,275 | Game Reserve | 33/22 N. 70/33 E. |
| Ucchali lake | 942 | Game Reserve | 32/36 N. 72/13 E. |
| Wathar Reserve Forest | 1,874 | Wildlife Sanctuary | Not Recorded |
| **Sindh** | | | |

| Protected Area Name | Area (ha) | Classification | Coordinates |
|---|---|---|---|
| Bijoro Chach | 121 | Wildlife Sanctuary | Not Recorded |
| Cut Munarki Chach | 405 | Wildlife Sanctuary | Not Recorded |
| Deh Akro/Nara Canal | 20,000 | Wildlife Sanctuary | ? 27/42 N. 68/52 E. |
| Deh jangisar | 314 | Game Reserve | Not Recorded |
| Deh Khalifa | 429 | Game Reserve | Not Recorded |
| Deh Sahib Saman | 349 | Game Reserve | Not Recorded |
| Dhoung Block | 2,098 | Wildlife Sanctuary | Not Recorded |
| Dograyon lake | 648 | Wildlife Sanctuary | Not Recorded |
| Dosu Forest | 2,312 | Game Reserve | Not Recorded |
| Drigh Lake | 164 | Wildlife Sanctuary (RW) | Not Recorded |
| Ghamot | 27,283 | Game Reserve | Not Recorded |
| Ghondak Dhoro | 31 | Wildlife Sanctuary | Not Recorded |
| Gullel Khon | 40 | Wildlife Sanctuary | Not Recorded |
| Gulsher Dhand | 24 | Wildlife Sanctuary | Not Recorded |
| Hab Dam | 27,219 | Wildlife Sanctuary | 25/05 N. 67/00 E. |
| Hadero lake | 1,321 | Wildlife Sanctuary | 24/50 N. 67/53 E. |
| Hala | 954 | Game Reserve | 25/48 N. 68/25 E. |
| Haleji Lake | 1,704 | Wildlife Sanctuary (RW) | 24/49 N. 67/44 E. |
| Hawks Bay/Sandspit Beaches | 324 | Wildlife Sanctuary | Not Recorded |
| Hilaya | 324 | Wildlife Sanctuary | Not Recorded |
| Indus River | 44,200 | Game Reserve | 28/24 N. 69/45 E. |
| Keti Bunder South | 8,948 | Wildlife Sanctuary | 24/08 N. 67/27 E. |
| Keti Bunder North | 23,040 | Wildlife Sanctuary | 24/08 N. 67/27 E. |
| Khadi | 81 | Wildlife Sanctuary | Not Recorded |
| Khairpur Game Reserve | Not Recorded | Unclassified | 27/32N . 68/47 E. |
| Khanpur | Not Recorded | Unclassified | Not Recorded |
| Khat Dhoro | 11 | Wildlife Sanctuary | Not Recorded |
| Khipro | 3,885 | Game Reserve | 25/49 N. 69/21 E. |
| Kinjhar (Kain) Lake | 13,468 | Wildlife Sanctuary (RW) | 29/54 N. 70/57 E. |
| Kirthar | 308,733 | National Park | 25/44 - 27/15 N. 67/10.E |
| Kot dinghano | 30 | Wildlife Sanctuary | Not Recorded |

| Protected Area Name | Area (ha) | Classification | Coordinates |
|---|---|---|---|
| Lakht | 101 | Wildlife Sanctuary | 26/36 N. 67/53 E. |
| Langh (lungh) Lake | 19 | Wildlife Sanctuary | 27/30 N. 68/03 E. |
| Mahal Kohistan | 70,577 | Wildlife Sanctuary | Not Recorded |
| Mejiran | 24 | Wildlife Sanctuary | Not Recorded |
| Mando Dero | 1,234 | Game Reserve | Not Recorded |
| marho kohn | 162 | Wildlife Sanctuary | Not Recorded |
| Miani Dhand | 57 | Wildlife Sanctuary | 25/27 N. 68/23 E. |
| Mirpur Sakro | 777 | Game Reserve | 24/32 N. 67/38 E. |
| Mubahat Dero | 16 | Wildlife Sanctuary | Not Recorded |
| Munarki | 12 | Wildlife Sanctuary | Not Recorded |
| Nara | 109,966 | Game Reserve | 27/42 N. 68/52 E. |
| Nara Desert | 223,590 | Wildlife Sanctuary | Not Recorded |
| Norang | 243 | Wildlife Sanctuary | Not Recorded |
| Pai | 1,969 | Game Reserve | Not Recorded |
| Pir Mahfooz Game Reserve | Not Recorded | Unclassified | Not Recorded |
| Pir Pagara Game Reserve | Not Recorded | Unclassified | Not Recorded |
| Runn of Kutch | 320,463 | Wildlife Sanctuary | Not Recorded |
| Sadnani | 84 | Wildlife Sanctuary | Not Recorded |
| Samno Dhand | 23 | Wildlife Sanctuary | Not Recorded |
| Shah Lanko | 61 | Wildlife Sanctuary | Not Recorded |
| Surjan,Sumbak,Eri & Hothiano | 40,632 | Game Reserve | 25/25 N. 67/55 E. |
| Takkar | 43,513 | Wildlife Sanctuary | 27/15 N. 68/49 E. |
| Tando Matha Khan | 5,343 | Game Reserve | Not Recorded |

Source: Guidelines for Sensitive and Critical Areas. Government of Pakistan. 1997.

