



Environmental Impact Assessment

PATRIND HYDROPOWER PROJECT

November 2010

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ACRONYMS

ADB	:	Asian Development Bank
AJK	:	Azad Jammu and Kashmir
Amsl	:	above mean sea level
AP's	:	Affected Persons
CDM	:	Clean Development Mechanism
D/S	:	Downstream
DRO	:	District Revenue Officer
EIA	:	Environmental Impact Assessment
EMU	:	Environmental Management Unit
EPC	:	Engineering, Procurement, Construction (Contractor)
F/S	:	Feasibility Study
FWL	:	Flood Water Level
GRC	:	Grievance Redress Committee
IFC	:	International Finance Corporation
KP	:	Khyber Pakhtunkhawa
LAA	:	Land Acquisition Act (1894)
LAC	:	Land Acquisition Collector
LVC	:	Land Evaluation Committee
LWL	:	Low Water Level
MIS	:	Management Information System
MWL	:	Maximum Water Level
NHWL	:	Normal High Water Level
NWFP	:	North Western Frontier Province
O & M	:	Operation and Maintenance
PES	:	Pakistan Engineering Services (Private Limited Lahore)
PMF	:	Probable Maximum Flood
RP	:	Resettlement Plan
SC	:	Supervisory Consultants

U/S	:	Upstream
USBR	:	United States Bureau of Reclamation
WAPDA	:	(Pakistan) Water and Power Development Authority
WB	:	World Bank

EXECUTIVE SUMMARY

1. INTRODUCTION

Patrind Hydropower Project (the Project) is sponsored by STAR Hydropower Limited (the Company). The Report on Environmental Impact Assessment (EIA) has been prepared on behalf of the Sponsor by Pakistan Engineering Services (Pvt.) Lahore. The Project consists of a weir on Kunhar river, located on the boundary of District Abbottabad of Khyber Pakhtunkhwa and District Muzaffarabad of Azad Jammu and Kashmir (AJK). The powerhouse is located on right bank of Jhelum river in lower Chatter area of District Muzaffarabad, (AJK).

EIA/RP Study was conducted by a multidisciplinary team initially during the period between June–September 2006 as the part of feasibility study. The proposed EPC Contractors for the Project have intimated slightly modified design which includes relocation of Weir and Powerhouse from the proposed sites in the feasibility study. As a result of this change additional environmental surveys were conducted in March 2010 and the EIA/RP study has been updated accordingly.

2. THE PROJECT

Patrind is a small village on the left bank of Kunhar river, 12 ½ km downstream from Garhi Habibullah bridge. The project components will consist of a weir near Patrind village, a head pond behind the weir at conservation level of 765 m above mean sea level, Intake Structure followed by sand trap, headrace tunnel, pressure shaft, surge chamber, penstocks, powerhouse, and tailrace. Two coffer dams and a diversion tunnel will be built to keep the Kunhar river bed in dry condition during construction of the weir.

3. PROJECT LAYOUT ALTERNATIVES

During feasibility study four alternatives for the project layout were identified and assessed. Each of the alternatives is the result of varying the location of the powerhouse keeping the location of the weir and headrace tunnel the same. The EPC Contractor while keeping the main concept of the feasibility study intact proposed a slight design modification by relocating the Weir and Powerhouse. EPC Contractor also proposed to construct a diversion channel on Jhelum river

to divert the flow temporarily during the low flow season for the construction of permanent bridge across Jhelum river to access the Powerhouse site.

4. LEGAL FRAMEWORK

The EIA/RP Report of the Project has been prepared in accordance with the national requirements for environment assessment and resettlement. The provisions laid down in Pakistan Environmental Protection Act 1997, National Environmental Quality Standards (NEQS), AJK Environmental Protection Act 2000, Land Acquisition Act 1894, Draft National Resettlement Policy 2002, NWFP Forest Ordinance 2002 and Sarhad National Conservation Strategy 1992 have been followed. Similarly requirements laid down by the World Bank/ International Finance Corporation, Asian Development Bank. In particular provisions of ADB *Safeguard Policy Statement* 2009 on resettlement have been used.

5. ENVIRONMENTAL BASELINE

Physiography

Catchment area of Kunhar river is mountainous and rugged with high relief amplitude and steep slopes. Starting from the upper areas, the landforms include valley slopes and terraces containing shale, slate, phyllite and scree. Only level areas in the catchment, consisting of small terraces, support human settlements. Patrind village about 484 acres in extent, downstream of the weir at about 780 m elevation is one such human resettlement. The geology of the project area mostly consists of slate. A value of 0.52 g has been adopted as maximum credible earthquake (MCE) for structural design purposes.

Climate

The data of the meteorological stations at Balakot and Muzaffarabad has been used for the project area. The climate is pleasant with mild summers and cold winters. The average annual rainfall at Balakot is 1538.5 mm and at Muzaffarabad is 1351.9 mm.

Water Resources

Besides numerous small streams (nullahs) and springs, Kunhar and Jhelum are the major rivers in the project area. Daily flows of Kunhar river at weir site vary from an average maximum of 10,000 cusecs (285 cumecs) to average minimum

of 850 cusecs (24 cumecs) with annual average of 3,671 cusecs (104 cumecs). Beyond the weir site, the reach of Kunhar river is joined by six nullahs, two of them being major one contributing high in flows of water through the year. To maintain ecological balance of Kunhar river valley, below the weir it is recommended to maintain a minimum of 2 cumecs below the weir during operation phase of the project.

Water Quality

Besides bottom load of pebbles and boulders, the suspended load of Kunhar river contains sand, silt and clay, their proportion varying in low and high flow seasons. The overall sediment load at weir site has been estimated at 4.94 million tons on the mean annual basis.

Flora and Fauna

The project region has flora in abundance. A variety of flora starting from Dhaman grass to spruce trees including herbs, weeds, grasses, plants, flowers and trees is found. The region has subtropical pine forests supporting broad leaved species as snatha and temperate forests supporting coniferous species like fir. Forest wealth of the region is shrinking due to illegal deforestation.

The valley slopes high above the project area are characterised by animal biodiversity promoted by variations in altitude, topography and climate providing wildlife habitats for mammals, reptiles, amphibians, insects and birds. As an example, mammals include Rhesus monkey, wild bear and avifauna include sparrow hawk and wood cock. Growth of human population has put pressure on the natural resources of the region, particularly the forests and wildlife. The population of avifauna will increase due to the creation of head pond at Patrind. Besides offering resting place for migratory birds, the avifauna population will also increase due to the improvement in the vegetal cover around the head pond.

6. SOCIO - ECONOMIC ENVIRONMENT

The 8 villages in the vicinity of the weir site and 5 villages around powerhouse site have a population of 7,397 according to 1998 census report. The household size ranges from 5 to 9 persons per household. There is a Panchayat/ Jirga system (informal village council) for conflict resolution mechanism at village level. The members of the Panchayat include Nazim of the Union Council, Numbardar (Revenue Collector) and representatives of the village households.

The per capita income in the project area is below the national level. Farming and livestock rearing are the major occupations of the local population followed by forest and construction labour. Some people own shops located around villages while others work in transport business. Socio-economic indicators point to poor standard of living, poor health, inadequate status of community water supply, sanitation and education. Women face problems due to restricted mobility, lack of decision making, limited productive employment opportunities and lack of awareness about health and hygiene.

7. ENVIRONMENTAL IMPACTS

Both construction and operation phases of Patrind Hydropower Project will have some impact on physical, biological and socio-economic environment of the project area. The nature and effect of construction related impacts will be limited to a 4 years construction period compared to the operation phase impacts which will last over the life of the project. As far as possible the magnitude and probability of occurrence of impacts have been quantified and described below.

Water Resources

During high flow period (May – August) when there will be water in excess of the requirements for the power generation, the variations in flow downstream of the weir will not be significant. But in the low flow period the flow variations will become significant, becoming even more so within months when the plant may be operated only during peak hours. The Kunhar river reach below the weir would then receive compensation flow of 2 cumecs from the headpond. This compensation flow, of course, will be substantially supplemented by six streams which join Kunhar river downstream of the weir, thus mitigating the stress on aquatic flora and fauna.

Land Resources

The land resources of the project area would be affected in terms of permanent acquisition (63.8 Ha) and in terms of temporary land acquisition (31.59 Ha). The permanent acquisition consists of reservoir impounding, structures on the weir side, powerhouse, maintenance and access roads. The temporary land acquisition involves temporary diversion channel on Jhelum river side, construction camps, storage area and dumping sites on both weir and Powerhouse side. The temporary land acquisition would be required for duration of the project construction phase estimated to be 4 years.

Excavated Material

Excavation work for diversion tunnel, weir, sand trap, headrace tunnel, pressure tunnel, surge chamber and pressure shaft would result in excavated material, some of which would be used as fill material for construction of project components. The coffer dam would result in excavation of 11,014 m³ of spoil but would require 21,767 m³ as fill material obviating any need for disposal of surplus material. The surplus material at the weir side requiring disposal is about 604,287 m³ and surplus material requiring disposal on powerhouse side is about 317,117 m³. Keeping in view the accessibility and haul distance for disposal of the excavated material, sites for deposition of surplus material have been identified in the vicinity of powerhouse and weir locations. The diversion channel on Jhelum river side would result in excavation of 100,100 m³, and about 16,000 m³ of total excavation would be used for the embankments of the upper and lower coffer dams. The spoil of the coffer dam on Jhelum river after the construction of bridge will be disposed off safely to the identified sites of disposal.

River Ecology

During project operation, compensation flow will be discharged year round downstream of the weir. As a result, river ecology particularly the flora and fauna would not be adversely affected.

Socio – Economics

During construction phase opportunities will be available to the locals for employment in the project activities. Once the project is completed, it is expected to invigorate the level of economic activity in the project area. Development of infrastructure facilities due to project construction and operation will lead to increase in tourist traffic promoting beneficial socio-economic changes for the local population.

8. MITIGATION MEASURES

With reference to physical, biological and socio-economic environment of the project area mitigation strategies aim at managing the environmental effects in a manner that minimize adverse impacts and maximize secondary benefits.

Excavated Material

As a result of excavation work for powerhouse, headrace tunnel, sand trap, diversion tunnel, surge chamber, pressure shaft and temporary diversion channel etc. spoil material will be generated. Maximum use of this excavated

material would be made for the construction of various civil works e.g. bulk fill, coarse aggregate, stone rip rap, construction of roads and embankments. The surplus excavated material will be disposed off in an environmentally sound manner. In order to facilitate as well as economise the transportation costs, the surplus material will be disposed off not far from where it is produced. The proposed land areas for disposal of excavated material have been estimated 21 acres for weir side and 35 acres for powerhouse side.

Erosion Control

Considering the site conditions in the context of erosion control methods, it is recommended that vegetation/ afforestation being the most effective and economical way, may be adopted as preferred options. Both sides of the affected areas should be planted with grass cover, tiny bushes and trees.

River Ecology

In order to take care of the stress on aquatic flora and fauna during low flow conditions in Kunhar river reach downstream of the weir site, it is recommended that a minimum flow of 2 cumecs should be allowed from the headpond during project operation phase. This of course would be in addition to the contribution of flows made by the six nullahs joining the Kunhar river downstream of the weir site.

Tree Cutting

It is recommended that smallest number of trees should be cut for project implementation.

Environmental Pollution Control

Environmental pollution control addresses water/ air pollution, and noise as well as safety measures. Excavated material will not be dumped in the rivers. Lubricants, waste oil and other chemical wastes will be collected and disposed off safely. Sprinkling of water to settle dust shall be practised in areas where equipment like compressors, blowers, dumper and excavators would be used. For safety measures the contractor shall provide Personnel Protective Equipment (PPE) to his personnel. The areas where noise cannot be kept within NEQS/ WB

Guidelines, like blasting, will be posted as zones of high noise levels.

Wildlife

Workers including supervisory staff associated with the project may be educated to protect wildlife. Any stray animals found may be handed over to the Wild Life Departments of Khyber Pakhtunkhwa and AJK.

Land Acquisition

The land acquired on temporary basis will be leased for 4 years to be compensated at rates decided in consultation with land owners.

Resettlement

The project implementation will directly affect 14 houses displacing 146 persons. During field surveys, persons/ communities affected by Patrind Hydropower Project were individually as well as collectively interviewed to gather their opinion for resettlement and relocation. All owners of land and houses directly affected by the project preferred the option to receive cash compensation instead of, land for land compensation or land for construction of new houses. As a result no resettlement sites have been identified or investigated.

9. RESETTLEMENT BUDGET AND FINANCING

The resettlement and environmental cost of Patrind Hydropower Project is estimated as Rs. 194.27 million (US\$ 2.3 million). The cost of land subject to submergence by the Headpond is Rs. 110.04 million and is the largest component of the environmental cost of the total environmental budget.

10. ENVIRONMENTAL & SOCIAL MANAGEMENT PLAN

Environmental management aims at providing safeguards for and enhancement of social, environmental and economic quality parameters which would be subject to project impacts whereas monitoring involves measurement and recording of such parameters to identify adverse trends for timely mitigation. These parameters have been enumerated in Environmental & Social Management Plan. The key players in the implementation of the plan are STAR Hydropower Limited (SHPL), Supervisory Consultant (SC), EPA Khyber Pakhtunkhwa and EPA AJK.

11. CONCLUSIONS AND RECOMMENDATIONS

The overall findings of the environmental impact assessment and resettlement plan shows that the project is environmentally and socially viable provided that

the proposed activities are carried out as mentioned in this report, and the mitigation measures are completely and effectively implemented.

It is recommended that the Company should follow the RP for addressing the involuntary resettlement issues pertaining to land acquisition and compensation for houses and other economic assets by adhering to the environmental legislation and regulations.

CHAPTER – 1

PROJECT DESCRIPTION

1.1 INTRODUCTION

The Report on Environmental Impact Assessment and Resettlement Plan of Patrind Hydropower Project (the Project) has been prepared on behalf of STAR Hydropower Limited (the Company) by Pakistan Engineering Services (Pvt.) Ltd. Lahore. This EIA Report is an integral part of project feasibility study which was completed in May 2007 and also approved by Panel of Experts (POE) appointed by PPIB. Subsequent review of the Feasibility Study in February 2010 by EPC Contractor resulted in some changes in the layout and design aspects of the project. These changes consist of moving the weir by 150 m upstream from its proposed position in feasibility study, sand trap changed from underground to open, moving the powerhouse 460 m downstream from its previously proposed location in the feasibility study and construction of a permanent bridge across the river.

The physical layout of the hydropower project extends from location of its weir on river Kunhar near Patrind village which acts as a boundary between Khyber Pakhtunkhwa and AJK to location of its powerhouse on Jhelum river at Lower Chattar in Muzaffarabad district, (AJK).

1.2 PROJECT BACKGROUND

In 1984, Montreal Engineering Company Monenco conducted an Inventory and Ranking Study for exploration of major hydroelectric schemes in Pakistan. Besides other regions Monenco identified three hydroelectric schemes at Naran, Suki Kinari and Patrind on river Kunhar. Stream gauging stations were installed at three locations (Naran, Khanian and Garhi Habibullah) on river Kunhar by WAPDA's Surface Water Hydrology Project (SWHP) in 1960. For Patrind project Monenco proposed a concrete gravity dam 130 m high with gated spillway in the central portion of the dam. Full supply level of the head pond was fixed at 838 m above mean sea level which extended the head pond about 3 km upstream beyond Gari Habibullah. Low level outlets were provided for sediment control. River diversion was proposed through a 7.0 m diameter concrete lined tunnel in the left abutment. This tunnel would have subsequently served as a headrace tunnel and would have been linked to the power intake by a 5.7 m diameter inclined concrete lined tunnel. The scheme promised an index capacity of 150 MW

with 3 Francis turbine units.

The hydropower potential on river Kunhar at Patrind was further studied by Sarhad Hydel Development Organization (SHYDO) with the collaboration of German Agency for Technical Co-operation (GTZ), which proposed two more layout alternatives in addition to the Menenco's layout. In their proposal GTZ considered the powerhouse site at the downstream limb of Jhelum river bend near Muzaffarabad. The short distance of 1.6 km from dam site to the bend of Jhelum river would have provided an additional head of about 82 m. The head pond level was lowered by GTZ to reduce the large human displacement associated with the Menenco's proposal. The detailed description of GTZ's layout alternatives can be found in SHYDO – GTZ publication "Identification of Hydropower Development Potential in Kaghan Valley, Vol. II, NWFP Pakistan" Second edition January 1995.

1.3 CONSULTANCY SERVICES

Under provisions of the original Agreement for Consultancy Services ETA LLC appointed Pakistan Engineering Services PES (Pvt.) Ltd. Lahore as the lead consultants in association with Fichtner GmbH Consulting Engineers Germany to carry out feasibility study for the Project. The Consultancy Agreement in terms of environmental impact assessment and resettlement plan includes the following.

- Conduct studies on all relevant environmental aspects (social, economic, cultural, physical and ecological) of the project, including the watershed, the head pond, the sites of the structures, and the upstream and downstream reaches that may be affected during construction and operation phases of the project.
- Determine potential impacts and costs; delays due to land acquisition and relocation of residents and utilities and other infrastructure; and identify mitigating measures to minimize the risk.
- Determine the requirements of an environmental management plan specifying mitigation measures for dealing with significant effects.

"All studies to be conducted in accordance with the EIA Guidelines for Energy Sector Pakistan issued by the Environmental and Urban Affairs Division of the Government of Pakistan, the guidelines of the major international development banks; and within the guidelines of the Land Acquisition Act, the Environmental Protection Act and the National and Provincial Conservation Strategy of Pakistan."

1.4 THE PROJECT

1.4.1 Project Location

The area of Patrind Hydropower Project is covered by G.T. Sheet No. 43-F/8 of Survey of Pakistan. The longitude and latitude of the site are $73^{\circ}:25':46''$ E and $34^{\circ}:20':38''$ N respectively. The proposed weir site is accessed by Boi Road on right side of river Kunhar. It is at a distance of 12.3 km from Garhi Habibullah bridge. The centre line of river Kunhar at the project site marks the boundary between Pakistan and Azad Jammu & Kashmir. The left bank of river Kunhar thus lies in AJK which can be accessed by a 3.1 km track leaving main road between Muzaffarabad and Garhi Habibullah (Hazara Trunk Road). The proposed powerhouse site is located on the right bank and downstream limb of Jhelum river at Lower Chattar District Muzaffarabad in AJK. The left bank of Jhelum river at the proposed site of powerhouse is accessible from Lower Chattar in Muzaffarabad district. A new bridge needs to be constructed to access the right bank for transportation of labour and equipment to the construction area of the powerhouse. Figure 1.1 shows the location of weir on river Kunhar near Patrind village and Figure 1.2 shows location of powerhouse on left bank of river Jhelum in Chattar.