## Exhibit B.2: Sites of Archeological and Historical Significance

**Sindh Province**

***Badin District***

1. Ruins of old city at Badin.

***Dadu District***

2. Tomb of Yar Muhammad Khan Kalhora and its adjoining Masjid near Khudabad, Dadu.
3. Jamia Masjid, Khudabad, Dadu.
4. Rani Kot Fort, Dadu.
5. Amri Mounds, Dadu.
6. Lakhomir-ji-Mari, Deh Nang opposite Police outpost, Sehwan, Dadu.
7. Damb Buthi, Deh Narpirar at the source of the pirari (spring), south of Jhangara, Sehwan, Dadu.
8. Piyaroli Mari, Deh Shouk near pir Gaji Shah, Johi, Dadu.
9. Ali Murad village mounds, Deh Bahlil Shah, Johi, Dadu.
10. Nasumji Buthi, Deh Karchat Mahal, Kohistan, Dadu.
11. Kohtrass Buthi, Deh Karchat about 8 miles south-west of village of Karchat on road from Thana Bula Khan to Taung, Dadu.
12. Othamjo Buthi Deh Karchat or river Baran on the way from the Arabjo Thano to Wahi village north-west of Bachani sandhi, Mahal, Kohistan, Dadu.
13. Lohamjodaro, Deh Palha at a distance of 30 chains from Railway Station but not within railway limits, Dadu.
14. Pandhi Wahi village mounds, Deh Wahi, Johi, Dadu.
15. Sehwan Fort, Sehwan, Dadu.
16. Ancient Mound, Deh Wahi Pandhi, Johi, Dadu.
17. Ancient Mound, Deh Wahi Pandhi, Johi, Dadu.

***Hyderabad District***

18. Tomb of Ghulam Shah Kalhora, Hyderabad.
19. Boundary Wall of Pucca Fort, Hyderabad.
20. Old office of Mirs, Hyderabad Fort, Hyderabad.
21. Tajar (Treasury) of Mirs, Hyderabad Fort, Hyderabad.
22. Tomb of Ghulam Nabi Khan Kalhora, Hyderabad.
23. Buddhist Stupa, (Guja) a few miles from Tando Muhammad Khan, Hyderabad.
24. Haram of Talpur Mirs, Hyderabad.
25. Enclosure containing Tombs of Talpur Mirs, Hyderabad.
26. Tower (Now used as water tank), Hyderabad Fort, Hyderabad.
27. Two Mosques and a Tomb, Tando Fazal, Hyderabad.
28. Tomb of Sarfaraz Khan Kalhora, Hyderabad.
29. Nasar-ji- Mosque, Mohalla Jhambhas, Nasarpur, Hyderabad.
30. Kiraiji Masjid, Mohalla Misri, Nasarpur, Hyderabad.
31. Mai Khairiji Masjid, Mohalla Memon, Hyderabad.
32. Mosque of Mirs, Hyderabad, ward “E”, Hyderabad.
33. Enclosure containing Tombs of Talpur Mirs, Hyderabad.

***Karachi District***

34. Wazir Mansion, birthplace of Quaid-e-Azam Muhammad Ali Jinnah, Karachi new Naham Road, Bundar quarters, Kharadar, Karachi.

35. Chaukhandi Tombs, near Landhi on National Highway, Karachi.
36. Lakho Shaikh (Baluch) Graveyard, Kharkhro, Karachi.
37. Khaliq Dina Hall and Library, M.A. Jinnah Road, Karachi.
38. Jam Bijar Fort (or Banbhore), Mirpur Sakro, Karachi.
39. Frere Hall, Karachi.
40. Flag Staff House (Quaid-e- Azam House Museum), Karachi.
41. Mausoleum of the Quaid-e-Azam Muhammad Ali Jinnah, Karachi.

***Khairpur District***

42. Diji ki Takri mound, remains of earliest fortified town, Deh Ghaunro near Kot Diji Fort. Khairpur.
43. Fort at Kot Diji, Kot Diji, Khairpur.
44. Maro Waro Dhoro mound situated on sand hill, Deh Naro Dhoro 2 miles east of Tando Masti Khan, Khairpur.

***Larkana District***

45. Jhukar mound, Mithadaro, Larkana.
46. Moenjodaro, Buddhist monastery and prehistoric remains around Moenjodaro, Larkana.
47. Moenjodaro, Buddhist Stupa and prehistoric remains underneath, Moenjodaro, Larkana.
48. Tajjar Building, Jinnah Bagh, Larkana.
49. Tomb of Shah Baharo, Larkana.
50. Square Tower, near Dhamrao, Larkana.
51. Dhamrao Dero (three groups), Deh Dhamrao, Deh 67 Nasrat, Larkana.

***Nawabshah District***

52. Buddhist Stupa, Village Mir Rukan, Nawabshah.
53. Tomb of Nur Muhammad Kalhora, Deh of Village Nur Muhammad, 17 miles from Daulatpur, Nawabshah.
54. Qubbo Mir Shahadad, Shahpur, Nawabshah.
55. Bhiro Bham Mound, Tepa Chibore, Nawabshah.

***Sanghar District***

56. Brahmanabad (Mansura) locally known as Dalo Raja-ji-Nagri, Jamara, Tehsil Sinjhoro. Deh Dalore, Sanghar.
57. Mound Thulh, Deh Kot Bujar, Sanghar.
58. Graveyard, Tehsil Shahdadpur, Sanghar.

**Sukkur District**

59. Mir Masum's Minar and tomb, Sukkur.
60. Satyan-jo-than, Rohri, Sukkur.
61. Bakkar Fort entire area including the walls and tombs of Hazrat Sadruddin Muhammad (occupied by the Army), between Lands down and Sukkur bridges, Sukkur...
62. Mumalji Mari, mound, Taluka Ghotki, Deh Mathelo, Sukkur.
63. Stone Tool Factory area Rohri, Sukkur.

***Tharparkar District***

64. Birth place of Akbar the Great (Small Building 9' x 9') near the town of Umerkot, Tharparkar.
65. Buddhist Stupa (Kahujodaro), Mirpurkhas, Tharparkar.
66. A stone mosque with white marble pillars, Bhodesar, Tharparkar.

67. Temple-I, Bhodesar, Tharparkar.
68. Temple-II, Bhodesar, Tharparkar.
69. Fort Naokot, Tharparkar.
70. Fort Umerkot, Tharparkar.
71. Gori Temple, 14 miles north-west of Virawah, Tharparkar.
72. Temple-IV, Bhodesar, Tharparkar.
73. Mound at Bhiro, Sherwah, Tharparkar.
74. Mound at Shadi Pali, Deh Khuda Bux, Tharparkar.
75. Jain Temple, Virawah, Tharparkar.
76. Brick Tomb of Arzi Khokhar, Ghitori, Goth, Deh No. 24, Tharparkar.
77. Tomb of Mir Khan s/o Karam Khan Talpur, Ghitori Goth, Deh No. 24, Tharparkar.
78. Tomb of Mir Jado, Ghitori Goth, Deh No. 24, Tharparkar.
79. Tomb of Mir Murad Khan, Ghitori Goth, Deh No. 24, Tharparkar.
80. Tomb of Musa Khan, Ghitori Goth, Deh No. 24, Tharparkar.
81. Tomb of Mir Raio, Ghitori Goth, Deh No. 24, Tharparkar.
82. Tomb of Shaheed Kapri Baloch, Ghitori Goth, Deh No. 24, Tharparkar.
83. A tomb (name not known) north-west of Shaheed Kapri Baluch, Ghitori Goth, Deh No. 24, Tharparkar.
84. Tomb of bricks, west of S.No. 81 above (name not known), Ghitori Goth, Deh No. 24, Tharparkar.
85. Stone tomb west of S. No. 82 above (name not known), Ghitori Goth, Deh No. 24, Tharparkar.
86. Tombs of Mir Fateh Khan and Mir Mirza Khan Ghitori Goth, Deh No. 24, Tharparkar.
87. Tomb of females of Mir dynasty, Ghitori Goth, Deh No. 24, Tharparkar.
88. Tomb of females of Mir dynasty, Ghitori Goth, Deh No. 24, Tharparkar.
89. Tomb of Aulia Pir Ghitori Badshah Qureshi, Ghitori Goth, Deh No. 24, Tharparkar.
90. Tomb and a Mosque, Ghitori Goth, Deh No. 24, Tharparkar.
91. Old ruined Mosque, Ghitori Goth, Deh No. 24, Tharparkar.

**Thatta District**

92. Brick dome to the north-east of tomb of Mubarak Khan (tomb of Fateh Khan's sister), Makli Hill, Thatta.
93. Tomb of Mubarak Khan son of Jam Nizamuddin, Makli Hill Thatta.
94. Tomb and compound wall of yellow stone to the south of Jam Nizamuddin, Makli Hill, Thatta.
95. Tomb and enclosure to the south-west of S. No. 92. Makli Hill, Thatta.
96. Tomb and enclosure to the west of the above tomb S. No. 93, Makli Hill, Thatta.
97. Brick dome to the south of the tomb S. No 94, above Makli Hill, Thatta.
98. Sultan Ibrahim and other tombs also but wrongly known a Amir Khalil Khan's tomb, Makli Hill, Thatta.
99. Tomb and compound wall of yellow stone to the south of Mirza Muhammad Baqi Tarkhan tomb (wrongly called Mirza Isa Khan's tomb), Makli Hill, Thatta.
100. Brick enclosure of Mirza Baqi Baig Uzbak's tomb, south of the tomb of Nawab Isa Khan the younger, Makli Hill, Thatta.
101. Dabgir Masjid, Makli Hill, Thatta.
102. Graveyard, Makli Hill, Thatta.
103. Goth Raja Malik graveyard known as Maqam Qadar Shah, Deh Raja Malik, Thatta.
104. Sonda graveyard, village Sonda, Thatta.