Figure1.1: Location of Weir on river Kunhar near Patrind Village



Figure1.2: Location of Powerhouse on Left Bank of Jhelum River in Chattar

1.5 PROJECT COMPONENTS

The Project components and their details are given in Table1.1. The physical components of the project as shown in Figure 1.3 consist of the weir, head pond, intake, headrace tunnel, sand trap, pressure shaft, surge chamber, penstock, powerhouse, and tail race. Diversion of river Kunhar flow will be required at the weir site to undertake construction of the weir in dry-bed condition. For this purpose two coffer dams on upstream and downstream of weir site will be constructed. A permanent bridge across river Jhelum will also be constructed.

1.5.1 Weir

The weir site is located 12 Km downstream of Garhi Habibullah concrete bridge on river Kunhar. The gorge at that site is relatively narrow and river bed level is 727 m above mean sea level. The sharp bend on river Kunhar near Patrind village ensures the shortest length of weir and a suitable diversion arrangement during construction phase. Weir site is accessible on the right bank of river Kunhar by Boi Road. The intake for the headrace tunnel will be on the left bank of river Kunhar.

1.5.2 Weir Height

Possible human resettlement issues associated with high weir structure restrict the height of weir. Therefore, the crest of gated overflow weir has been fixed at a height 42 m after estimating the design flood and waves surcharge over the crest as well as the minimum elevation of human settlements. This weir height ensures that not even a single house will be subject to submergence by the head pond.

Table 1.1: Components of Patrind Hydropower Project

Sr. #	Project Components	Details
1.	River River Name Catchment Area	Kunhar 2, 429.00 Km ²
2.	Weir Type of Weir Height Elevation	Concrete Gravity Dam 42.00 m 727 m amsl
	Crest Elevation Width Length	769.00 m amsl 8.20 m 130.00 m
3.	Head Pond NHWL (Conservation Level) Reservoir Submergence Area Reservoir Capacity	765.00 m amsl 57.2 Hectares 5.81 million m ³
4.	Spillway Design Discharge Crest Level Type No. of Radial Gates	2,626.6 m ³ /sec 757.00 m amsl Flip Bucket Type 4 Nos. each 12 X 10.33 m
5.	Intake Design Discharge No. of Chambers	153 m ³ /sec 2
6.	Sand Trap Type Design Discharge No. of Chambers Size of Each Chamber	Open Type 153 m ³ /sec 2 Width : 23 m

Sr. #	Project Components	Details
7.	Headrace Tunnel Shape Type Size	Height : 26.7 m Modified Horse Shoe (Inner Circular Section) Concrete Lined Diameter : 7 m
8.	Surge Tank Type Size Max. Upsurge Level Min. Downsurge Level	Simple Orifice, Circular Diameter 16 m 788.70 m amsl 745.10 m amsl
9.	Vertical Pressure Tunnel and Horizontal Pressure Tunnel Type Shape Size	Concrete Lined Inner Circular Section Diameter : 7 m
10.	Penstock Type Size and Nos.	Inner Circular Section, Steel Lined Diameter : 5.5 m, 1 No. Diameter : 3.0 m, 3 Nos.
11.	Powerhouse Type Size Discharge Capacity Turbine Units Type	Surface Station 38.2m x 66.0m x 41.7 High 153 m ³ /sec 150 MW 3 Nos. Vertical Francis
12.	Tailrace Type Length	Open Channel 55 m
13.	U/S Cofferdam on Kunhar River Type Crest Height Crest Elevation	Concrete Gravity Dam 13.0 m 750.0 m amsl

Sr. #	Project Components	Details
14.	D/S Coffor Dam on river Kunhar	
	Type	Earth Dam
	Crest Width/ Height	3.0 m/ 3.0 m
	Crest Elevation	739 m amsl

1.5.3 Design Discharge

The design discharge for power generation adopted for medium to high head projects is usually 25 to 40 % of the available flow of natural stream. The optimal design discharge is the one which results in a project size that will give maximum net present value (NPV). Flow in river Kunhar at Patrind varies from an average minimum of 24m³/sec in January to an average maximum of 285 m³/sec in June. The average annual flow is 104m³/sec. The design discharge is 153m³/sec, which is available 27% of the time of the year.

The project costs and benefits were estimated by varying the design discharge for headrace tunnel from 100 to 180 m³/sec for all project layout alternatives while releasing a minimum flow of 2m³/s in river Kunhar downstream of weir throughout the year. The number of turbine units is also optimized by analyzing the units to ensure consistent working of machines during low flows as well as to avoid too heavy machines/parts considering the proposed access facilities.

1.5.4 Headrace Tunnel

To gain an additional head of over 80 m the river Kunhar water will be diverted into headrace tunnel inlet at the weir site. The headrace tunnel, 2.2 Km long, is an underground structure. Its construction will start simultaneously at its two ends, each from weir site as well as from powerhouse site. The maximum land cover over the tunnel for Alternatives 1, 2, 3, 4 and EPC modified design can be estimated with reference to Figure 1.4.

1.5.5 Head Pond

Figure 1.5 shows the area-elevation-capacity curves. Keeping environmental considerations the foremost, the weir height has been fixed as 42 m with conservation level at elevation 765 m above mean sea level. Figure 1.6 shows that the surface area of the head pond at this elevation would extend back up to 7Km and cover an area of 57.21 ha with a storage capacity of 5.81 million cubic meters. Distance of the major streams down side the weir which joins river Kunhar namely Bio-Da-Katha is 4.6 Km and Salol Nullah at 7.5 Km. Other



Figure 1.1 : Location Map of Patrind Hydropower Project

LEGEND

LINE OF CONTROL
DISTRICT BOUNDARY
PROVINCE BOUNDARY

RIVER
NULLAH
BRIDGE
SITE

POWER STATION

1. OPTIONAL
2. UNDER CONSTRUCTION



Fig 1.2 : Project Area of Patrind Hydropower Project Covering Districts of Abbotabad In NWFP And Muzaffarabad in AJK

numerous small streams joining the river Kunhar are at distances of 1.7Km, 3.6Km, 4.5Km, 4.8Km, 6.1Km, 7.4Km, 7.8Km and 10.5Km. It has been estimated that it will take approximately 14 years to fill the dead storage.

1.5.6 Power House

The powerhouse site has been proposed at right bank of Jhelum river on downstream limb of horse shoe bend of Jhelum river. Powerhouse Alternatives 1 and 2 is open surface structure and for Alternatives 3 and 4 it is proposed to be underground. At the feasibility study stage an alternate with the surface type powerhouse was selected. After the review of the EPC contractor the same option was finalized with the changed location about 460m downstream from the original position.

1.6 PROJECT LAYOUT ALTERNATIVES

The project components detailed in the Table 1.1 have been considered based on available information, project area maps, Monenco study review and field surveys. river Kunhar flows in a very narrow gorge in the vicinity of the proposed weir site. The studies for project layout alternatives focused on hydropower development utilizing the flow in river Kunhar at weir site and the head available using low height weir and more by joining the head pond water level to horse-shoe bend of Jhelum river at Muzaffarabad through a shortest headrace tunnel. It must be emphasized that assessment of all the layout alternatives, was primarily guided by the socio-environmental imperatives, particularly population displacement/ resettlement issues. The selected alternative was then sized for optimal weir height and design discharge.

1.6.1 Socio-Environmental Considerations in Project Layout

For optimal design of the project, socio-economic factors have also been focused besides technical considerations. The population of Garhi Habibullah along the river Kunhar banks has increased significantly during the last two decades. There are a number of camps of 2005 earthquake refugees from Balakot and Muzaffarabad located along the banks of river Kunhar upto 12 Km upstream of the proposed weir site. Due to these reasons, the project layouts which involve high dam for water storage (Monenco and GTZ proposals) were discarded for further studies. Due to environmental issues relating to human resettlement, the Consultants have considered run-of-river project layouts with relatively low height overflow weir and a headrace tunnel located on the left side of river Kunhar. For powerhouse, both surface and underground development alternatives have been studied. Figure 1.4 shows these alternatives which are

discussed in the following sections.

No Project Option

At present there is an increasing demand for power outstripping supply in Pakistan. This disproportion results in power failures and load shedding i.e. intentional alternating disconnecting of power supply of rural areas/ cities. For example parts of major cities in the country remain without electricity supply for some hours every day putting industrial, commercial as well as domestic activities in great disruption. Adequate electrical power which would fully meet the requirements of all sectors of economy is a key to achieve growth targets of Pakistan economy resulting in higher welfare of its population. Thus, the “No Project Option” is not realistic scenario as the country needs urgent enhancement of electrical power generation to meet the increasing demand.

Alternative - 1

The weir site is to be located 12 Km downstream of Garhi Habibullah Bridge on river Kunhar. The gorge at that site is relatively narrow and river bed level is 733 m amsl. The sharp bend on river Kunhar near Patrind Village shown at Figure 1.3 provides a suitable diversion arrangement during construction. Weir site is accessible by Boi Road along the right bank of river Kunhar. The intake for headrace tunnel will be on the left bank.

The headrace will be concrete lined pressure tunnel 7.5 m diameter. The steel penstocks with valve chambers will discharge into powerhouse turbines and then through tailrace channel into Jhelum River.

The powerhouse site has suitable geological conditions for surface power station. For access to powerhouse site on the right bank of Jhelum River a new bridge on Jhelum River is required to be constructed. With a weir height of 26 m, the difference in water level between head pond conservation level to powerhouse site is 110 m to be gained in an approximate distance of 2.0 km. The proposed river diversion for construction of weir i will be done through a 235m long horse shoe shape tunnel on right bank of river Kunhar just upstream of the river bend near Patrind village.

Alternative - 2

The layout is same as for Alternative – 1, with a steel lined pressure shaft instead of penstocks. The diameter of pressure shaft would be 4.5 m with a flow velocity of 9.5 m/sec. The project layout plan for Alternative – 2 indicating the proposed location for project structures is shown in Figure 1.4.

Alternative - 3

As the project area lies in high seismic risk zone, the Consultants also considered the option of underground powerhouse possibilities/alternatives because of better resistance to high ground accelerations. Alternatives 3 & 4 both have been formulated with underground powerhouse keeping in view the recent seismic activities in the project area.

The layout of weir and intake is the same as for the above mentioned alternatives 1 and 2. The pressure shaft arrangement is same as for Alternative – 2 but with reduced length due to an underground powerhouse. The minimum cover over powerhouse will be approx. 60 m. The reduced length of pressure shaft implies less hydraulic losses thus providing more head for power generation. A tailrace tunnel 400 m in length will be provided. Geological investigations have identified the rock type as slate which is suitable for cavern type powerhouse.

Alternative - 4

The layout on river Kunhar side consists of underground project components as in Figure 1.4. The headrace tunnel length has been reduced to approx. 450 m by shifting the cavern powerhouse closer to the river Kunhar side. The location of upstream surge chamber has been changed accordingly.

EPC Contractor Proposed Design Modification

By moving the powerhouse from original position 460 m downstream, the safety of the powerhouse has been ensured. The amount of excavation and slope protection has also been minimized since the new powerhouse site is located on a low and gentler slope. As such this modification has been finally adopted for construction. The layout profile of this design is given in Figure 1.7.

1.7 COMMUNICATION INFRASTRUCTURE**1.7.1 Existing Road Network**

The project area extends from location of its weir site in Abbottabad district (Khyber Pakhtunkhwa) to powerhouse site in Muzaffarabad district (AJK). For accessibility in terms of transportation of manpower/plant equipment as well as availability of national power grid, the distances with reference to existing road network from Islamabad are given in Table 1.2.

Table 1.2: Road Distances up to Project Site

Section	Distances (Km)		Remarks
	Incremental	Cumulative	
Route – 1: Islamabad – Abbottabad – Garhi Habibullah – Muzaffarabad			
Islamabad – Abbottabad	120	120	Silk Route
Abbottabad – Bassian	50	170	Silk Route
Bassian – Garhi Habibullah	15.5	185.5	Single Lane, Metalled
Garhi Habibullah – Patrind	12.3	197.8	Boi Road (weir site)
Patrind – Muzaffarabad	37.3	235.1	Via Garhi Habibullah (Powerhouse Site)
Route – 2: Islamabad – Murree – Muzaffarabad			
Islamabad – Murree	53	53	Expressway
Murree – Muzaffarabad	76	129	Metalled Road
Muzaffarabad – Lower Chattar	2.5	131.5	Metalled Road (Powerhouse Site)
Lower Chattar – Patrind	37.3	168.8	Metalled Road (Weir Site)

1.7.2 Proposed Access Roads

The plan for access road is established considering relocation of weir, sand trap, powerhouse, surge tank and etc. Minimum 15.0 m radius of curve was applied to improve traffic capacity, safety and workability. The road width was extended by 7.0m and emergency parking bay will be installed. The access road to powerhouse starts in lower Chattar reaching prior to proposed bridge site near left bank of Jhelum river cover a distance of 1.7 km. This portion of 1.7 km is all metalled requiring possible widening at 2 to 3 locations. The distance beyond metalled portion before reaching the proposed bridge is 200 m and a proper road of 7m width needs to be constructed there.

Table 1.3: Route Outline of the Proposed Access Roads

Type	Section	Length (m)	Width (m)	Remarks
Weir	Boi Road – Weir	240	7.0	Weir Access
Weir	Construction Camp –	906	4.0	Maintenance Road

	Weir – Storage Camp			at Weir Site
Powerhouse	LowerChattar – Bridge	200	7.0	Powerhouse Access
	Bridge – Powerhouse	84	7.0	Powerhouse Access
Surge Tank	Powerhouse – Surge Tank	1,162	4.0	Surge Tank Access
Switchyard	Switchyard	96	7.0	Switchyard Access

For actual accessibility for transportation of equipment, material and manpower to the sites of the weir and powerhouse construction, some length of metalled road as well as one bridge across Jhelum river is required to be built.

Weir Site

The right hand side of weir site on river Kunhar is accessible by Boi Road requiring no additional bridge for construction of weir, diversion tunnel and coffer dam. Muzaffarabad road (Hazara Trunk Road) crosses river Kuhnar at Garhi Habibullah and passes by the left hand side of the weir site. A length of less than ½ km of metalled road is required to access left hand side of the weir site, proposed headrace tunnel, its intake and sand traps.

Powerhouse Site

The location of the proposed powerhouse is on the right hand side of Jhelum River about 9 km upstream of the confluence of Kunhar with Jhelum river in Muzaffarabad district. This location requires construction of both a major bridge and a given length of metalled road.

1.8 MANPOWER

Manpower both for construction phase and operation phase of the project would need professionals specialising in construction management, engineering personnel for operation & maintenance, technicians, and labour force. It is to be noted that semi-skilled and unskilled labour which forms bulk of the project manpower would be readily available from surrounding villages and towns, Garhi Habibullah, Mansehra and Abbottabad in case of weir site and Lower Chattar (Muzaffarabad) in case of powerhouse site. These workers will commute daily to the construction sites, thus obviating any need for their housing. The manpower estimates for construction and operation phases are as follows.

1.8.1 Weir Site

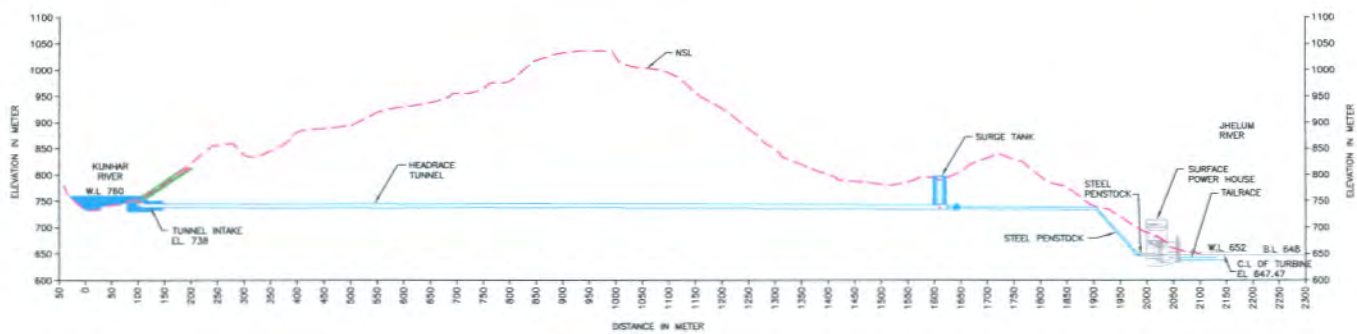
i) Construction Phase

Professional Staff	20
Skilled Labour	70

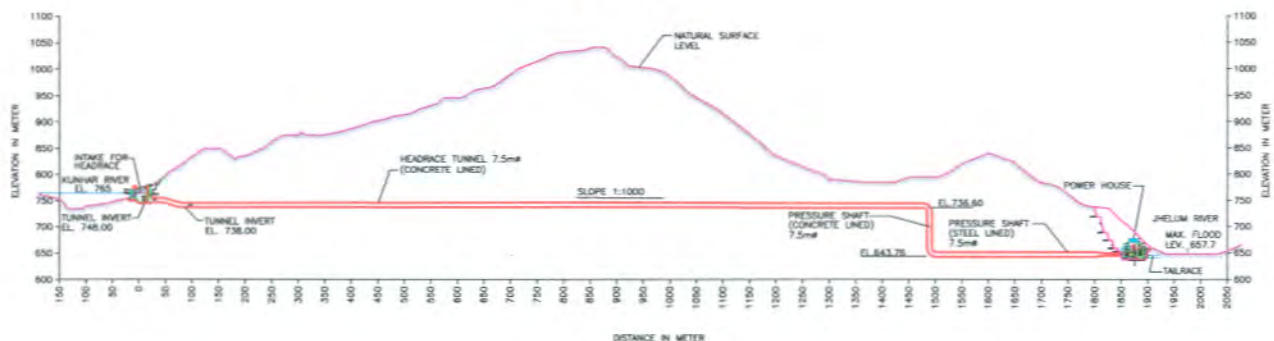
	Semi - and un-skilled Labour	100
ii) Operation Phase		
	Professional Staff	2
	Others	7
1.8.2 Powerhouse Site		
i) Construction Phase		
	Professional Staff	25
	Skilled Labour	75
	Semi - and un-skilled Labour	95
ii) Operation Phase		
	Professional Staff	4
	Others	10

1.8.3 Construction Camps and Storage Areas

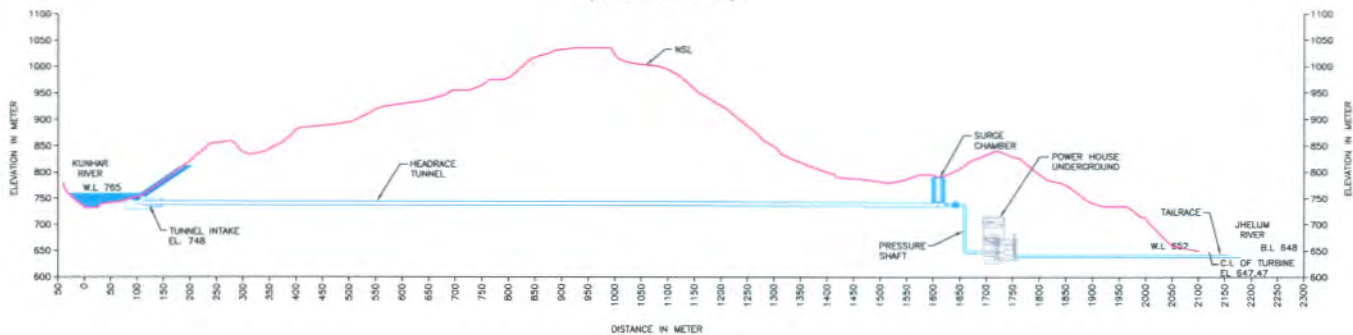
The manpower (skilled) needed for construction phase would require temporary housing including land for storage areas. Permanent residential facilities would be needed after completion of the project for operation and maintenance staff. The location of sites for such housing including storage areas at weir and powerhouse sites is marked on the location map at Figure 1.8 at an estimated land area requirement of ½ ha each.



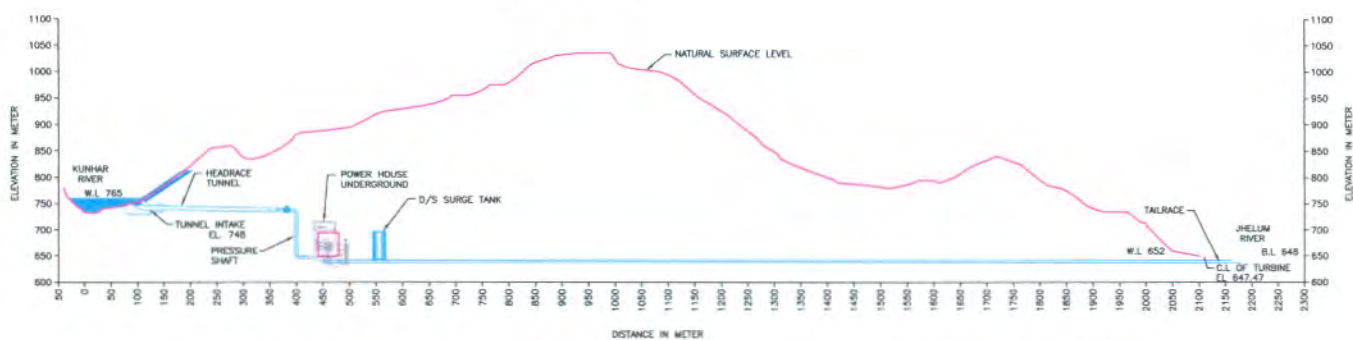
ALTERNATIVE - 1
(INDICATIVE SKETCH)



ALTERNATIVE - 2
(INDICATIVE SKETCH)



ALTERNATIVE - 3
(INDICATIVE SKETCH)



ALTERNATIVE - 4
(INDICATIVE SKETCH)

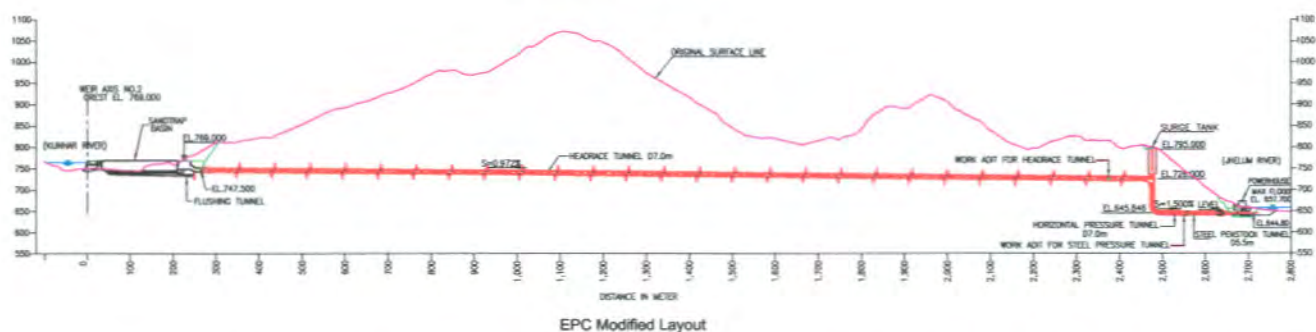


Figure 1.4 Project Layout Alternatives 1, 2, 3,4 and EPC Modified Layout

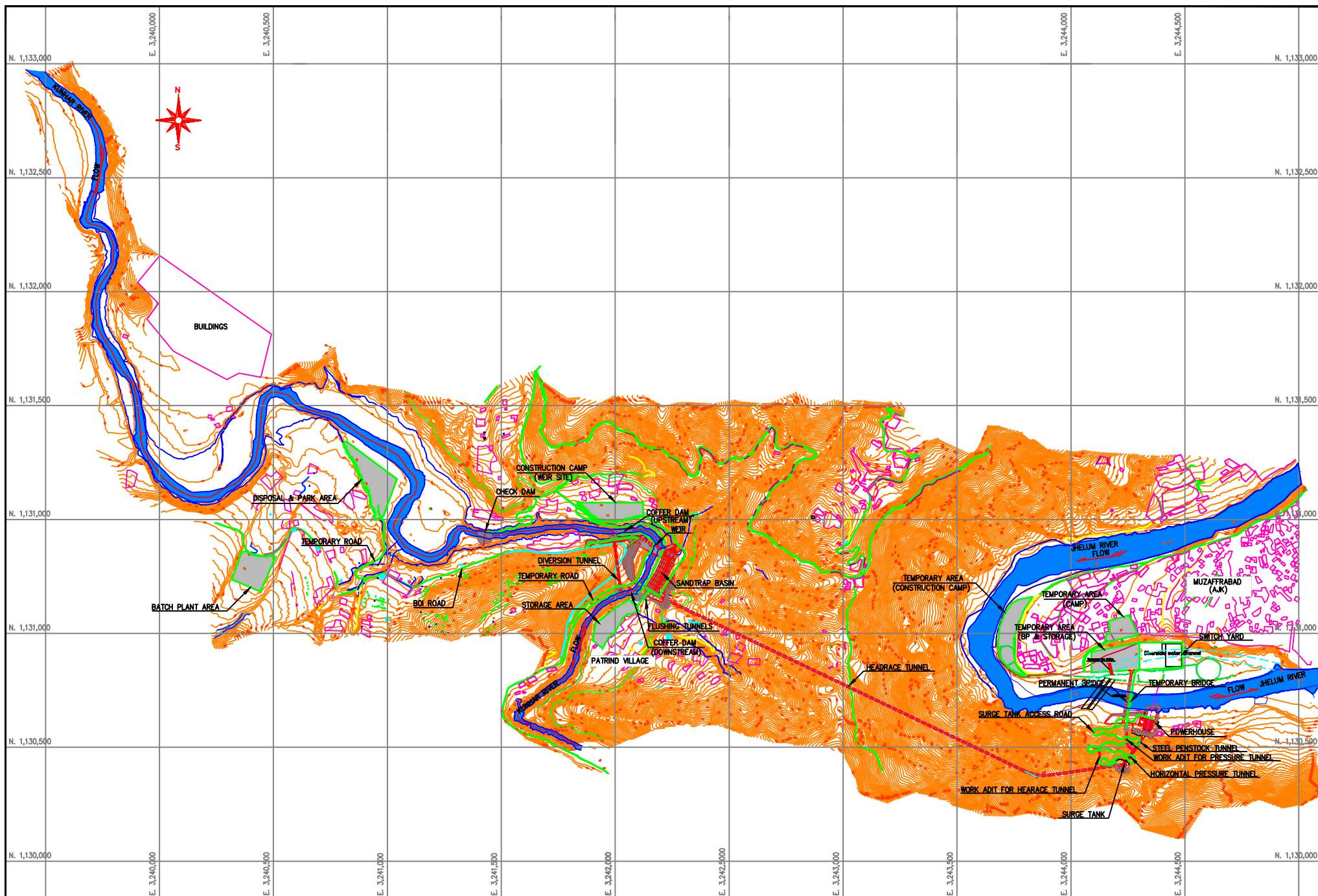


Figure 1.5 : Location of Construction Camp and Storage Areas at Weir Site and Powerhouse Site

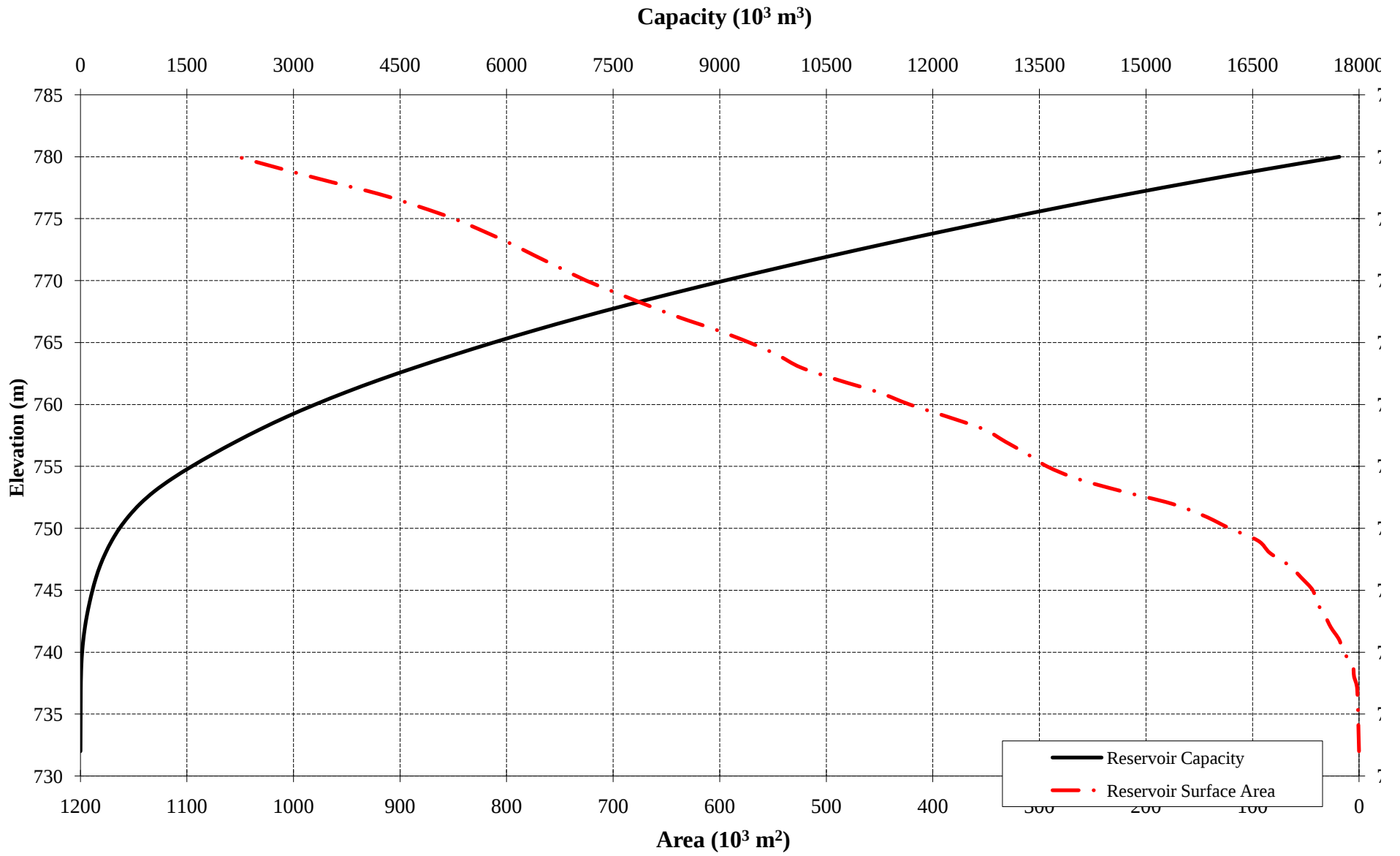


Figure 1.6 : Head Pond Surface Area-Elevation-Capacity Curve

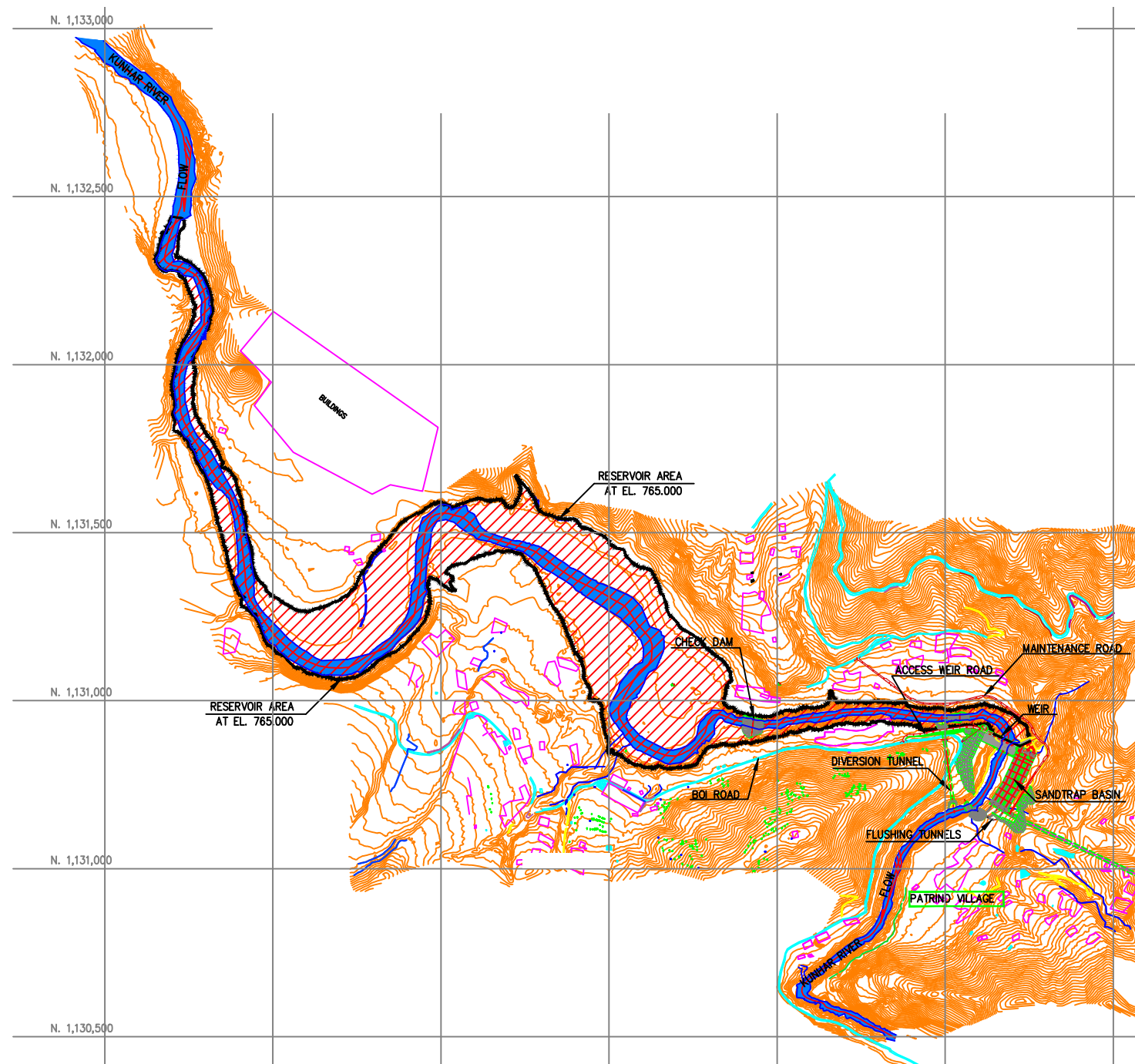


Figure 1.7 : Patrind Hydropower Project Headpond Surface Area at Conservation Level of 765m above mean sea Level



1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.
2. ALL LEVELS ARE IN METERS UNLESS OTHERWISE NOTED.
3. FEATURES OF MAJOR STRUCTURES CAN BE CHANGED ACCORDING TO HYDRAULIC MODEL TEST.

Figure 1.8 : EPC Modified Layout

CHAPTER – 2

LEGAL FRAMEWORK

FOR ENVIRONMENTAL ASSESSMENT AND RESETTLEMENT

2.1 NATIONAL POLICY

2.1.1 Introduction

Pakistan has had laws that contain provisions for environmental protection. These laws which were partly inherited from pre-independence days dealt with air and water quality, canal irrigation, land tenure and use, forest conservation, wildlife protection, energy development, pesticides use, noise, public health etc. Not only did these laws proved ineffective, punishment for violation was mild and easy to circumvent. These laws also did not adequately cover the subject areas and several of these laws became outdated. Many aspects of environmental degradation remained uncontrolled and under-regulated. Pakistan therefore responded to its environmental concerns by introducing laws, establishing environmental protection institutions and developing human resources and technical capability through local resources and foreign assistance.

Pakistan Environment Protection Act (PEPA – 97) which provides national policy on the subject was promulgated in December 1997. It is a single comprehensive law that provides for the protection, conservation, rehabilitation and improvement of the environment, for the prevention and control of pollution and promotion of sustainable development. The Act covers air, water, soil and noise pollution, including hazardous waste disposal and motor vehicular pollution. Environment Cell has been established in the National Planning Commission and one in each of the four provincial planning and development (P&D) departments.

The Act provides the requisite administrative framework for environmental protection in the country. It is reproduced as Annexure - I of this report.

Pakistan Environmental Protection Council (PEPC)

Among its many functions, PEPC coordinates and supervises enforcement of PEPA-97, approves national environmental policies, and ensures their implementation. PEPC is required to meet at least twice a year.

Pakistan Environmental Protection Agency (Pak. EPA)

Under Section 5 of PEPA-1997 Pakistan Environmental Protection Agency (Pak.EPA) has been established with a Director General as its head. Sections 6 and 7 of PEPA 1997 describe the functions and powers of the Agency. Similarly

provincial EPA's are functional in each province as provided in PEPA-1997. Azad Jammu and Kashmir has its own EPA.