105. Jam Nizmuddin's tomb, Makli Hill, Thatta.
106. Baradari, Makli Hill, Thatta.
107. Tomb of Amir Sultan Muhammad son of Amir Hajika, Makli hill, Thatta.
108. Tomb of Nawab Isa Khan, the younger Makli Hill, Thatta.
109. Mirza Tughral Baig's tomb, Makli Hill, Thatta.
110. Tomb of Mirza Jani and Mirza Ghazi Baig, Makli Hill, Thatta.
111. Stone enclosure containing tombs of Nawab Isa Khan, Makli Hill, Thatta.
112. Mirza Muhammad Baqi Tarkhan's tomb (wrongly called Mirza Isa Khan's tomb) Makli Hill, Thatta.
113. Stone tomb with a dome on stone pillars by the side Mirza Jani Baig's tomb, Makli Hill Thatta.
114. Brick masjid and enclosure near Nawab Shurfa Khan's tomb (supposed to be the tomb of Sayyed Amir Khan), Makli Hill, Thatta.
115. Stone tomb with enclosure to the south of tomb of Mirza Muhammad Baqi Tarkhan, Makli Hill, Thatta.
116. Tomb of Mirza Muhammad Isa Turkhan I, Makli Hill, Thatta.
117. Brick tomb near the tomb of Qulia pir, Makli Hill, Thatta.
118. Tomb with superstructure on stone pillars to the north of tomb of Jam Nizamuddin, Makli Hill, Thatta.
119. Brick structure to the north of tomb of Jam Nizamuddin, Makli Hill, Thatta.
120. Two pavilions on stone pillars over the tombs to the southwest of tomb of Jam Nizamuddin. One is the tomb of Jam Sikandar Shah, Makli Hill, Thatta.
121. Kalan Kot, Makli Hill, Thatta.
122. Nawab Amir Khan's mosque, Makli Hill, Thatta.
123. Building with two domes near the Civil Hospital, Thatta, Makli Hill, Thatta.
124. Jama Masjid, Makli Hill, Thatta.
125. Sasian-Jo-Takar (Mirpur Sakro, Thatta.
126. Jama Masjid, Thatta.

**NATIONAL MONUMENTS**

1. Mausoleum of the Quaid-e-Azam Muhammad Ali Jinnah, Karachi.
2. Wazir Mansion, Quaid-e-Azam's birth place, Karachi.
3. Khaliq Dina Public Hal and Library, Karachi.
4. Flag Staff House (Quaid-e-Azam House Museum), Karachi.

**WORLD HERITAGE MONUMENTS ON UNESCO LIST.**

1. Mohenjodaro, District Larkana.
2. Makli Hill, Thatta.

**Punjab Province**

***Attock District***

1. Lala Rukh's tomb, Hasan Abdal, Attock.
2. Begum ki Sarai, on left bank of Indus River near Attock fort, Attock.
3. Saidan Baoli, Hatti, Attock.
4. Hakim's tomb, Hasan Abdal, Attock.
5. Chitti Baoli, Pindi Suleman Makhan, Attock.
6. Attock Fort, Attock.
7. Attock tomb, on G.T. Road near Ziarat Hazrat Baba Sahib, Attock.

8. Behram ki Baraddari, Attock.
9. Tope and Mnastery (Buddhist remains), 5 miles east of Hasan Abal Baoli Pind, Attock.
10. Kallar (temple) or Sassi da Kallara, village Shah Muhammad Wali, Tesil Talagang, Attock.
11. Site at Garhi, village Malak Mala, 6 miles east of hasan Abal, Attock.
12. Inderkot mosque, Fateh Jang, Inderkot, Attock.
13. Buddhist site (Behari Colony) Hasan Abddal Town, Behari Colony, Attock.

***Bahawalpur District***

14. Tomb of Abu Hanifa, Uchh Sharif, Bahawalpur.
15. Tomb of Bibi Jawidi, Uchh Sharif, Bahawalpur.
16. Tomb of Nuria, Uchh Sharif, Bahawalpur.
17. Tomb of Bhawal Halee, Uchh Sharif, Bahawalpur.
18. Tomb of Musa Pak Shaheed, Uchh Sharif, Bahawalpur.

***Dera Ghazi Khan District***

19. Ghazi Khan's Tomb, Mohalla Zaminaran, Village Chirotta, Ddera Ghazi Khan.
20. Ther Dallu Roy, Dajal, Ddera Ghazi Khan.

***Fasialabad District***

21. Wangar Wala Tibba, Chak No. 742, Tehsil Taoba Tek Singh, Faisalabad.

***Gujranwala District***

22. Baraari in Sherawala garen, Gujranwala city.
23. Tomb of Abdul Nabi Kotli Maqbara, Gujranwala.

***Gujrat District***

24. Akbari Baoli in fort Gujrat city.
25. Bahar Wali, Baoli Kharian Town, Gujrat.
26. Tomb of Shaikh Ali Baig, locally calle Hanjeera, Village Hailan, Tehsil Phalia, Gujrat.

***Jhang District***

27. Shahi Masi, Chiniot, Jahng.
28. Tomb of Shah Burhan, Chiniot, Jhang.

***Jhelum District***

29. Rohtas Fort, 5 miles from Dina Railway Station, Jhelum.
30. Ruined Temple with gateway, Melot, Jhelum.
31. Raja Mansigh's Haveli Rohtas, Jhelum.
32. Hill measuring 25 ft. long and 190 ft. broad, Murti in Tehsil Pind Dadan Khan, Jhelum.
33. Two ancient teples, Bhagan Wala, 11 miles from Haranpur Railway Station, Jhelum.
34. Ruins of Nandana, For Bhagan Wala, Jhelum.
35. Sardar of Hari Singh's Haveli, Katas, Jhelum.
36. Ruined Buddhist Stupa area around it, Katas, Tehsil Pind Dadan Khan, Jhelum.
37. Satghara temple Village Katas, Tehsil Pind Dadan Khan, Jhelum.

***Khanewal District***

38. Tomb of Khali Walid, village Kabirwala, Khanewal.

***Lahore District***

39. Tomb of Ali Mardan Khan and Gateway, Lahore.
40 .Buddo's tomb, Lahore.
41. Sarvwala Maqbara, Lahore.
42. Huzuri Bagh Baradari, Lahore.
43. Dai Anga's tomb, Lahore.