Under Section 6(2) of the Act, Pak.EPA has the authority:

1. To undertake inquiries or investigations into environmental issues.
2. To request any person to furnish any information or data relevant to the functions of Pak.EPA.
3. To recommend to the Federal Government incentives, prizes, awards, subsidies, tax exemptions, rebates etc. for achieving environmental objectives and goals.

Under Section 7(a) of the Act Pak.EPA has been empowered:

- a. To summon and enforce the attendance of any person for conduct of any enquiry/investigation into any environmental issue.
- b. To enter and inspect any land, building and premises to verify an offence under the Act being committed.
- c. To take sample of effluents, wastes or air pollutant being discharged or emitted and
- d. To arrange for test and analysis of the samples at a laboratory 8certified by Pak.EPA.

Environmental Tribunals

Under Section 20 of the Act, Environmental Tribunals have been established to try cases of contravention or failure to comply with designated provisions of PEPA-1997.

2.1.2 Environmental Assessment

Section 12 of Pakistan Environmental Protection Act 1997 lays down requirements for Initial Environmental Examination (IEE) and Environmental Impact Assessment (EIA). This section states that:

- 1) No proponent of a Project shall commence construction or operation unless he has filed with the Government Agency designated by Federal Environmental Protection Agency or Provincial Environmental Protection Agencies, as the case may be, or, where the Project is likely to cause an adverse environmental effects, an environmental impact assessment, and has obtained from the Government Agency approval in respect thereof.
- 2) The Government agency shall, subject to standards fixed by Pakistan

Environmental Protection Agency,

- a) review the initial environmental examination and accord its approval, or require submission of an environmental impact assessment by the proponent; or
- b) review the environmental impact assessment and accord its approval subject to such conditions as it may deem fit to impose, require that the environmental impact assessment be re-submitted after such modifications as may be stipulated or reject the Project as being contrary to environmental objectives.

Federal Government Notification August 2000 titled "Policy and Procedures for the Filing, Review and Approval of Environmental Assessments" contains schedules A, B and C listing requirements of IEE or EIA as follows.

EIA Requirements

Pak - EPA in August 2000 issued "Policy and Procedures for Filing, Review and Approval of Environmental Assessment", which includes Schedules A, B and C defining development projects in terms of requirements for EIA and IEE.

Schedule A defines projects which require an EIA. It deals with list of major projects which have the potential to affect a large number of people. The impact of such projects may be irreversible and could lead to significant changes in land use and in the social, physical and biological environment. The Section of Schedule A relating to Energy Sector is reproduced below.

Energy Sector – Schedule A

- i) Energy Sector : Hydroelectric power generation over 50 MW.

Schedule B defines projects which require an IEE. It deals with projects where the range of environmental issues is comparatively narrow and issues can be understood and managed through less extensive analysis. The Section of Schedule B relating to Energy Sector is reproduced below.

Energy Sector – Schedule B

- ii) Energy Sector : Hydroelectric power generation less than 50 MW.

Schedule C combines everything not in Schedule A and B. Illustrative example given in Schedule C includes the following.

- iii) Projects promoting energy efficiency

Thus Patrind Hydroelectric Project is covered by Schedule A which requires

préparation of a full EIA report, for submission to provincial EPA KHYBER PAKHTUNKHWAH Peshawar for their approval.

2.1.3 National Environmental Quality Standards (NEQS)

National Environmental Quality Standards (NEQS) for gaseous emissions and industrial/municipal effluents, issued earlier, were revised by Pakistan Environmental Protection Agency with effect from August 10, 2000 as SRO 549(1)/2000 and appear as Annexure - II of this Report. Relevant NEQS were consulted in the preparation of EIA Report for Patrind Hydroelectric Power Project.

2.1.4 Land Acquisition Act 1894

The Land Acquisition Act 1894 is a “law for the acquisition of land needed for public purposes and for companies and for determining the amount of compensation to be paid on account of such acquisition”. The *raison de etre* of this piece of legislation is, therefore, two-fold: firstly to fulfil the needs of government and companies for land required by them for their projects, and secondly, to determine and pay compensation to those private persons or bodies whose land is so acquired. The exercise of the power of acquisition has been limited to public purposes. The principles laid down for the determination of compensation, as clarified by judicial pronouncements made from time to time, reflect the anxiety of the law-giver to compensate those who have been deprived of property, adequately. It is with this end in view that the association of the persons interested in the property, with the process of determination of its negotiated market value by the Collector is a highlight of this Act.

2.1.5 Draft National Resettlement Policy 2002

A draft of National Resettlement Policy was issued by Pakistan Environmental Protection Agency Islamabad in March 2002. After considering the problems experienced in application of Land Acquisition Act 1894, the draft deals with basis of compensation and resettlement of project affected persons.

2.2 PROVINCIAL LEGISLATION

2.2.1 Forest Act 1927 / NWFP Forest Ordinance 2002

The Forest Act, 1927, and later amendments, establish the right of the government to designate areas for reserved forest, village forest and protected forest, and may acquire such areas for prohibiting or restricting the public use of the resources or other activities. NWFP Forest Ordinance 2002 has the objectives of protection, conservation, management and sustainable development of forests as well as promotion of the economic, social and ecological well-being of the local people.

2.2.2 Sarhad National Conservation Strategy 1996 / 2004

Pakistan Environmental Protection Act 1997 is the basis of environmental legislation and provides the framework for the implementation of the National Conservation Strategy (NCS) issued in 1991 by the Government of Pakistan in collaboration with IUCN. North Western Frontier Province N.W.F.P initiated the Sarhad Provincial Conservation Strategy in 1992 for completion in 1996; it was reviewed in 2004. This document has the goal to secure the economic, social and ecological well being of the people of KHYBER PAKHTUNKHWAH through the conservation and sustainable development of the province's natural resources.

2.2.3 AJK LG Act 1997 and Other Laws

Law Department of Azad Government of the State of Jammu and Kashmir issued Local Government Act in 1997. This Act was later revised by AJK Government to include some amendments. In the preparation of this Report AJK Act 1997 as well as Antiquity Act (Government of Pakistan), Explosives Act, Factory Act etc. were consulted.

2.2.4 AJK Environmental Protection Act 2000

Azad Jammu and Kashmir Environmental Protection Act was promulgated on October 11, 2000 by Government of Azad Jammu and Kashmir, Muzaffarabad.

2.3 EXTERNAL SUPPORT AGENCIES

2.3.1 Introduction

Funds in the form of loans or grants for development Projects in Pakistan are generally available from external support agencies like the World Bank and Asian Development Bank. As a policy matter, these agencies lay emphasis on the protection of environment from adverse impacts due to development projects. Proponents of projects in Pakistan planning to receive financial support from these organizations must ensure that the projects are not harmful to the environment, and that appropriate mitigation measures are carried out, as necessary, in accordance with the requirements laid down by these agencies.

2.3.2 The World Bank

For the Patrind Hydropower Project the latest policies of the World Bank, as one of the possible major financiers, play an important role. These policies include Operation Policy (OP) 4.01 Environmental Assessment, Bank Procedures (BP) 4.01 Environmental Assessment December 1999 and OP/BP 4.12 Involuntary Resettlement. The Environmental Assessment Source Book Vol I and Vol II Sectoral Guidelines 1991 are designed to assist in the environmental assessment. It provides practical guidance and specific information for designing sustainable projects by incorporating fundamental environmental considerations. Noise levels laid down by World Bank Group appear as Annexure - III of this Report.

2.3.3 Asian Development Bank (ADB)

"ADB's 2009 Safeguard Policy Statement (SPS) sets out the policy objectives, scope and triggers, and principles for three key safeguard areas: (i) environmental safeguards, (ii) involuntary resettlement safeguards, and (iii) Indigenous Peoples safeguards. On environment, the SPS aims to ensure the environmental soundness and sustainability of projects and to support the integration of environmental considerations into the project decision-making process. On involuntary resettlement, the SPS aims to avoid involuntary resettlement wherever possible; to minimize involuntary resettlement by exploring project and design alternatives; to enhance, or at least restore, the livelihoods of all displaced persons in real terms relative to pre-project levels; and to improve the standards of living of the displaced poor and other vulnerable groups. With respect to Indigenous Peoples, the SPS aims to design and implement projects in a way that fosters full respect for Indigenous Peoples' identity, dignity, human rights, livelihood systems, and cultural uniqueness as defined by the Indigenous Peoples themselves so that they (i) receive culturally appropriate social and economic benefits, (ii) do not suffer adverse impacts as a result of projects, and (iii) can participate actively in projects that affect them. ADB has adopted a set of specific safeguard requirements that borrowers/clients are required to meet in addressing environmental and social impacts and risks. The Patrind Hydropower Project will comply with ADB's Safeguards Requirements 1 on Environment and 2 on Involuntary Resettlement. Safeguards Requirement 3 on Indigenous Peoples is not expected to be triggered."

2.3.4 International Finance Corporation

Guidelines provided by IFC Handbook for Preparing a Resettlement Action Plan are based on World Bank OP/BP 4.12. It explains how and under what circumstances OP/BP 4.12 applies and what actions IFC expects of project sponsors to manage involuntary resettlement defining rights, roles and responsibilities of all parties involved in involuntary resettlement. The IFC Performance standards 2006 (PS1 to PS6) have been kept in view in the preparation of this Environmental Impact Assessment Report.

2.4 PATRIND HYDROPOWER PROJECT

In preparing EIA for Patrind Hydropower Project, the requirements/ guidelines laid down by WB/IFC/ADB and Pakistan Environmental Protection Act 1997 have been followed. In this respect land acquisition and resettlement aspects have been focused with reference to ADB Policy. Scope of land acquisition and resettlement as well as compensation payment based on views of affected persons/ market conditions has been dealt with in a subsequent chapter of this Report.

CHAPTER – 3

BASELINE CONDITIONS

3.1 INTRODUCTION

The project area covers administrative region consisting of Manshera and Abbottabad districts in Khyber Pakhtunkhwa and Muzaffarabad district in Azad Jammu and Kashmir (AJK). Overall, the area has a mountainous topography dissected by rivers, hill streams and springs. Kunhar and Jhelum are two major rivers in the project region. The baseline data has been collected by field surveys during the months of June, July and September 2006 as well as during March 2010. The purpose of field surveys was to investigate the planning area and the project layout for environmental and socio-economic conditions as well as resettlement aspects. Pre-designed proformas in English and Urdu version (Annexure-IV and V) were used to collect baseline data. The collected information includes physical, biological and socio-economic conditions. Environmental features like type of land, land use, built-up property, economic trees, flora and fauna were recorded.

Relevant government departments, agencies and NGO's were visited during this period. These include Departments of Wildlife, Fisheries, Forest, Health and Agriculture in Muzaffarabad and Abbottabad. Representatives of NGOs like WWF and Sungi were also contacted in these cities. Published information relating to the project area available from various sources was collected. This included literature on geology, landforms, land use, climate, water resources and district census reports.

3.2 PHYSICAL ENVIRONMENT

3.2.1 Physiography

Catchment area of the Kunhar river is mountainous and rugged with a high relief amplitude and steep slopes. Up-north in Naran the elevation is 2,362 m above mean sea level falling to an elevation of 735 m at Patrind weir site. Geologic erosion on these mountains is substantial due to area's steep and rugged physiography. Much of the northern mountains confine the river flow within narrow valleys. The steepness of the topography in combination with weak and shattered rocks predisposes the area to landslides. In higher areas active scree slopes are formed. The only level areas in the catchment consist of small terraces located along the river valleys supporting human settlements. The terrace at Patrind 484 ha in extent is a typical example of such parts. Otherwise settlements are established well above the valleys on topographically suitable ridges.

3.2.2 Geology

In the project region slopes along left bank of Kunhar river are steep, whereas the right side has comparatively gentler slopes with dips in upstream direction. Rocks are mostly slate. They are dark grey in colour, moderately hard to hard, thinly to medium bedded, sparsely jointed, non to sparsely fragmented, fresh to slightly weathered on exposed surfaces. The headrace tunnel route 2.2 km long also lies in slate. Jhelum river forms a meandering loop near the powerhouse site. The foundation rock of the powerhouse site is slate with geologic characteristics same as those at the weir site. Figure 3.1 shows the geological map of the Project area.

3.2.3 Seismicity

According to the Preliminary Seismotectonic Map of Pakistan (1979) the project region in parts belongs to one of the major earthquake zones. The recent earthquake of 8th October 2005 caused damage to lives and property with land and rock slides occurring in the vicinity of the project region. This indicated the importance of the seismicity in planning the layout and design of the project. For Patrind Hydropower Project a value of 0.52g has been adopted as maximum credible earthquake for design purposes as shown in Table 3.1 at the end of this Chapter.

3.2.4 Landform and Soils

The following landforms occur in the project region starting from weir site in district Abbottabad at Patrind to powerhouse site near Lower Chattar in Muzaffarabad district. The prominent landforms and soils relative to weir site, powerhouse site and along headrace tunnel route are described in the following sections.

Lower Slopes and Terraces

Some narrow strips of land occur as slightly raised terraces just above the Kunhar and Jhelum rivers, along straight sections of the river or on the inside of bends. These areas contain boulder beds and alluvial deposited soils. In some areas deposits have been covered by landslides. Soils are either mixtures of young and poorly formed stony soils or are composed of infertile skeletal soils derived from landslides. In many cases steep middle to upper slopes of the Kunhar and Jhelum valleys extend all the way to the river channel. These areas are covered with poor forage grasses and several unpalatable shrubs.

Middle Terraces

Small terrace remnants above the lower slopes of Kunhar and Jhelum rivers are predominantly of colluvial origin and of low to moderate fertility. The soils can be affected by drought. In some villages springs are channelled to these areas for

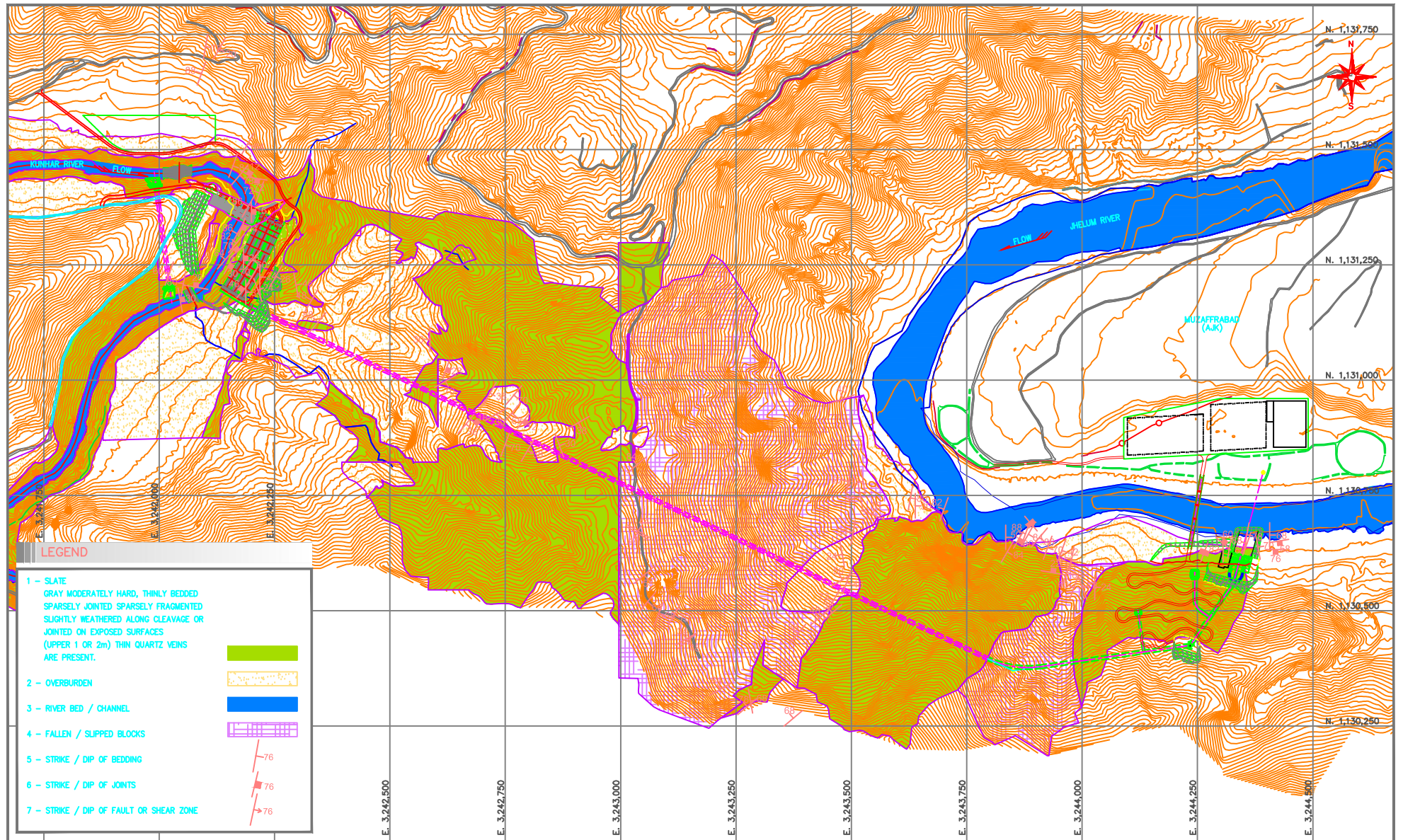


Figure 3.1 : Geological Map of Project Area

village irrigation systems for a range of crops including maize, rice and wheat cultivation. The terraces are subdivided into small farming areas. These areas are supporting the lower villages and the community infrastructure of mosques, schools and shops. Road access to the lower villages is normally inadequate. Middle terrace areas rise abruptly to upper valley slopes.

Middle to Upper Valley Slopes

Soils in middle to upper valley slopes are shallow, have low inherent fertility and contain shale, slates and phyllite rock fragments. These slopes are unstable and landslides are common. Wherever the rivers or roads have cut into the valley sides, rock outcrops are common. This area merges into upper ridge areas.

Upper Ridge Areas

Some older and deeper soils occur along the high mountain ridge which forms the watershed between the Kunhar, Neelum and Jhelum rivers. Only the upper areas which are wider and open, support permanent communities. Soils formed within these areas are better structured and have higher fertility. These areas are cooler and are used for vegetables and fruit trees. Snow occurs on these areas and grazing is restricted to the late spring and summer seasons. The lower communities also return during the summer for grazing flocks of sheep and goats as well as for agricultural activities such as vegetable cultivation. These areas retain some natural tree cover though are rapidly shrinking due to cutting for timber and fuel wood supplies. Access to many of these upper areas is poor and in many cases is limited to steep narrow tracks.

3.2.5 Climate

The climate of the project area is pleasant, characterised by mild summers and cold winters. The climatological data for weir site at Patrind is not available. Instead, the data of nearest meteorological stations at Balakot and Muzaffarabdd is used, which has been recorded at these stations maintained by Surface Water Hydrology Project (SWHP) WAPDA.

Temperature

At Balakot the months of May to July are the hottest with average daily temperature ranging between 24°C to 28°C while December to February are coldest with temperature varying between 8°C to 10°C. At Muzaffarabad the months of May to July are the hottest months with temperature ranging between 26°C to 30°C while December to February are coldest with temperature varying between 10°C to 11°C. Average monthly temperatures are tabulated below.

Table 3.2: Average Monthly Temperature at Balakot and Muzaffarabad (1960-2003)

Month	Temperature °C	
	Balakot	Muzaffarabad
January	8.1	9.5
February	9.6	11.4
March	13.3	16
April	19.0	21.1
May	24.1	25.7
June	28.2	29.9
July	26.8	28.8
August	25.9	28.1
September	24.0	26.3
October	19.4	21.7
November	14.0	15.9
December	9.4	10.9

Rainfall

June and July are wettest months for both Balakot and Muzaffarabad and November the driest. At these places rain is caused by western disturbances and monsoon. Average annual rainfall is 1538.5 mm for Balakot and 1351.9 mm for Muzaffarabad. Average monthly and mean annual rainfall for both Balakot and Muzaffarabad are given in Table 3.3.

Table 3.3: Average Annual and Monthly Rainfall at Balakot and Muzaffarabad (1960-2003)

Month	Rainfall (mm)	
	Balakot	Muzaffarabad
January	81.6	79.7
February	132.1	128.4
March	159.6	142.6
April	113.5	95.4
May	69.4	72.1
June	87.1	101.7
July	351.1	273.3
August	275.4	215.5
September	117.5	100.8
October	50.3	43.7
November	37.1	34.0
December	63.7	64.8
Annual	1538.5	1351.9

3.2.6 Water Resources

Jhelum and Kunhar are the major rivers in the project region besides numerous small streams (nullahs) and springs. The Kunhar river length from Naran to the site of the Weir at Patrind is 80 miles (Figure 3.2). The Kunhar river catchment area of 938 square miles falling from an elevation of 2,362 m above mean sea level at Naran to 735 m above mean sea level at Patrind weir site. Surface Water Hydrology Project (SWHP) WAPDA has established gauging station at Garhi Habibullah since 1960. By extending Kunhar river flows at Garhi Habibullah at Patrind proportionate to catchment area mean monthly flows of Kunhar river at Patrind for the period 1960 to 2007 have been calculated. The flows at weir site vary from an average minimum of 24 cumecs in January to an average maximum of 285 cumecs in June as shown in Figure 3.3. The annual average flow is 104 cumecs. Kunhar River average monthly flows pre- and post-Project below diversion weir are given in the table below.

Table 3.4: Average Monthly Flows Pre- and Post-Project Downstream of Weir – Kunhar River (1960-2007)

Month	Mean Natural Flow (m ³ /s)	Proposed Mean Flow (m ³ /s)		
		Environment-al Release	Spill Flow	Total as Percentage of Mean Natural Flow (%)
January	23.9	2.0	-	8.4
February	26.6	2.0	-	7.5
March	44.8	2.0	-	4.5
April	98.9	2.0	-	2.0
May	187.4	2.0	32.4	18.4
June	281.1	2.0	126.1	45.6
July	244.9	2.0	89.9	37.5
August	154.3	2.0	-	1.3
September	81.4	2.0	-	2.5
October	46.3	2.0	-	4.3
November	33.1	2.0	-	6.0
December	27.3	2.0	-	7.3

The low flow period of Kunhar river, from December to April will be used for construction of weir by diverting all flow stored behind coffer dam into the diversion tunnel.

Combined flows of the rivers of Jhelum, Neelum and Kunhar pass by the proposed site of the powerhouse. Taking account of the flows, the fluctuations in powerhouse tail water level have been determined at a minimum of 650 m above mean sea level to a maximum of 657 m above mean sea level. Jhelum River average monthly flows pre- and post-Project immediately below tailrace outlet are given in the table below.

Table 3.5: Average Monthly Flows Pre- and Post-Project Immediately Below Tailrace Outlet – Jhelum River (1980-1997)

Month	Pre-Project Flow in Jhelum River below Tailrace (m ³ /s) (Powerhouse Site)	Project Discharge into the Jhelum River via Tailrace (m ³ /s)	Project Flow in Jhelum River below Tailrace (m ³ /s) (Powerhouse Site)	Percentage Increase in Flow (%)
Jan	184.5	21.9	206.4	11.9
Feb	259.3	24.6	283.9	9.5
Mar	664.2	42.8	707.0	6.4
Apr	1181.9	96.9	1278.8	8.2
May	1594.2	153.0	1747.2	9.6
Jun	1482.8	153.0	1635.8	10.3
Jul	1260.0	153.0	1413.0	12.1
Aug	892.4	152.3	1044.7	17.1
Sep	541.4	79.4	620.8	14.7
Oct	294.6	44.3	338.9	15.0
Nov	194.3	31.1	225.4	16.0
Dec	186.6	25.3	211.9	13.6

Summary of mean monthly water temperatures in Kunhar river at the weir site near Garhi Habibullah and Jhelum river at the powerhouse site near Domel is tabulated as follows;

Table 3.6: Mean Monthly Water Temperature at Weir Site (Garhi Habibullah) and Jhelum River (Domail)

MONTHS	TEMPERATURE (°C)	
	Kunhar River Near Garhi Habibullah (1980-1993)	Jhelum River Near Domel (1980-1995)
January	6.1	8.5
February	7.2	10.4
March	10.2	13.6
April	11.4	16.8
May	12.0	19.9
June	12.3	22.4
July	14.9	25.1
August	17.9	25.0
September	16.5	23.3
October	13.6	19.2
November	9.8	14.6
December	7.0	9.4

Reserved Flow

Starting from weir up to powerhouse site, direct river flows are neither used for irrigated agriculture nor for domestic water supplies due to high banks of the Kunhar river relative to its bed level. Instead springs as well as nullahs joining the Kunhar river flows are used to serve both these purposes.

Ecological considerations downstream of the weir require that flow of water should remain available throughout the year. All definitions of reserved or minimum flow place emphasis on the protection of natural life in the river. From the point of view of environmental considerations there are numerous methods and formulas for calculation of reserved flow or minimum flow [13]. The one used here is $Q = [(0.0651 Q_{mm} + 2) / 100] Q_{am}$ (Ref. CEMAGREF: Agricultural and Environmental Research Institute, Antony, France; Formula developed for Minimum Flow for Ecological Requirements, 2006). where Q_{mm} is monthly mean and Q_{am} is annual mean discharge of the Kunhar river at the weir site. Referring to Figure 3.3 and using 23.56 cumecs for Q_{mm} and 103.5 cumecs for Q_{am} , the required ecological flow Q is equal to 3.7 cumecs as compensation flow. However, numerous small and two big hill torrents namely Boi-da-katha and Salol Nala join the Kunhar river stretch below the weir site.

Considering the results of the Aquatic Ecology Study of the project, the flow contributions of these numerous streams and absence of any abstractions of water in the stretch of Kunhar river accompanied by 2 cumecs planned to be released from the headpond for ecological flow throughout the year is reasonable to take care of stress on aquatic flora and fauna including any fisheries potential which is very limited in any case.

3.2.7 Water Quality

Kunhar river derives its flow from rainfall and snowmelt both of which do not contain any impurities. As the river flow proceeds over the drainage basin, water picks up sediment load, dissolved solids, toxic substances, and organic matter including bacteria from the surface of the earth. Domestic sewage though insignificant, may get into it. Sediment load is important with respect to the operation stage of the project. The suspended load of Kunhar river contains sand, silt and clay particles, their proportion varying in low and high flow seasons. The sediment load at the weir site has been estimated at 4.94 million tons on the mean annual basis. It carries bottom load of pebbles, boulders and suspended load of sand, silt and clay.

3.3 BIOLOGICAL ENVIRONMENT

3.3.1 Forestry

Forest in the project region occur only in the upper valley sides and thus remain un-affected by the project, however forests in the region are classified into categories mainly determined by altitude and rainfall. Ecological distribution of different types of forest is described in the following paragraphs to give an overall picture of the vegetative worth of the project area. It is also needed because it affects the life of reservoir through sedimentation. The principal plant communities of Kunhar catchment's are related to the altitudinal zonation.

A. Sub-tropical Pine Forests

- ii) Himalayan sub-tropical scrub forests (750-1000m)
- iii) Himalayan chir pine (*Pinus roxburghii*) forests (100-1500m)

B. Himalayan moist temperate forests

- i) Low level blue pine (*Pinus wallichiana*) forests (1500-2000m)
- ii) Moist deodar (*Cedrus deodara*) forests (1500-2500m)
- iii) Western mixed coniferous forests (1500-3000)
- iv) Upper west Himalayan fir and broad-leave forests (2700-3200m)

C. Dry Temperate Forests

D. Sub Alpine Scrub and Alpine Pastures

3.3.2 Legal Classification of Forests

Legally the productive forests of the Kunhar catchments are of two types the reserved or the Government owned forests, and the guzaras or the private or community owned forests.

3.3.3 Rangelands

Rangelands occupy about 50 % of the entire land area of the valley; therefore the production of grass is a major land use of Kunhar river watershed. The rangelands were classified as under:

- i) Sub-mountain rangeland: below 4000 elevation sub-divided into two slope classes i.e. less than 50% slope and more than 50% slope.
- ii) Mountain rangelands: between 4000 and 10000 elevation subdivided into two slope classes i.e. less than 50% slope and more than 50% slope.
- iii) Alpine pastures: between 10000 elevation and the permanent snow line.

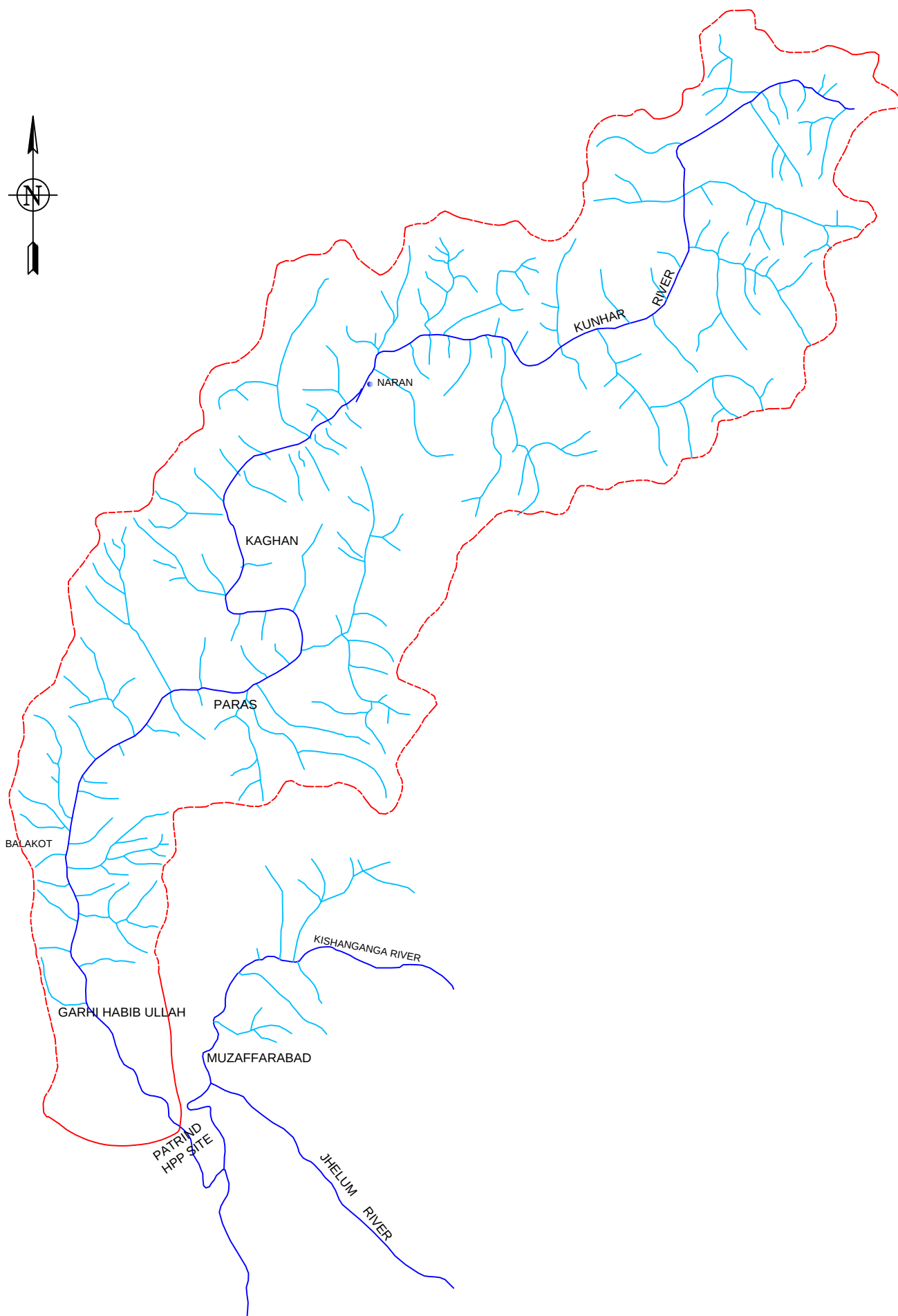


Figure 3.2 : Kunhar River Catchment Area.

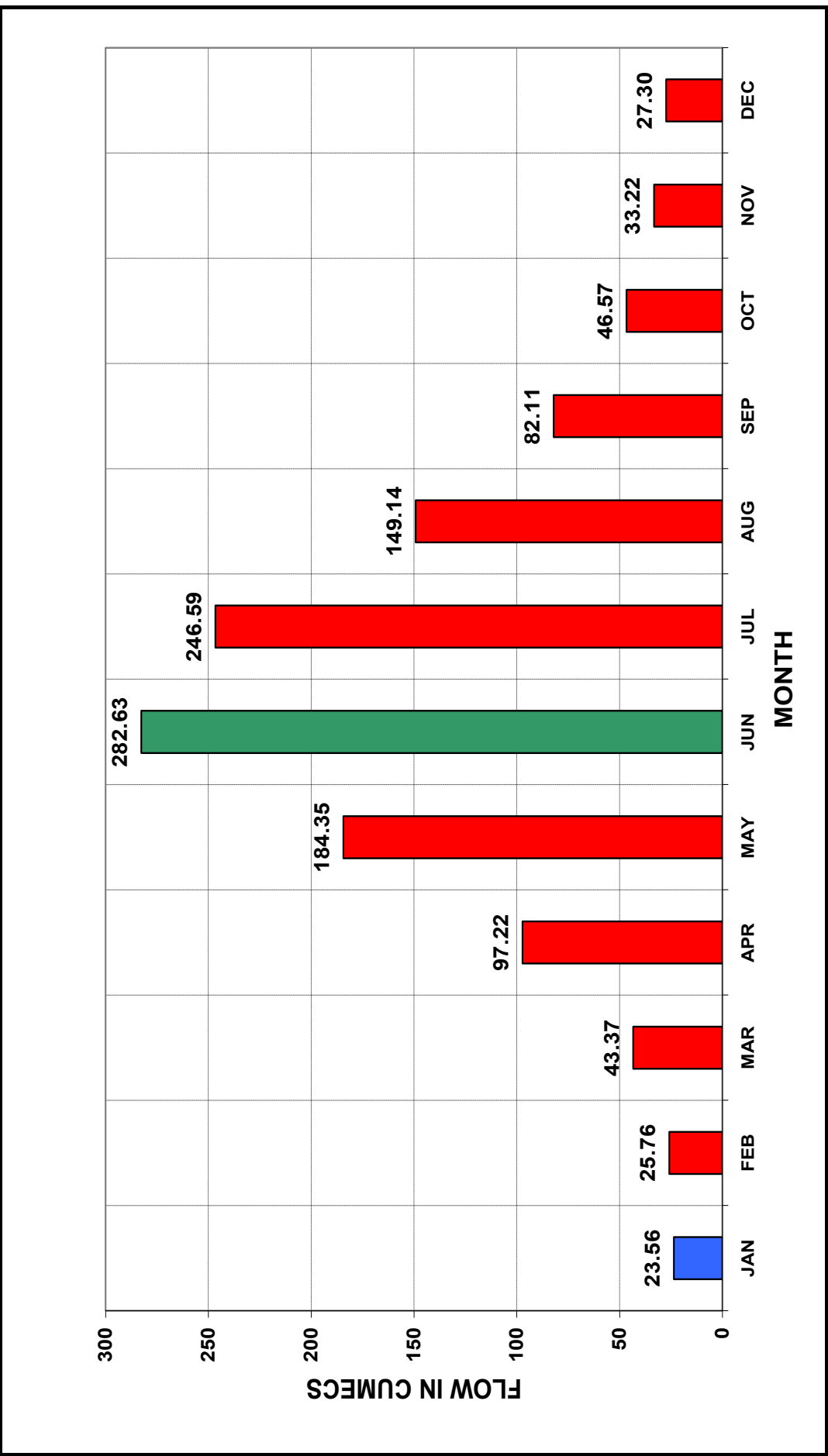


Figure 3.3: Mean Monthly Flows of Kunhar River at Patrind Weir Site (1960 - 2003)

3.3.4 Patrind Hydropower Project Area

A detailed study of the project area was conducted. The area behind the weir site is up to almost 7 Km backward. Three representative sites were selected for vegetation survey. At each site two transect lines of 500 meter each were laid across one another. On each transect line 1m X 1m Quadrat for grasses/herbs, 4m X 4m Quadrat for shrubs/trees were laid on an interval of 50 meter. The data was collected and compiled for identification, calculation of cover percentage, species composition and forage production. For forage production the species were clipped and air dried at 2 cm from the ground level. The study yielded following results.