44. Shalamar Garden, including baradari, gateway, kiosks, pavilions, well, Naqqar Khana, asmani well and garden, Lahore.
45. Old Fort, Lahore.
46. Buddho ka Awa, Lahore.
47. One kos minar, Lahore.
48. Roshani gate, Lahore.
49. Mirza Kamran's baradari, Lahore.
50 Tomb of Dr. Muhammad Iqbal, Lahroe.
51. Tomb of Dr. Muhammad Iqbal, 34-A, Mcleod Road, Lahore.
52. Chauburji, Mazang, Lahore.
53. Gulabi Bagh gatweay, Begumpura, Lahore.
54. Qutbudddin Aibak's tomb, Anar kali street, Lahore.
55. Tiledd gatweay and two bastions, Nawankot, Lahore.
56. Two kos minars, Minola, 6 miles from Jullo, Lahore.
57. Tomb of Shaikh Mosa, Ahangar, mosque and house, Mcleod Road, 35, Chiraghan Street, Lahore.
58. Tomb of (erroneously called) Zebun-Nisa, Nawankot, Lahore.
59. Naddira Begum's tomb and tank, Mian Mir, Lahore Cantonment, Lahore.
60. Hujra Mir Mehdi (Janazegah), Kot Khawaja Saeed, Lahore.
61. Tomb of Prince Parwaiz, Kot Khawaja Saeed, Lahore.
62. Tomb of Nawab Bahadur Khan, Mughalpura near Railway crossing, B-II, South of railway carriage shop, Lahore.
63. Javedd Manzil, Allama Iqbal Road, Lahore.
64. Jahangir's tomb and compound, Shahdara, Lahore.
65. Akbari Sarai an mosque, Shahdara, Lahore.
66. Tomb of Asif Khan and compound, Shahdara, Lahore.
67. Tomb of nur Jeha, Shahdara, Lahore,
68. Tomb of Mahabat Khan and boundary wall, Baghbanpura, Lahore.
69. Samadh of Rajit Singh, Karakh Singh and Nau Nihal Singh, Lahore.
70. Tomb of Anarkali, Lahore.
71. Baradari and Samadh of Maharaja Sher Singh, Lahore.
72. Badshahi mosque, Lahore.
73. Wazir Khan's mosque, Lahore.
74. Chitta gate, Chowk Wazir Khan inside elhi Gate, Lahore.
75. Another gate to northeast of Wazir Khan's mosque, Chowk Wazir Khan, Lahore.
76. Well of Raja Dina Nath, Chowk Wazir Khan, Lahore.
77. Masti gate, Lahore.
78. Bhati gate, Lahore.
79. Sheranwala gate, Lahore.
80. Kashmiri gate, Lahore.
81. Lahori known as Lahori gate, Lahore.
82. Delhi gate, Lahore.
83. Wazir Khan's hammams inside Delhi gate, Chowk Wazir Khan, Lahore.
84. Haveli Nau Nihal Singh including garden, quarters, latrine etc. inside Bhati gate, Kucha Nau Nihal Singh, Lahore.
85. Tomb of Khawaja Sabir (Nawab Nusrat Khan) inside Railway Mechanical Workshop,

Mughalpura, Lahore.
86. Tomb of French Officer's ddaughter, Kuri Bagh, Lahroe.
87. Wazir Khan's baradari, oldd Anarkali, Behind Lahore Museum, Lahore.
88. Samadh of Jhingar Shah Suthra (Suthron ka Asthan) Suthron, Teshl Lahore, Lahore.
89. Samadh of Bhai Wasti Ram Tixali gate near Shahi Qila, Lahore.
90. A Mughal period tomb, Tehsil Lahore Singhapura, oppsite Police Post, Lahore.
91. Jani Khan's tomb, Baghbanpura, Lahore.
92. Dai Anga's mosque, Naulakha, Lahore.
93. Mosque with glazed tiles work, Bagumpura, Lahore.
94. Mosque of Nawab Zakariya Khan, Bagumpura, Lahore.
95. Inayat Bagh, opposite Shalamar Garden, Bagumpuura, Lahore.
96. Angori bagh, opposite Shalamaer Garen Bagumpura, Lahore.
97. Mariam Zammani mosque, insie Masti gate, Lahore.

***Mianwali District***

98. Shershah's baoli, Wah Buchhran, Mianwali.
99. A buddhist Stupa with a surrounding area on River Inddus to the north of Village Rokhari, Mianwali.

***Multan District***

100. Sawi Masjid an graves, Kotla Tole Khan, Multan.
101. Tombs of Petrick Alexander Vana, Andrew & William Anderson, Old Fort, Multan.
102. Shrine of Rukne Alam, Old For, Multan.
103. Tomb of Shah Ali Akbar's mother, Sura Miana, Multan.
104. Tomb of Shams Tabriz, Sura Miana, Multan.
105. Tomb of Shah Ali Akbar, Sura Miana, Multan.
106. Tomb of Shah Yousuf Gardezi, Multan.
107. Mound Ratti Khari, Head Bust 133 village Bhatianwala, Teshil Kaberwala, Multan.
108. Tobm of Shah Hussain Soozai, near Abdal Road, Multan.
109. Tomb of Mai Mehraban, Mohallah Kirialoghana, Multan.
110 Ruined mosque Village Sargana, Multan.
111. Maryala Moun, Chak No. 267/IOR, Multan.