3.3.4.1 Vegetation Species

Climate is very conducive for the growth of mesophytes. Flora is in abundance in the area. A variety of herbs, weeds, flowers, plants and trees is growing in the area. Starting from Dhaman grass to Deodar and Spruce trees, all type of flora is met. Both conifers and broad leave trees occur in the project area. The Vegetation Species comprising of grasses, herbs, shrubs and trees collected and identified in the project area are listed in Table below;

Table 3.7: Type of Trees in the Project Region

Sr. #	Botanical Name	Local Name
TREES		
1.	<i>Pinus roxburghii</i>	Chir pine
2.	<i>Cedrus deodara</i>	Deodar
3.	<i>Picea smithiana</i>	Spruce
4.	<i>Prunus padus</i>	Birdscherry
5.	<i>Ficus carica</i>	Fig
6.	<i>Ascer spp.</i>	Maple
7.	<i>Cornus macrophylla</i>	Kandar
8.	<i>Acacia modesta</i>	Phulai
9.	<i>Robinia pseudocacia</i>	Kikar
10.	<i>Olea cuspidate</i>	Kau
11.	<i>Bauhinia variagata</i>	Kachnar
12.	<i>Azedarachta indica</i>	Bakain
13.	<i>Zizyphus jujube</i>	Ber

Sr. #	Botanical Name	Local Name
14.	<i>Pyrus pashia</i>	Pear
15.	<i>Cedrela serrata</i>	Drawa
16.	<i>Salmalia malabaricum</i>	Simal
17.	<i>Acacia Arabica</i>	Punjabi Kikar
18.	<i>Cassia fistula</i>	Amaltas
19.	<i>Aesculus indica</i>	Bankhour
20.	<i>Juglans regia</i>	Walnut
21.	<i>Grevia opposittifolia</i>	Tamman
22.	<i>Celtis australis</i>	Batkarar
23.	<i>Populus spp.</i>	Popular
SHRUBS		
1.	<i>Dodonaea viscosa</i>	Hopseed bush
2.	<i>Berberis lyceum</i>	Barberry
3.	<i>Rosa moschata</i>	Rose Wild
4.	<i>Vitex negundo</i>	Five leave Chaste tree
5.	<i>Buxus wallichiana</i>	Boxwood tree
6.	<i>Clematis gouriana</i>	Oldmans Breed
HERBS		
1.	<i>Tribulus terrestris</i>	Calthrop
2.	<i>Oxalis repens</i>	Wood Sorrel
3.	<i>Mentha sylvestris</i>	Pepermint
	<i>Chenopodium album</i>	Whitegoosefoot
	<i>Amaranthus viridis</i>	Amaranthus
GRASSES		
1.	<i>Themeda anathera</i>	Red Oat Grass
2.	<i>Pennisetum typhoid</i>	Pearl, Millet
3.	<i>Aristida cyanatha</i>	Wildgrass
4.	<i>Apluda mutica</i>	Apluda
5.	<i>Heteropogon contortus</i>	Speargrass
6.	<i>Bothriochloa pertusa</i>	Palwan
7.	<i>Cynodon dactylon</i>	Lawngrass
8.	<i>Cymbopogon jawarancusa</i>	Common Scented Grass

3.3.5 Forage Production Data (Kg/ha)

Forage production data was calculated in the area supposed to be submerged so as to calculate the biomass going under water. It was estimated that on the average about 3.5 tons per hectare of biomass would be submerged.

Forest areas are shrinking and forest is being lost at a substantially greater rate than regeneration. No figures are available for deforestation rates within the areas adjoining the project. The forested areas are now being progressively replaced by a mixed grassland and shrubland community. With majority of the population living in rural areas, there is a large demand for fuel wood which has to be provided by the surrounding forests in the project region. In case of Azad Jammu and Kashmir this is estimated by Forest Department (1985) to be $0.8\text{m}^3/\text{person}/\text{year}$. Thus for a typical family of 8 persons the annual family requirement is in the order of 6.4 m^3 of wood. Likewise in Azad Jammu and Kashmir over $100,000\text{ m}^3$ of timber ($0.04\text{m}^3/\text{person}/\text{year}$) are extracted each year from forests extending timber extraction into the more critical higher forested areas. Despite Forestry Department regulations and controls, the area continues to be logged for traditional uses through illegal cutting. Similar situation prevails in other parts of the project region.

3.3.6 Wildlife

The project area is located on the lower valley slopes and terraces separated from the upper forested areas. The valley slopes high above the project area are characterised by plant and animal biodiversity promoted by variations in altitude, topography and climate providing numerous habitats for several species of flora and fauna. The fauna of the project area consists of mammals, reptiles, amphibians, insects, and birds. For example in 1987 a wildlife survey in Khyber Pakhtunkhwa was conducted which was updated in 1993. The survey comprises important species of the mammals and avifauna in the area. Group of the mammals are represented by Rhesus monkey, wolf, jackal, brown/ black bear, leopard cat and common leopard. Furthermore, sparrow hawk and wood cock can be found. Information on the vertebrate or on the invertebrate fauna in the region is scanty. Among the reptiles, the only species of snakes likely to occur is *Aqkistrodon mimalavansus*. It is one of the ten poisonous snakes in Pakistan. Also, the lizard *Agama tuberculata* may be found in rocky areas and crevices. Among the amphibians, *Bufo himalayanus*, *Rana cyanophlyctis* and *Rana breviceps* exist in the area.

Wildlife Protection, Preservation, Conservation and Management Act of 1975

covers the project area in Khyber Pakhtunkhwa. However, its implementation is hampered by many administrative and socio-economic factors. Over the last 50 years the number of animal species has decreased. Growth of human population has put great pressure on the natural resources of the area, particularly the forests and on the wildlife. A lot of species are endangered by the destruction of habitats, by unrestricted hunting and by poaching. Immediate and effective conservation measures are needed to save the wildlife in the project region.

Endangered Species

As per wildlife survey of Pakistan Map published by the Zoological Survey Department (undated) Leopard Cat (*Felis bengalensis*), Leopard Panther (*Panther Pardus*), Pir Panjal Markhor (*Capra Falconeri Cashmiriensis*) and others like *Lutra Spp* have been declared as the endangered species. Leopard Cat and Leopard Panther both are found upto 3,500 m elevation in the pine forests of Pakistan. They may also be found in the south western part of the country, such as Malakand, Suleman Mountain range etc. Their attractive skin makes them a valuable prey because of which they have become endangered.

Markhor is another animal which has been declared endangered. Its name is derived from its horns i.e its horns are snake like. Its habitat is dry and steep mountains and generally eats Chestnut tree leaves and other leaves and herbs. It also exists from elevations 1,000 to 3,500 m. Although it occurs extensively in Pakistan i.e from Azad Jammu Kashmir upto Balochistan including Gilgit and Baltistan, Mardan, Swat, Dir, Chitral and Dera Ismail Khan, yet its existence is endangered because of its persistent hunting. It is known for its excellent smelling power.

Monkeys are common in the project area but Rheasus Monkey (*Macaca mylatta*) has been adjudged to be a vulnerable species by the Zoological Survey Department. Langur (*Presbytisentellus ajax*) has been rated as endangered species. Musk deer (*Moschus moschiferus*) is also an endangered species.

Monal pheasant normally occurs between 2,000 to 5,000 m elevation in moist temperate forest and juniper scrubs in Swat, Dir, Hazara, Chitral, Indus Kohistan, Gilgit and Azad Jammu and Kashmir. Because of its beauty and colourful feathers it has become a bird of prey. It is designated as endangered species. Koklas pheasant is comparatively smaller in size and generally lives on comparatively lesser heights in a similar habitat as the Monal pheasant. This bird is rated as rare species. Chukar (*Alectoris chukar*) is found all over Pakistan leaving out plain

parts of Punjab and Sindh provinces. This bird is also designated as rare species by the Zoological Survey Department.

With reference to elevations at which endangered species exist it would be seen that the wildlife habitats in general and endangered species in particular do not exist in the Project area.

3.3.7 Livestock

The people of the project area possess sheep, goats, donkeys, mules, buffaloes and cows. Donkeys and mules are kept for carrying loads while cows and buffaloes for milk. Livestock population in Muzaffarabad and Abbottabad Districts is given in Table 3.8.

Table 3.8: Livestock Population in Muzaffarabad and Abbottabad Districts

Sr. #	Livestock	Muzaffarabad*	Abbottabad**
		2005	1996
1.	Buffalo	4,91,615	1,33,463
2.	Sheep	2,09,600	32,217
3.	Goat	10,52,500	222,472
4.	Horse	7,872	8,661
5.	Mule	41,82	11,991
6.	Ass	72,110	37,378
7.	Cattle	5,13,175	1,15,805
8.	Poultry	38,30,000	6,22,649

* Azad Kashmir at a Glance 2005. Planning and Development Department, Muzaffarabad.

** District Census Report, Abbottabad 1998.

3.3.8 Fishery

3.3.8.1 Introduction

Being a river of cold water, the fish fauna of Kunhar River is limited and does not form the significant economical fishery. The following major fresh water fish species are available mainly in the upper portions of Kunhar River;

- Salmo trutta (Brown Trout)
- S.gairdneri (Rainbow trout)
- Schizothorax plageostimus (Swati)
- Garra gotila
- Glyposternum spp (Auyur)
- Namacheilus spp (Chitala)

A detailed study was conducted about the kind, number and quantity of fish available as well as that of quality of water in the Kunhar river falling in the project reach with the objectives to;

- assess aquatic ecology (fish fauna) in Kunhar River between head pond and downstream to Jhelum confluence.
- describe aquatic ecology (fish fauna) and existing water quality in Kunhar River.
- describe the overall impact of the project on aquatic ecology in Kunhar River between head pond and downstream to Jhelum confluence.

3.3.8.2 Methodology Adopted

A survey of Kunhar River (head pond and downstream to Jhelum confluence) regarding aquatic ecology was carried out from 15-25 September, 2010 to assess aquatic biodiversity (fish fauna) and water quality.

Discussion with DFO Wildlife, Mansehra, DFO Jhelum valley, Deputy Director, Fisheries, Abbottabad and other officials of Forest/Fishery Department of AJK and Khyber Pukhtunkhwa were undertaken for collection of information about the project area for the fish fauna. After discussion, a detailed programme for survey of fish fauna of Kunhar river falling in the project reach was chalked out. In addition to this, short interviews with community members and fishermen were undertaken to know the method of hunting, types of fishes found in the project area, quality and flow of water. Netting for fish catch and sampling for water quality was undertaken at following three sites of Kunhar river namely:

- i) 7 Km length of the proposed submergence area to be created by headpond,
- ii) Weir site near Patrind village, and
- iii) Confluence point of Kunhar with river Jehlum at Domishahi.

3.3.9 Fish Sampling

Netting was done at three sites for one day each in Kunhar River between Head pond and downstream to Jhelum confluence for gathering details about fish fauna. The fishing methods used were simple and suited to the nature of the river reach. Cast nets, drag nets, bag nets were used. Seasonal variation information was collected through interviews with locals as well as from relevant Fishery Department of the project area. The weight of all fish collected was recorded.

3.3.10 Water Quality Sampling

Sampling was done for water temperature (°C), pH, total dissolved solids (g/l), turbidity, dissolved oxygen (mg/l), total hardness(mg/L as CaCO₃), total alkalinity (mg/l as CaCO₃), BOD, COD,TSS, Ca, Mg, K, Phosphate, Nitrate etc.for the mentioned three sites.

3.3.11 Sampling Results

3.3.11.1 Fish Fauna

The results regarding fish fauna are summarised in the Table below.

Table 3.9: Fish Sampling Results

Fish Group	Area (Head pond Submergence)		At Weir site (Patrind)		At Domishahi	
	Number s	Weight (kg)	Number s	Weight (kg)	Numb	Weig ht (kg)
Common Cyprinids	00	00	00	-	01	0.95
Snow Carp	07	6.25	08	9.25	06	7.0
Schistura group	02	1.75	00	-	01	1.25
Tripolysa group	12	9.50	05	6.0	08	9.15
Cat fish	00	00	00	-	00	00

It is to be noted that the number of fish caught is small varying between 12 to zero. Also the weight of almost all fish caught is less than 1 kg per fish indicating that the conditions are not conducive to fish culture in the river reach under consideration.

3.3.11.2 River Water Quality

The results of water quality sampling are reproduced in the Table below. The Dissolved Oxygen (DO) saturation level at 12.48 °C is known to be 11.79 mg/l and therefore the river water DO level, being 8.21-8.55 mg/l, is below saturation.

Table 3.10: Mean* water quality results at three sampling sites

Parameter	Headpond Submergence Area	Weir Site (Patrind)	At Domishahi	Average Values
PHYSICAL				
Water temperature (°C)	12	12.5	13	12.33
pH	6.16	6.54	6.36	6.36
Air Temperature (°C)	29	29	31	29.33
Depth (m)	2.16	1.85	3.21	2.4
Total Suspended solids (mg/l)	88.01	89.93	93.33	90.42
Inorganic Suspended solids (mg/l)	59.93	64.56	71.15	65.21
Organic Suspended solids (mg/l)	19.22	22.39	26.11	19.22
Organic matter in bottom mud (ppm)	28858	29765	26338	28320
Rate of flow (cu.m/sec)	34	36	41	37
CHEMICAL				
Dissolved oxygen matter (mg/l)	63.28	64.88	66.97	65.04
Dissolved oxygen (mg/l)	8.21	8.55	8.34	8.33
Salinity (ppm)	.017	.019	.018	0.018
Total alkalinity (mg/l)	1.98	1.60	1.52	1.7
Total carbon dioxide (mg/l)	2.12	2.42	2.51	2.35
Total Ammonia- nitrogen (mg/l)	.015	.023	.031	0.023
Biological Oxygen Dissolved (mg/l)	.076	.081	.086	0.081

*Mean values were calculated by averaging the results from three samples at each site, mixed together and a single sample was taken for analysis at Pakistan forest Institute, Laboratory.

3.3.12 River Water Quality versus Fish Culture

- E. The color of the water usually remained muddy (July-September) due to suspended solids of mud and sand remained more transparent from October to December as told by the local people. During course of study at the Project area it was found light muddy to transparent.
- F. Fish is very sensitive to temperature. It can sense even 1-3°C difference. It would move else where if the temperature exceeds its preference. Cold water fish remain in 0-12°C temperature regime.

- G. Total suspended solids and Organic suspended solids comprised greater proportion during the monsoon season when each and every thing is washed down, coupled with greater water velocity. Dissolved organic matter which acts as food for aquatic organisms like algae for fishes was found suitable. The organic matter in bottom mud increases from July-December due to settlement of organic compounds in the bottom.
- H. Salinity tolerance varies with the fish species. Some scientist think that 0.6 -20 ppm is lethal while other considers 7 ppm to be lethal for freshwater fishes. At project site the value found was $.017 \pm .001$ was harmless for fish life. It also affects other aquatic life causing migration of fish from fresh to salt water for growth and reproduction.
- I. Fish can survive the pH of 6-10 (Lone.1983).pH value of 6.36 ± 0.2 was considered suitable for fishes. Some scientist considers the 6-6.5 value as dangerous when aeration remains improper in water.
- J. Dissolved Oxygen remains lower in summer, increase up to December because cold water has great ability to hold Oxygen than warm water. Upper lethal levels 16.8-32.11 mg/l and lower lethal levels 3-4 mg/l (Rounsefell and Everhast, 1983).The value for the project area was found 8.33 ± 0.2 mg/l and was not lethal.
- K. Biological oxygen demand (BOD) generally decreased from July-December because the organic matter and micro-organisms (Phytoplentention, zooplentention) activity remained rich during the summer and decreased up to December. It is inversely proportion to the dissolved Oxygen. The value of BOD calculated for Project site was 0.081 ± 0.05 mg/l and was found suitable for aquatic life.
- L. Alkalinity is not a pollutant. Total alkalinity value >20 mg/l is considered dangerous for fish and other aquatic life (Ahmad et al, 1983).The value calculated for the project area was 1.7 ± 0.3 mg/l so it was safer for aquatic and fish life.
- M. Upper dangerous limit total carbon dioxide is 6 mg/l (Lone, 1983).It was calculated as 2.35 ± 0.2 (mg/l) was considered fit for every kind

of fish.

N. Ammonia is much more toxic to fish and aquatic life when water contains very little dissolved oxygen and carbon dioxide. Ammonia nitrate has an upper dangerous limit of 0.1 mg/l (Lone, 1983). The calculated value was 0.023 ± 0.008 far below the danger.

3.3.13 Findings of the study

The netting data and discussion with people indicated that the occasional fishing in the project area is not an occupation but a hobby due to little availability of fish fauna. The fishing activity was practiced more in winter due to lesser speed, low turbidity and depth of the river. The same position persists from the head pond area to the confluence of river Kunhar with river Jehlum as far as the availability of fish and angling is concerned according to local people. When asked about the availability of trout, the answer of majority of the public was no with occasional evidences of trout availability in the project area after many years. They revealed that the Trout was restricted mainly above the Balakot area of KP.

3.4 SOCIO-ECONOMIC INFORMATION AND PROFILE

3.4.1 Introduction

The collection of baseline data on socio-economic environment involved study of available documents, field surveys for socio-economic status of the project area in terms of land holdings, occupations and income. For this purpose participatory rural appraisal technique was used and scoping sessions were held during field survey June and September 2006. The aspect of acquisition of land in terms of land area requirement and infrastructure falling within the project area was also investigated. This involved consultations and scoping sessions with primary and secondary stakeholders like owners of land, people of the area, shopkeepers, religious community leaders. Cost of land, built-up property, economic trees etc was discussed with the owners, local people, and revenue department staff. The baseline data collected in pre-designed proformas form part of existing socio-economic conditions discussed in the following sections.

Administrative and Social Set-up

The project area falls in Districts of Muzaffarabad (AJK) and Abbottabad (Khyber Pakhtunkhwa). Union Council, under Local Government Ordinance 2001, is the lowest tier of local government. Depending upon population, villages or urban settlements are grouped into Union Councils (UC). The UC's are formed of public representatives elected by popular vote. The next higher tiers of local government are Tehsil Council and District Council. The district administration is run by District Nazim elected by Union Council members. Social and physical

infrastructure of a district is managed by District Nazim. District Coordination Officer (DCO) is the highest ranking administrative functionary of the government in a district.

Scoping Sessions

In order to obtain data on socio-economic profile, opinions and concerns of the project area population, scoping sessions were held in villages in the vicinity of weir and powerhouse sites. In particular people were informed about the scope of lost assets due to project implementation and compensation to be paid to them by the project sponsors. Annexure - VI gives summary and number of participants of scoping sessions held in the respective villages. In addition officials of relevant departments were also contacted during field surveys. A list of contact persons is given in Annexure - VII.

3.4.2 Population

The population survey of the villages in the vicinity of Weir and Powerhouse sites were conducted. The population in the project area is local people belonging to settled districts of Khyber Pakhtunkhwa/ AJK; it is neither characterised by ethnic diversity nor by any indigenous people. The project will not in any way affect them. The District Census Reports 1998 of Abbottabad and Muzaffarabad issued by Population Census Organisation Islamabad were also consulted.

Population of Weir Site Villages

There are 8 villages within 2 Km of weir site. Half of the villages fall in the Muzaffarabad district while other half in Abbottabad district as shown in Table 3.11. At annual growth rate of 2.99% and 1.82% for Tehsils of Muzaffarabad and Abbottabad, the present (2010) population of these villages totals 11,974. Number of households has decreased to 202 due to earthquake of October 8, 2005 demolishing almost all the Katcha houses in the area.

Population of Powerhouse Site Villages

There are five villages within 2 Km of Powerhouse site in Muzaffarabad district as given in Table 3.12. Their population according to Muzaffarabad District Census Report 1998 is 2,658. At annual growth rate of 2.99% for Muzaffarabad Tehsil, the present population of these villages totals 3,776.

3.4.3 Socio-Economic Indicators

Tables 3.11 and 3.12 also give socio-economic indicators of the population of villages within 2 Km of the weir and powerhouse site in terms of literacy ratio, availability of civic amenities like water supply and electricity.

Table 3.11: Population and Socio-Economic Indicators of Villages/ Human Settlements - Weir Site

Tehsil and District	Village Name	Area Acres	Kunhar River Bank	Population		Literacy Ratio 10+	No. of House-holds		Household Size		Household Facilities (1998)	
				1998	2010		1998	2010	1998	2010	Potable Water	Electricity Connection
Muzaffarabad	Patrind	1195	LHS	2159 (1081 + 1078) *	3066	48.6	336	-	6.4	-	28	335
Muzaffarabad	Tarcheela	-	LHS	-	752	-	-	-	-	-	-	-
Muzaffarabad	Raiter	114	LHS	321 (170 + 151) *	456	72.8	37	-	8.7	-	26	37
Muzaffarabad	Gotha	436	LHS	868 (425 + 443) *	1233	70.3	112	-	7.8	-	59	112
Abbottabad	Taitree	-	RHS	-	266	-	-	-	-	-	-	-
Abbottabad	Sarati	-	RHS	-	277	-	-	-	-	-	-	-
Abbottabad	Hundi	-	RHS	-	173	-	-	-	-	-	-	-
Abbottabad	Deedal Meera	463	RHS	1391 (669 + 722) *	1975	46.5	217	-	6.4	-	106	216
Total				4,739	8,198							

LHS: Left Hand Side, RHS: Right Hand Side, Household Size: No. of Persons/Household

* The figures in the brackets are population of males followed by females.

Table 3.12: Population and Socio-Economic Indicators of Villages -Powerhouse Site

Tehsil and District	Village Name	Area Acres	Kunhar River Bank	Population		Literacy Ratio 10+	No. of House-holds		Household Size		Household Facilities (1998)	
				1998	2010		1998	2010	1998	2010	Potable Water	Electricity Connection
Muzaffarabad	Thori	356	LHS	753 (342 + 411) *	1070	60.7	144	-	5.2	-	2	144
Muzaffarabad	Sarar	492	RHS	704 (335 + 369) *	1000	76.2	99	-	7.1	-	26	99
Muzaffarabad	Alora	184	RHS	278 (147 + 131) *	395	82.4	42	-	6.6	-	42	42
Muzaffarabad	Hussan-abad	188	RHS	485 (240 + 245) *	689	76.9	70	-	6.9	-	12	69
Muzaffarabad	Dhani	186	RHS	438 (227 + 211) *	622	77.7	70	-	6.3	-	37	70
Total				2,658	3,776							

LHS: Left Hand Side, RHS: Right Hand Side, Household Size: No. of Persons/Household

* The figures in the brackets are population of males followed by females.

Current water supply at the two sites i.e. in Alora village on powerhouse site

and in patrind village on weir site is poor. In case of Patrind village about 10% where as 100% houses are supplied with potable water in Alora village. The source of potable water is spring which is supplied through pipe to the households. In the project area villages, water is carried mostly by the women folk from the springs flowing in the area.

Sanitation facilities are poor overall except Alora and Patrind villages where septic tanks have been constructed in most of the houses.

Almost all the houses in the project area are supplied with electricity connections.

3.4.4 Agriculture and Other Professions

Agriculture in Muzaffarabad and Abbottabad districts is the dominant economic activity. Majority of the farmers have their own simple irrigation systems using water of streams and springs. Wheat, maize and rice are the major crops. Crop yields are variable and the most reliable estimates of crop yields are wheat 470 Kg/Acre, maize 452 Kg/Acre, rice 320 Kg/Acre. Other professions followed by active male population of the project area are private businesses, service in government, and skilled/ semi-skilled labour.

3.4.5 Livelihood Activity

Livelihood activity in the project area is a little different on two sites i.e. weir and powerhouse site of the project area. There is almost no agriculture activity on powerhouse site rather people are involved in business and government jobs. About 35% of population at powerhouse site is engaged in business and about 22% is in government jobs because of nearness of Muzaffarabad city. A review is given in Table 3.13 based on the interviews with the locals during the field surveys conducted in 2006 and 2010.

Table 3.13: Livelihood Sources on the Weir and Powerhouse Sites
Shown in Percentages

Sr. #	Source of Livelihood	% age at Weir Side	% age at Powerhouse Side
1.	Government/Semi-Government Jobs	6.0	22.2
2.	Business	17.8	35.2
3.	Agriculture	17.8	-
4.	Professionals	9.4	4.0
5.	Skilled Labour	8.8	11.0
6.	Unskilled Labour	28.2	19.1
7.	Others	12.0	8.5
	Total	100	100

3.4.6 Income Level

It has been assessed that the following income level exists in the project area.

Category (Rs PER MONTH)	Percentage
5000 – 15,000	32%
15000 – 30,000	58%
> 30,000	10%

The National threshold level for poverty line has been fixed at \$ 1.25 per person per day and it has been estimated that about 34.5% of the population live below poverty line.

3.4.7 Health Services

The availability of health services in terms of hospitals, clinics, dispensaries and of medicines is not satisfactory in the surveyed villages around weir and powerhouse sites. Health facilities like basic health unit (BHU) / rural health centre (RHC), medical practioner (qualified doctor or hakeem), lady health visitor (LHV) / lady health worker (LHW), traditional birth attendant (TBA) or dai are almost non-existent except for Hakeems, Dais and very small number of government or private clinics in the villages around weir and powerhouse sites. So the people have to travel long distances in case of emergency.

3.4.8 Education Facilities

The District Census Report 1998 gives 60.7% to 82.4% literacy ratio in villages around Power house site and 46.5% to 72.8% in the villages around weir site. The existing number of educational institutions in the villages within 2 Km of weir site and powerhouse site are shown in Table 3.14 and 3.15.

Table 3.14: Educational Facilities in the Surveyed Villages – Weir Site

Sr. #	Village Name	Educational Facilities							
		Primary School		Middle School		High School		Madrasa / Masjid	
		Male	Female	Male	Female	Male	Female	Male	Female
1.	Patrind	0	1	1	-	-	-	6	1
2.	Tarcheela	1	1	-	-	-	-	1	-
3.	Raiter	1	-	1	-	-	-	1	-
4.	Gotha	1	1	1	-	-	-	1	-
5.	Taitree	1	1	1	-	-	-	1	-
6.	Sarati	-	-	-	-	-	-	-	-
7.	Hundi	-	-	-	-	-	-	-	-
8.	Dedal Meera	1	1	1	-	-	-	1	1
Total		5	5	5	-	0	-		2

It will be seen at present no male or female high school exists in the surveyed villages of weir site. However, there are five primary schools, 5 middle schools, 11 Madrassas for male and 5 primary school, and 2 Madrassas exist for female population in the surveyed villages of weir site.

Powerhouse region has one high school each for male and female population. For males there are 4 middle schools 4 primary schools, 5 Madrassas and for females 4 primary schools, 5 middle schools and 2 madrasas in the surveyed villages.

Table 3.15: Educational Facilities in the Surveyed Villages - Powerhouse Site

Sr. #	Village Name	Educational Facilities							
		Primary School		Middle School		High School		Madrasa / Masjid	
		Male	Female	Male	Female	Male	Female	Male	Female
1.	Thori	1	1	1	1	1	1	1	1
2.	Sarar	1	1	1	1	-	-	1	1
3.	Alora	-	-	-	1	-	-	1	-
4.	Hassanabad	1	1	1	1	-	-	1	-
5.	Dhani	1	1	1	1	-	-	1	-
Total		4	4	4	5	1	1	5	2

3.4.9 Culture

Mosques and graveyards exist in each village of the project area. There are no sites of archaeological and historical importance in the project area.

3.4.10 Women in Project Area

Life in the villages is entirely male-dominated and women face many problems due to restricted mobility, lack of decision-making, poor access to social services, limited productive employment opportunities, early marriages, no family planning practices and no awareness about health and hygiene. According to the women, health is one of the biggest problems in their villages. Diseases like diarrhoea, cholera, chest-infections, goitre, abdominal problems and seasonal inflections (cold, cough, etc.) are very common among the villagers. The women often suffer from health problems after childbirth and there are no regular immunizations of the children.

The people have difficulty in obtaining the necessary medicines. Serious

illnesses force people to go to Abbtabad/ Mansahra for treatment and most of them cannot afford this. Since the women lack awareness about health and hygiene, the children suffer from various health problems due to poor hygienic conditions.

According to the 1998 Census Report, sex ratio is 100.2 in Abbottabad Tehsil whereas in Muzaffarabad Tehsil the sex ratio is 107.3. However, the sex ratio in 14 villages occurring in the vicinity of the project as described in Table 3.11 & 3.12 comes out to be 96.7.

3.4.11 Vulnerable Groups, Indigenous People

There are neither vulnerable or minority ethnic groups in project area nor are there any other groups which can be considered indigenous people. It is pointed out that Constitution of Pakistan does not recognise any ethnic/ linguistic indigenous groups, it takes notice only of religious minorities.

Table 3.1 Seismic Design Parameters Adopted for Major Water Resources Development Projects of Pakistan Including Patrind HPP

Project	Location	Structure	Dam Type	Dam Height (m)	Major Tectonic Features	Normal Storage Capacity (MCM)	Return Period (Years)		Max 'g'		Remarks
							MCE	OBE	MCE	OBE	
Patrind	Muzaffarabad (AJ&K)	Weir	RCC	42	Main Boundary Thrust	5.81	10000	150	0.52	0.23	
Basha	Diamer	Dam	Arch Gravity Concrete	274	Main Mantle Thrust	9011.34	10000	100	0.63	0.25	MDE
Tarbela	Abbotabad	Dam	Earth and Rockfill	143.25	Tarbela Fault, Darband Fault	13949.06	100		0.5	0.25	Tarbela Fault passes under the dam
Mangla	Mirpur (AJ&K)	Dam	Earthfill	138.38	Jhelum Fault, Himalayan Thrust	9132	6000	100	0.35	0.11	0.14 for Embankments
Ghazi Barotha	Attock	Headpond Embankment	Earthfill	-	Pr/Attock Fault	15		60 - 100	0.5	0.26 - 0.30	
Kurram Tangi	Kurram (North Waziristan)	Dam	Concrete Faced Rockfill	89.92	Kurram Thrust, Daryoba Anticlines	1135.68			0.2	0.2	MDE
Satpara	Skardu	Dam	Earth and Rockfill	39	Stak Fault	115.277	10000	1000	0.34	0.19	
Neelum-Jhelum	Zaminabad (AJ&K)				Jhelum Fault			1000	0.45 - 0.6	0.25	
									0.3 - 0.4	0.17	

MCM: Million Cubic Meters
OBE: Operational Basis Earthquake
MDE: Maximum Design Earthquake
MCE: Maximum Credible Earthquake

CHAPTER – 4

INFORMATION DISCLOSURE, CONSULTATION AND PARTICIPATION

4.1 INFORMATION DISCLOSURE

The field team consisting of environmentalists, sociologist and ecologist undertook the process of informing community representatives and affected households about the Project and its impacts. Field trips were conducted in June 2006 and March and April 2010. The consultation process helped the affected persons regarding land acquisition and bringing clarity on issues that might be raised during project implementation. The process also included the preparation of an introductory and information brochure in Urdu about the Project, its location, main impacts and benefits.

Questionnaire prepared and used in the field is placed as Annex -1. Urdu version of the questionnaire is included as Annex -2.

4.2 COMMUNITY CONSULTATIONS

The feasibility study was carried out by Pakistan Engineering Services (PES) and the Environmental Impact Assessment was a part of the Feasibility Study Report. A conceptual design was proposed in the feasibility study and by following the layout of the project the environmental team from PES visited the site. The team consulted with the local community and after the consultation they assessed and identified the stakeholder (affectees) who will be affected by the land acquisition due to the project implementation.

Community consultation process was started at an early stage in the project cycle. This ensures that feedback from communities and other stakeholders directly or indirectly affected by the project can be used to adjust and improve the project's design, planning, and implementation and help structure the project to be both environmentally and socially acceptable. The consultants held meetings with primary stakeholders to assess any potential issues that could be raised due to the project activities. The survey team visited five villages in total that may be affected from the activities of the proposed project. During these

consultations a simple, non-technical description of the project was given, along with an overview of the project's likely human and environmental impacts.

Following the project description, detailed discussions were held so that the participants could voice their concerns and opinions. These concerns and suggestions were recorded in field notes.

Apart from consultations with the local community, consultations with concerned public representatives and officials of the relevant line government departments were also held. The details of community consultations showing names of participants are given in the Table 4.1.

Table 4.1: Participants of Meetings held for Information Disclosure and Community Consultation in 2006 and 2010

Sr. No.	Date	Name of Participants	Professions	Topics Discussed
Venue: Village Thori, Muzaffarabad				
1.	02/06/2006	Rifaqat Shah Kazmi S/o Mushtaq Shah Kazmi	Farmer	• Project Benefits in the area • Awareness of the people about the project • Identification of Assets affected • Redress mechanism • Procedure for Land Acquisition • Prevailing prices of land/ trees in the area • Social values of the area • Existing infrastructure in the area • Utility services in the area
		Nazir Awan S/o Mir Zaman	Mason Worker	
		Syed Tahir Shah S/o Syed Maqbool Hussain	Farmer	
		Javaid Awan S/o Bashir Awan	Shopkeeper	
		Mehrbaban Shah S/o Imran Shah	Tailor	
		Nazar Shah S/o Nooran Shah	Driver	
		Venue: Village Tarcheela, Muzaffarabad		
2.	03-06-2006	M. Ayub S/o Pir Khan	Farmer	• Project Benefits in the area • Awareness of the people about the project • Identification of Assets affected
		M. Yousaf S/o Sher Zaman	Medical Store	
		Habibur Rehman S/o Faiz Ali	Shopkeeper	

Sr. No.	Date	Name of Participants	Professions	Topics Discussed
		M. Tayyab S/o M. Farid	Farmer	• Redress mechanism • Procedure for Land Acquisition • Prevailing prices of land / trees in the area • Social values of the area • Existing infrastructure in the area • Utility services in the area
		Badar Qureshi S/o Malik Amer	Hotel	
		Noor Zaman S/o Sikandar Khan	Ex. Member UC	
		Qadir Ahmad S/o Noor Amer	Farmer	
Venue: Dedal Meera Village, Abbotabad				
3.	04-06-2006	M. Azhar S/o Mir M. Irfan	Farmer	• Project Benefits in the area • Awareness of the people about the project • Identification of Assets affected
		Khan Owais S/o Gul Zauai	Farmer	
		M. Hussain S/o Safiullah	Farmer	• Redress mechanism • Procedure for Land Acquisition • Prevailing prices of land / trees in the area • Social values of the area • Existing infrastructure in the area • Utility services in the area
		M. Siraj S/o M. Sadiq	Farmer	
		Juma Khan S/o Faqir Mohammad	Farmer	
		Azizur Rehman S/o Sain Mohd	Farmer	
		Ghulam Ali S/o Hassan Ali	Farmer	
Venue: Patrind Village, Muzaffarabad				
4.	05-06-2006	M. Rafique S/o Hassan Ali	Ex. Member UC	• Project Benefits in the area • Awareness of the people about the project • Identification of Assets affected • Redress mechanism • Procedure for Land
		M. Nizahat S/o M. Rafique	Farmer	
		Qaiser Hussan S/o M. Hassan	Farmer	

Sr. No.	Date	Name of Participants	Professions	Topics Discussed
		M. Saleem S/o Sikandar	Farmer	Acquisition - Prevailing prices of land / trees in the area - Social values of the area - Existing infrastructure in the area - Utility services in the area
		Oarang Zeb S/o Jumma Khan	Farmer	
Venue: Deedal Meera Village, Abbottabad				
1.	31-03-2010	Mr. Muhammad Kabir s/o M. Bashir	Student	- Project Benefits in the area - Awareness of the people about the project - Identification of Assets affected - Redress mechanism - Procedure for Land Acquisition - Prevailing prices of land/ trees in the area - Social values of the area - Existing infrastructure in the area - Utility services in the area
2.		Mr. Muhammad Sabir s/o Abdul rashid	Mason Worker	
3.		Hagi Gul Zaman s/o M. Faqeer	Farmer	
4.		Mr.Muhammad Bashir s/o M. Yasin	Mason Worker	
5.		M. Shafi s/o M. Maskeen	Tailor	
6.		M.Khan vaiz s/o M. Gul Zaman	Driver	- Social values of the area - Existing infrastructure in the area - Utility services in the area
7.		M. Nazir s/o Waris Ali	Cook	
8.		M Akseer s/o Waris Ali	Shopkeeper	
9.		M. Suleman s/o Matwali	Farmer	
10.		M. Nazakat s/o Ameer Rehman	Shopkeeper	
11.		M. Pervez s/o M. Maskeen	Farmer	
12.		Rafiat Hussain s/o Amir Khan	Student	
13.		Shah Mohammad s/o Hyder	farmer	
14.		M.Tanveer s/o M. Bashir	Farmer	
Venue: Boi Village, Abbottabad				
1.	31-03-2010	Mr. Fayyaz Ahmed	Shopkeeper	Project Benefits in the area

Sr. No.	Date	Name of Participants	Professions	Topics Discussed
2.		s/o Ali Khan		• Awareness of the people about the project
3.		Mr. Barkat Nawaz s/o M. Akber M. Shafeer s/o Aziz ur Rehman	Medical Store Shopkeeper	• Identification of Assets affected • Redress mechanism
4.		Dayar Khan s/o Qutbuddin	Rtd. Lineman WAPDA	• Procedure for Land Acquisition
5.		M, Irshad s/o Lal Khan	Hotel	• Prevailing prices of land / trees in the area
6.		Khan Awais s/o Gul Zai	Farmer	• Social values of the area
7.		Juma Khan s/o Faqir Muhammad	Farmer	• Existing infrastructure in the area
8.		M Siraj s/o M Sadiq	Farmer	• Utility services in the area
9.		Jamil ur Rehman s/o Khalil ur Rehman	Driver	
Venue: Patrind Village, Muzzaffarabad				
1.	1-04-2010	Mr. Gul Hassan s/o Nadir Ali	Farmer	• Project Benefits in the area
2.		Mr. Abdul Aziz s/o Fateh Ali	Farmer	• Awareness of the people about the project
3.		Mr. Abdul Rashid s/o Faqir Mohammad	Farmer	• Identification of Assets affected • Redress mechanism
4.		Mr. Ali Rehman s/o M. Zaman	Farmer	• Procedure for Land Acquisition
5.		Mr. M Hassan s/o Qalander Khan	Farmer	• Prevailing prices of land / trees in the area
6.		Mr. Shabir s/o Ali Zaman	Farmer	• Social values of the area
7.		Mr. Pir Khan s/o M. Khan	Farmer	• Existing infrastructure in the area
8.		Mr. Ali Khan s/o M. Khan	Farmer	• Utility services in the area
9.		M. Abdul Razaq	Farmer	