***Muzaffargarh District***

112. Tomb of Thar Khan Nahar, Sitpur, Musaffargarh.
113. Mosque of Tahar Khan Nahar, Sitpur, Muzaffargarh.
114. Tomb of Sheikh Sadan Shaheedd, Village Sadan, Muzaffargarh.

***Rawalpini District***

115. Tope or stupa (Buddhist), Mankiyala, Rawalpindi.
116. Top or stupa (Buddhist) Bhallar, Rawalpindi.
117. Pharwala fort Pharwala, Rawalpindi.
118. Losar baoli, Wah Cantonment, Rawalpindi.
119. Bhir Moun,Taxila, Mauza Majawer, Rawalpindi.
120. The area or Track known as Babar Khan, Taxila, Babar Khan, Rawalpindi.
121. Kalawansite, Mauza Karawal, Rawalpindi.
122. Chirtope site, Taxila, Chirtope, Rawalpindi.
123. Sirkap site, Mauza Gangu Bahaddur, Rawalpindi.
124. Giri remains, Mauza Khuram Gujjar, Rawalpindi.

125. Mohra Maradu site, Taxila, Rawalpindi.
126. Rewat fort, Village Rewat, Rawalpindi.
127. Nicholson Column, Margala Pass, Rawalpindi.
128. Kos minar, Milestone 102, G.T. Road, Rawalpindi.
129. Kos Minar, near Golara Railway Station, Rawalpindi.
130. Farudgh-e-Shahan-e-Mughalia, tank and garden Wah, Rawalpindi.
131. Ratta Pind, Village Gangu Bahadur, Rawalpindi.

***Sahiwal District***

132. Mounds, Harappa, Saiwal.
133. Mir Chakar's tomb, Satghara, Sahiwal.
134. Tomb of Syyed Daud Kirmani, Shergah, Sahiwal.

***Sargodha District***

135. Three temple inside fort, Amb Sargodha.
136. Site of ancient city, Bhera, Sargodha.
137. Site of ancient city, Vijjhi, 2 milles southwest of Miani known as Sabzal Pind, Sargodha.
138. A red sandstone teple, Sodhi Zerin, Sargodha.

***Sheikhupura District***

139. Sheikhupura fort, east of Sheikhupura town, Sheikhupura.
140. Baoli and mosque, Jandiala Sher Khan, Sheikhupura.
141. Tank and tower, Sheikhupura.
142. Tomb of Abdullah Shah, Jandiala Sher Khan, Sheikhupura.
143. Mound Mian Ali Sahib, Mian Ali Faqiran, Sheikhupura.
144. Tibba (Mound), Kala Shah Kaku, Sheikhupura.
145. Tomb of Noor Muhammad, Jandiala Sher Khan, Sheikhupura.
146. Tomb of Hafiz Barkhurdar, Jandiala Sher Khan, Sheikhupura.

***Sialkot District***

147. Tibba Jolian, Sialkot.

**Balochistan Province**

1. Pirak mound, Village Kolachi, Kachhi.

***Kalat District***

2. Nindo Damb, Ornach Valley, Tehsil Wadh, Kalat.

***Kharan District***

3. Fort wall of Jalawar Pass, Jhalawar, Kharn.
4. Fort of Azad Khan (Kharan Fort), Kharan twon, Kharan.
5. Pally Kalat, Washbohi, Kharan.
6. Nauroze fort, Nauroze Kharan.
7. Aneient tomb, Jhalawar, Kharan.
8. Har-o-Goke, Garuk, Kharan.

***Lasbella District***

9. Ancestral graveyard of Jam of Lasbella, Babrs, Lasbella.
10. Tomb of General Muhammad Ibn-e-Haroon, Bela town, Lasbella.
11. Tombs at Hinidan, Pir Mubarakm Lasbella.
12. Chowkhundi (Rumi) graves, Bhawani Sarai, 5 miles from Hub Chowki, Lasella.

***Loralai District***

13. Tordheri site, Tordheri, Loralai.
14. High cound, Dabarkot, Loralai.
15. Pre-historie mound, Harian Haider Zai, Loralai.

***Nasirabad District***

16. Damb Judeir or Judeir-jo-daro, Deh Jodher No.2 between Jhatpat and Dera Murad Jamali, Nasirabad.

***Quetta District***

17. Mound No. 2, Village Samangali, west side of Airport, Quetta.
18. Mound No.1, Village Kotwal Near Killi Gul Muhammad, Quetta.
19. Mound No. 3, Damb Sadat, 14 miles from Quetta, Quetta.
20. Mound No. 5, Ahmad Khan Zai, Quetta.
22. Mound No. 7, Kachlak on Chaman Road, Quetta.
23. Mound NO. 8, Village Samali (Dosak-i-Khasyan), Quetta.
24. Mound No. 9, Village Metar Zai, Quetta.
25. Mound No. 10, Shaikh Manda on Chaman Road, Quetta.
26. Mound No. 11, Village Vauhisar, Quetta.

***Sibi District***

27. Quaid-i-Azam Residency Building, Ziarat, Sibi.

**NATIONAL MONUMENT**

Ziarat Residency, Ziarat.

**NWFP**

***Abbottabad District***

1. Jandial, A,B,C,D, (excavated remains), Tafikian, Abbottabad.
2. Sirsukh city, Marchabad, Abbottabad.
3. Jaulian site, Jaulian, Abbottabad.
4. Piplan site, Jaulian, Abbottabad.
5. Garhian (Lal Chak) stupa and monastery, Garhian, Abbottabad.
6. Badalpur stupa and monastery, Badalpur, Abbottabad.
7. Ancient stie, Bhamala, Abbottabad.
8. Tofikian mound, Tofikian, Abbottabad.
9. Therr Bajran Sites B,C,D, Tofikian, Abbottabad.
10. Pind Ghakhran mound, Pind Ghakhran, Abbottabad.
11. Mirpur mound, Mirpur, Abbottabad.
12. Tope iste (mound), Jaulian, Abbottabad.
13. Bhera (mound) Bhera, Abbottabad.
14. Chitti site, Chitti, Abbottabad.
15. Tarnawa Chitti site A & B, Tarawa, Abbottabad.
16. Burj or Tuma site, Garamthun, Abbottabad.
17. Bhari Dheri, Kutehra, Abbottabad.
18. Dana Wali, Kutehra, Abbottabad.
19. Tope site, Kamalpur, Abbottabad.
20. Part of site, Dobandi, Abbottabad.
21. Zuro Dheri, Village Shin kiari, Abbottabad.

***Bannu District***

22. Akra (A) mound, near Village Bhart, Bannu.
23. Akra (B) mound, near Village, Vhart, Bannu.
24. Sheri Khan Tarakai, Village Jani Khel Wazir, Bannu.
25. Ghundai, Village Bakka, Khel Wazir, Bannu.

***Buner District***

26. Ranighat Totalai, Buner.

***Dera Ismail Khan District***

27. Northern Kafir Kot, ancient fort and temple, Umer Khel, D.I.Khan.
28. Graveryard including four tombs at Lal Mohra Sharif, Lunda Pahar, D.I.Khan
29. Rehman Dheri, Hisam, D.I.Khan.
31. Southern Kafir Kot, ancient fort and temple, Bilot, D.I.Khan.

***Kohat District***

32. Kohat fort, Kohat.

***Mansehra District***

33. Tomb of Hazrat Shaheed Ahmad Maujadid Baralvi, Bala Kot, Mansehra.
34. Tomb of Shah Ismail Shaheed, Bala Kot, Mansehra.
35. Fourteen rock ediets of Asoka inscribed on three rock boulders, Mansehra.
36. Buddhist incribed rock at Shahdaur, Shahdaur Agror, Mansehra.

***Mardan District***

37. Buddhist ruins, Jamal Garhi, Mardan.
38. Fourteen rock, ediets of Asoka inseribed on two rocks Shahbaz Garhi, Mardan.
39. Stone circle, Asota, Ssawabi Tehsil, Mardan.
40. Buddhist ruins, Takht-e-Bahi, Mardan.
41. Chanaka Dheri, Shahbaz Garhi, Mardan.
42. Sahri Bahlol remains, Sahri Bahlol, Mardan.
43. Tereli Buddhist remains, Sawal Dhera, Marden.
44. Kasmir Samast, Babuzai, Mardan.
45. Ruined fort wall, Hund, Mardan.
46. Maida Ghundai or Maida Dheri, Shahbaz Garhi, Mardan.
47. Hussai Dheri, Shahbaz Garhi, Mardan.
48. Adina Dheri, near Gariala, Mardan.
49. Chargul Dheri, Chargul, 5 miles southwest of Rustam, Mardan.
50. Chichar Dheri, Jamal Garhi, Mardan.
51. Turlandi Ghundai (mound), Chak No. 2, Mardan.
52. Takhta (Takhta Band) Taakhta Band, Tehsile Sawabi, Mardan.

***Nowshera District***

53. Black Rock, on right bank of Indus River, Modery, Nowshera.

***Peshawar District***

54. Mirchi-ki-ddheri, Head Bust, Chak Razar, Peshwar.
55. Gorkhatree, Peshawar.
56. Bala Hisar mound, Charsadda, Peshawar.
57. Tomb built by one Shah Qutb during the rein of Mughal Emperor, Akbar, Dilzak, Peshawar.
58. Sheikhan Dheri, Chak Razar, Head Bust, Peshawar.
59. Rattappan mound, 2 miles from Jalbi Village, Peshawar.

60. Ghaz Dheri, Razzar, Peshawar.
61. Hamza Garhi mounds, Hamza Garhi, Peshawar.
62. Dharam Sal-ki--dheri, Mera Prang, Peshawar.
63. Kaniza-ki-dheri, Charsadda, Peshawar.
64. Tomb and mosque of Sheikh Immamuddin, Pilosi Piran, Peshawar.
66. Sethi House Complex, Mohallah, Setian, Peshawar.
67. Barama site, Mingora, Swat.
68. Udegram Castle, Udergarm, Swat.
69. Butkara-I Mingora, Swat.
70. Panr site, Panr, Swat.
71. Loebnr stupa, Loebanr, Swat.
72. Saidu stupa, Saidu Sharif, Swat.
73. Dangram stupa, Dangram, Swat.
74. Gogdara Rock Carvings, Gogdara, Swat.
75. Manglawar stupa, Manglawar, Swat.
76. Shinashah stupa, Batura, Swat.
77. Gullaki Dheri, Kukarai, Swat.
78. Aligrama site, Aligrama, Swat.
79. Najigram site, Nijigram, Swat.
80. Nawagai (Gumbatuna), Nawagai Swat.
81. Amlukdara stupa, Amlukdara Serai, Swat.
82. Shingardara stupa, Amlukdara Serai, Swat.
83. Nimogram site, Village Gumkot, Swat.
84. Barikot Ghundai, ancient Bazira, Barikot, Swat.
85. Ghalegay Cave, Barikot, Swat.
86. Butkara-III, Gulkada Babozai, Swat.

Source: Guidelines for Sensitive and Critical Areas. Government of Pakistan. 1997.

# Appendix C

### Questions and Answers: Mobile Phone (Cell Phone) Base Stations and Human Health[6]

**1) What are mobile phone base stations; and are there health hazards associated with living, working, playing, or going to school near one?**

Mobile phone base stations are low-power multi-channel two-way radios. A mobile phone (cell phone) is a low-power, single-channel, two-way radio. When you talk on such a mobile phone, you (and perhaps dozens of other people around you) are talking to a nearby base station. From that base station your phone call goes into the regular land-line phone system.

Because mobile phones and their base stations are two-way radios, they produce radio-frequency (RF) energy (that's how they communicate), and they expose people near them to RF energy. However, because both the phones and the base stations are low power (short range), the RF energy exposure levels from them are generally very low.

The consensus of the scientific community, both in the US and internationally, is that the power from these mobile phone base station antennas is far too low to produce health hazards as long as people are kept away from direct access to the antennas (see Q13 and Q14).

It is critical to be aware of the difference between antennas, the objects that produce RF energy; and towers or masts, the structures that the antennas are placed on. It is the antennas that people need to keep their distance from, not the towers that hold the antennas.

It is also important to be aware that there are many different designs of mobile phone base stations that vary widely in their power, their characteristics, and their potential for exposing people to RF energy.

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**2) Are scientists seriously concerned about possible health risks from mobile phone base station antennas?**

**Not really.** There are some reasons to be concerned about human health effects from the hand-held mobile (cellular) phones themselves (although it is not certain that any risks to human health actually exist). These concerns exist because the antennas of these phones deliver much of their RF energy to very small volumes of the user's body. Base station antennas do not create such "hot spots" (unless you are standing

[6] Excerpts from a FAQ: 'Electromagnetic Field and Human Health' by John Moulder, Professor of Radiation Oncology, Medical College of Wisconsin, Milwaukee, Wisconsin, U.S.A. (The entire text of the FAQ can be seen at: http://www.mcw.edu/gcrc/cop/cell-phone-health-FAQ/toc.html).

directly in front of one), so the potential safety issues concerning the phones have no real applicability to the base station antennas.

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**13) Are there circumstances where mobile phone base station antennas could fail to meet the safety guidelines?**

**Yes.** There are some circumstances under which an improperly designed (or inadequately secured) mobile phone base station site could fail to meet safety guidelines.

Safety guidelines for uncontrolled (public) exposure could be exceeded if antennas were mounted in such a way that the public could gain access to areas within 8 meters/25 feet (horizontal) of the radiating surface(s) of the antennas themselves. This could arise for antennas mounted on or near the roofs of buildings. For example, Petersen et al found that 2-3 feet (1 meter) from a roof-top antenna radiating 1600 W ERP, the power density was as high as 2 mW/cm-sq (compared to the ANSI/IEEE public exposure standard of 0.57-1.2 mW/cm-sq).

For antennas mounted on towers, it is somewhat difficult to imagine a situation that would not meet the safety guidelines. However, there are reports (principally from outside North America and Europe) of mobile phone base station antennas facing directly at nearby buildings. Whether these antennas would meet FCC, ANSI/IEEE or ICNIRP safety guidelines would depend on the ERP, the exact geometry and the degree of shielding provided by the building.

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**14) What siting criteria are required to ensure that a mobile phone base station antenna will meet safety guidelines?**

While specific recommendations require a detailed knowledge of the site, the antenna, and the mounting structure, some general criteria can be described.

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**14A) What are some general siting criteria?**

1. Antenna sites should be designed so that the public cannot access areas that exceed the 1999 ANSI/IEEE or FCC guidelines for public exposure. As a general rule, the uncontrolled (public) exposure guideline cannot be exceeded more than 8 meters (25 feet) from the radiating surface of the antenna.
2. If there are areas accessible to workers that exceed the 1999 ANSI/IEEE or FCC guidelines for uncontrolled (public) exposure, make sure workers know where the areas are, and what precautions need to be taken when entering these areas. In general, this would be areas less than 8 meters (25 feet) from the radiating surface of the antenna.

3. If there are areas that exceed the 1999 ANSI/IEEE or FCC guidelines for controlled (occupational) exposure, make sure that workers know where these areas are, and that they can (and do) power-down (or shut down) the transmitters when entering these areas. Such areas may not exist; but if they do, they will probably be limited to areas within 3 meters (10 feet) of the antennas.

If there are questions about whether these guidelines are met, compliance should be verified by measurements done after the antennas are activated.

The FCC guidelines require detailed calculations and/or measurement of RF energy for some types of base stations. In June 2003, the FCC proposed some significant changes in these rules.

Problems, when they exist, are generally confined to:

- Antennas placed on the roofs of buildings; particularly where multiple base station antennas for different carriers are mounted on the same building;
- Antennas placed on structures that require access by workers (both for regular maintenance, and for uncommon events such as painting or roofing). Note that the occupation safety standards for RF energy apply only to workers with appropriate RF energy safety training.
- Towers that are placed very close to, and lower than, nearby buildings.

(For the complete text of the FAQ, please see the website: http://www.mcw.edu/gcrc/cop/cell-phone-health-FAQ/toc.html.)