Sr. No.	Date	Name of Participants	Professions	Topics Discussed
10.		s/o M. Khan		
		Mr. M. Azeem	Farmer	
11.		s/o Khairullah		
		M. Jan s/o Abdul Ghafoor	Farmer	
12.		Mr.M.Yusuf s/o Zafar Ali	Farmer	
Venue: Tarcheela Village, Muzzaffarabad				
1.	01-04-2010	Noor Zaman	Ex.Member Union Council	• Project Benefits in the area • Awareness of the people about the project • Identification of Assets affected • Redress mechanism • Procedure for Land Acquisition • Prevailing prices of land / trees in the area • Social values of the area • Existing infrastructure in the area • Utility services in the area
		s/o Sikander Khan		
2.		Mr. Muhammad Riaz	Farmer	
		s/o Gul Zaman		
3.		Mr. M. Ghulab	Farmer	
		s/o Gul Zaman		
4.		M. Yousuf	Farmer	
		s/o Sher Zaman		
5.		M. Ayoub	Farmer	
		s/o Pir Khan		
6.		Mr. Ashraf	Farmer	
		s/o Gohar Rehman		
7.		Mr. M Javaid	Farmer	
		s/o M. Suleman		
8.		Mr. M. Zaman	Farmer	
		s/o Ali Zaman		
9.		Mr. Haroon	Farmer	
		s/o Gohar Zaman		
10.		Mr. qadir Ahmed	Farmer	
		s/o Noor Amer		
11.		Mr. Malik Awan	Farmer	
		s/o Gul Zaman		
12.		Hameed s/o Gul Zaman	Farmer	
13.		Mr. Anwar	Farmer	

Sr. No.	Date	Name of Participants	Professions	Topics Discussed
		s/o Ali Zaman		
Venue: Alora Village, Muzzaffarabad				
1.	02-04-2010	Mr.M. Farooq	Govt. Employee	- Project Benefits in the area - Awareness of the people about the project
2.		Mr.Sadaqat Saleem	Govt. Employee	
3.		s/o M. Saleem Mr. M. Aslam s/o Samandur Khan	Govt. Employee	
4.		Mrs. Raisham Jan w/o M Maskin	House Wife	- Identification of Assets affected - Redress mechanism - Procedure for Land Acquisition - Prevailing prices of land / trees in the area - Social values of the area - Existing infrastructure in the area - Utility services in the area
5.		Mr. M. Pervez s/o M. Suleman	Govt. Employee	
6.		Mr. M. Ashraf s/o Ghulam Ali	Buisness	
7.		Mr. M. Akber s/o Mehar Ali	Buisness	
8.		Mr. Abdul Qayyum s/o Mehar Ali	Govt. Employee	
9.		Mr. M. Nawaz s/o Samunder Khan	Govt. Employee	
10.		Mr. Sarfaraz Khan s/o Essa Khan	Revenue clerk	
11.		Mr. M. Maskin s/o Saif Ali	Buisness	
12.		Mr. Tanveer Ahmad s/o Abdul Rashid	Buisness	
13.		Mr, Mahwali s/o Faqir Muhammad	Govt. Employee	

4.2.1 Outcome of Consultations

During session held for information disclosure and community consultation, the overall response from the project area population was positive. Everyone welcomed the project as being beneficial to the region. Among the major topics which came up for discussion included the following.

- **Community Concerns**

During scoping sessions it has been observed that more than 95% of participants did not express any objections to implementation of the proposed project only a small minority expressed some apprehensions about compensation payment.

- **Land Acquisition**

Generally community apprehensions pertained to the land and houses to be acquired for the project implementation. They expected project authorities to pay them timely compensation on the basis of current market prices.

- **Employment**

The participants emphasized the need to ensure the appointment of locals in all non-technical and support services through a transparent process. They demanded that during operation stage of the project employment should be given to the locals.

- **Project Benefits**

Local community also expressed the opinion that the project should be designed in a manner that all people including the poor should be benefited from the project like availability of electricity, establishment of schools and health clinics.

- **Traffic Hazards**

The participants of the public consultations expressed concerns over the safety hazards that could result from the increase in the roadside traffic particularly during the construction phase of the project. Traffic will produce heavy noise affecting the environment of the area. Participants emphasized to evolve realistic noise management plans to curtail its impact on rural community. In order to pre-empt roadside accidents of both humans and animals, a traffic alert system like guards and traffic signs should be available before the construction starts.

- **Cooperation of the Project Sponsors**

The participants expressed that the project proponents should maintain and encourage a cooperative attitude towards the community paying due attention to their concerns arising out of project implementation.

4.2.2 Meetings with Officers of the Government Departments

Offices of the government and NGO's were visited. They were apprised of the project by sharing available information with them. These include Departments of Wildlife, Fisheries, Forest, Health and Agriculture in Muzaffarabad and Abbottabad. Representatives of NGOs like WWF and Sungi were also contacted in these cities. Published information relating to the project area was collected. This included literature on forests, fisheries, wildlife, geology, landforms, landuse, climate, water resources and district census reports. Record of meetings with relevant Government Department Officers is given in Table 2.2.

Table 4.2: Record of Meetings with Relevant Governments Officers

Date	Place	Organisation / Person Consulted Position	Reason for visit Topics discussed
03-06-06	Muzaffarabad	Wildlife and Fisheries Division Shiekh Altaf Fisheries Development Officer	General situation of wildlife in the project area, minimal ecological flow, Fisheries in the project area
03-06-06	Muzaffarabad	Wildlife and Fisheries Department Syed Rashid Hussain Assistant Director Fisheries	General situation of wildlife in the project area, minimal ecological flow, Fisheries in the project area
04-06-06	Muzaffarabad	Protected Areas Management Project, Machiara National Park Naeem Iftikhar Dar Project Manager	Protected areas, Wildlife in Project Area, Wildlife protection measures
05-06-06	Abbottabad	Hazara Wildlife Division M. Hussain Khan District Forest Officer	Wildlife in Project Area Wildlife protection measures

Date	Place	Organisation / Person Consulted Position	Reason for visit Topics discussed
		M. Abdullah Range Forest Officer	Forest types / trees
05-06-06	Abbottabad	Hazara Forest Division Rustam Khan District Forest Officer	Forest types / trees Location of forests / pastures Sustainable use of forests by community
06-06-06	Muzaffarabad	Local Govt. and Rural Development Department Babar Minhas Assistant Director Environment	Environmental issues, Guidelines etc.
06-06-06 & 02-03-10	Muzaffarabad	P&D Building Secretariat Bashir Qureshi Director General Dr. Syed Asif Shah Secretary P&D and Environment	Legal Framework of AJK Guidelines of AJK
02-03-10 &	Muzaffarabad	Revenue Department Nisar Shah & Gulbaz Revenue Clerk	Role of District Revenue Officer in land acquisition and payment of compensation Redress procedures
03-03-10	Abbottabad	NGO- SUNGI M. Arshad, Mrs. Tahira Awan Community Facilitator	Community awareness about development projects Possible role of SUNGI in Patrind HPP
16-09-10	Muzaffarabad	M. Asad Divisional Forest Officer	Forest types / trees Location of forests / pastures

Date	Place	Organisation / Person Consulted Position	Reason for visit Topics discussed
			Sustainable use of forests by community
16-09-10	Muzaffarabad	Syed Mufassar Gillani Subject Matter specialist, Forest	Forest types / trees Location of forests / pastures Sustainable use of forests by community
16-09-10	Muzaffarabad	Mir Abdul Rehman Forster	Forest types / trees

4.3 PUBLIC HEARING

4.3.1 Public Hearing in Muzaffarabad - AJK

A public hearing meeting was held on August 05, 2010 in Muzaffarabad, AJK under the requirement of EPA – AJK. The meeting was attended by about 150 participants including legislator of AJK Assembly, Senior Govt. Officers, Union Council Nazims, NGOs and Civil Society Members as well as project affectees. List of participants is appended as Annexure-3. Photographs of the public hearing are placed at the end of this report.

4.3.2 Minutes of the Public Hearing at Muzaffarabad

Main points/minutes of the Public Hearing held at Sangam Hotel Muzaffarabad Azad Jammu & Kashmir:

Date of Hearing: 5th August 2010

Time of Hearing: 1000hrs – 1330hrs

AJ&K Representation:

Mr. Bashir Khan (Director EPA)

Mr. Samiullah (Secretary P&D)

Mr. Shafiq Abbasi (Assistant Director EPA)

Mr. Farooq Hyder Khan

Mr. Muhammad Haneef (Member Assembly)

SHPL Representation:

Mr. Farrukh Javed (CEO)

Mr. No Hyuk Park (GM Civil)

Mr. Ali Shan (GM Admin & HR)

Mr. Ahmed Mufeez Sadiq (Commercial Manager)

Mr. Atif Ali Shah (Manager Civil)

PES Representation:

Dr. Nawaz Tariq (Environmental Expert)

Mr. Naeem Akhtar (Environmentalist)

Minutes of the Meeting:

1. The meeting started with recitation of Holy Quran.
2. Mr. Shafiq Abbasi started the proceeding with a welcome note and explained the audience regarding the legal requirements of the public hearing under the relevant sections of environmental law.
3. Mr. Abbasi briefed the participants about the basic features of Patrind Hydropower Project.
4. Mr. Abbasi invited CEO to present the project features, benefits and impacts before the audience.

CEO briefed in detail all the aspects of the project from development to operation phase. The presentation and brief of the project were prepared in local language (Urdu) for better understanding of all the stakeholders.

In the presentation CEO addressed the issues raised by the locals after the publication of the advertisement in the newspapers.

a) Protection of the Graveyard

CEO told the participants that this is our cultural and religious issue and the company will take all necessary actions to protect the sensitive areas.

b) Free Electricity

CEO told the audience that the power distribution is responsibility of Power Purchaser (NTDC) and our generation despatch is on 132 KV line, so this is not possible for the company.

c) Development of roads, schools, colleges and hospitals for the locals

CEO told that under the social uplift plan the company is planning to

establish a medical clinic for the locals in the project area under the KOICA project. In addition the company is willing to facilitate the Govt. of AJ&K in capacity building of the locals. Roads which fall in the project area and used by the company will definitely be improved.

5. After the completion of detailed briefing by CEO Mr. Abbasi invited the participants for their questions/reservations/suggestions.

During the Q&A session following issues were raised.

- i. Mr Iftikhar Awan a local resident asked that in Muzaffarabad there is only one children park for the local community at Lower Chattar. The project company is planning to take over the Park during construction what will happen to it after wards any plans of its development?

CEO of SHPL detailed that after end of construction phase a state of the art park like Japanese Park in Islamabad will be developed for children with much better facilities than the existing one and the people of Muzaffarabad will definitely feel proud.

- ii. Mr Farid enquired that the spring flows would be affected by the construction of the Tunnel in Patrind and also for the flows on the downstream of the weir in winter season.

CEO replied that the tunnel is concrete and steel lined so there will be no chance that the water from the springs can enter in to the system only water can enter the tunnel will be from the intake. In this regard people need not to worry for the flow of spring water. On the other issue of downstream flow CEO again informed that 2 cumecs of the flow will be discharged throughout the year and on the downstream there is no consumptive use by the locals.

- iii. Mr Noor Zaman a resident of Tarcheela told the audience that the company is working in the area from last 5 years and we are facilitating them and will facilitate them in future as well. Furthermore, he demanded that:

- a) Permanent employment should be given to the affectees

CEO replied that suitable/capable locals will be given preference in the employment

- b) The compensation package should be equivalent to the rates as in Muzaffarabad city

CEO told that the compensation package will be prepared in consultation with the Revenue Department of Muzaffarabad and the affectees

- c) Proper arrangement should be there for the privacy of the residents specially the women in the area

CEO told that this issue will be given high importance

- d) Proper water supply scheme should be developed for the use of the residents and the company staff

CEO told Mr. Zaman that during his last visit to the site he has already satisfied the locals that proper arrangement will be made for this issue

- e) Disturbance for the locals during the construction regarding the Noise and Dust

CEO replied that now-a-days the technology has developed significantly and the procedures are done in such a way to minimize the noise and dust issues, but the contractor has also promised and will ensure the control on the above said issues.

- iv. In addition to above he enquired about the height of the weir that if the weir height is 42 meters from the normal water level then the villages will be submerged.

CEO replied that the weir height is 42 meters from the foundation of the weir to the level of the bridge, in actual it will be about 26 meters high as in feasibility study and not a single house will be submerged/affected due to the storage.

- v. A professor from the Zoology Department of University of AJ&K asked about the mitigation measures regarding the birds and aquatic life. He further enquired about the disposal of the excavated material.

Dr. Nawaz Tariq explained that there are no such species in the project area, this issue has already been mentioned in the EIA in very much detail and the same question was also answered during the presentation to EPA AJ&K. He further explained that the disposal sites have already been identified in the EIA report.

CEO added that together with the proposed disposal sites in EIA Report, the company in consultation with the EPA will decide the sites for the disposal of the material.

- vi. Mr. Saleem, resident of Tarcheela asked that the compensation package should be reasonable and water supply scheme should be developed for the locals.

In addition to above he demanded that if the area to be acquired separates the land in two or three portions and the company is planning to acquire only the central part then what will happen with the remaining area because it will be of no use or very difficult to manage, so the company should acquire whole of the

land of that owner.

CEO replies that the process of land acquisition will definitely address this issue.

- vii. Mr. Sarfaraz Khan, resident of village ALDA handed over his demands in writing. (Letter attached)

In addition he suggested that the bridge across River Jhelum may be shifted downstream.

CEO replied that he will visit the site and look in to the matter but he also mentioned that changing the location or the design is the responsibility of the EPC Contractor and it may be difficult to change the location at this stage.

In addition to all the queries CEO added that by constructing the bridge across the Jhelum river and on the weir side on Kunhar river will definitely enhance the accessibility of the locals and will boost the real estate as well.

After the Q&A session the AJ&K participants addressed the audience and requested that this project is of national importance so the people of Muzaffarabad should facilitate the company in all the manners as the people of AJ&K always do.

Furthermore, the officials also told the locals that Govt. of AJ&K will protect the rights of the affectees. According to the laws, the No Objection Certificate (NOC) will have the conditions for the project company to fulfill all the requirements under the Environmental Law and commitments made by the company, if the company fails to fulfill the requirements the NOC can be withdrawn at any time.

In the end Director EPA on behalf of Govt. of AJ&K appreciated the efforts of the project company for investing in AJ&K and its seriousness for the implementation of Patrind Hydropower Project.

He addressed the audience and motivated them that this project is very important for the country in this period of electricity shortage and is one of the best environmentally viable project.

Lastly he thanked CEO SHPL, his team and especially Korean friends for coming all the way to Muzaffarabad for this occasion.

4.4 CLEAN DEVELOPMENT MECHANISM (CDM) PUBLIC MEETING

4.4.1 CDM Stakeholders Meeting Muzaffarabad

A public meeting was held on September 27, 2010 in Muzaffarabad to discuss the CDM issues with the stakeholders. The meeting was attended by the local people and EPA Officials. List of participants and photographs of the meeting are attached at the end of the report.

4.4.2 Minutes of the Stakeholder Meeting for CDM at Muzaffarabad

Please find below main points/minutes of the Public Hearing held at Sangam Hotel Muzaffarabad Azad Jammu & Kashmir:

Date of Hearing: 27th September 2010

Time of Hearing: 1000hrs – 1500hrs

AJ&K Representation:

Mr. Mohammad Ahsan (Director EPA)

Mr. Shafiq Abbasi (Assistant Director EPA)

Mr. Arshad Iqbal (Assistant Director EPA)

Mr. Javed Ayub (Director Wildlife and Fishries)

Hagler Bailly Pakistan Representation:

Mr. Manzar Naeem Qureshi (Manager Energy Programmes)

SHPL Representation:

Mr. Won-Cheol Park (DCEO)

Mr. Ali Shan (GM Admin & HR)

Mr. Sohail Alam (Finance Manager)

Mr. Atif Ali Shah (Manager Civil)

Mr. Abdul Wahab (Accounts Executive)

Minutes of the Meeting:

1. The meeting started with recitation of Holy Quran.
2. Mr. Ali Shan started the proceeding with a welcome note and thanked the guests for attending the meeting.

4.4.3 Presentation on Project Overview by SHPL

3. Mr. Ali Shan made a presentation on overview of Patrind Project, its sponsors and the EPC Contractor. He briefed the participants about the basic features of Patrind Hydropower Project.
4. He also stressed that although this is a hydropower project but it is quite different from the other hydropower projects under operation in Pakistan like Terbela and Mangla. He informed that both these projects are storage type projects while Patrind hydropower Project is a run-of-river

project and not much area will be submerged because of the storage behind the weir.

5. Mr. Ali Shan also explained the purpose of the meeting to the participants by differentiating the stakeholder meeting for CDM from the Public hearing of EIA which was held on 5th August 2010.
6. He informed the participants that the bridge across the Jhelum river shall be permanent and will be utilized by the company and the locals as well which will be a highly beneficial for the local residents of village ALDA. He shared that by constructing the bridge the life of the locals will be changed because of the fact that there will be a major development in this area and the village will become a part of the city Muzaffarabad.
7. SHPL also showed its commitment towards environmental compliance and stressed upon the importance of the trees and other environmental and social aspects. Mr. Ali Shan explained the participants that the number of trees given in the presentation and in the EIA can be changed after the detail survey from the forest department and all of them will not be cut down, only few will be removed because of construction of roads. The trees will also be planted during the annual tree plantation campaign arranged by the provincial governments annually.
8. SHPL ensured that graveyards, mosques and schools shall be protected as also been committed in the public hearing, in relation to this matter a survey was also conducted by the consultants (PES) in presence of the local residents and was confirmed that no cultural heritage is being damaged by the head pond.

4.4.4 Presentation on CDM by HB

After completion of the presentation by Mr. Ali Shan he invited Mr. Manzar Naeem Qureshi for the presentation on CDM.

9. Mr. Manzar introduced himself and thanked the public for showing up in the consultative stakeholder meeting.
10. Mr. Manzar again clarified the confusion between Public Hearing and CDM Stakeholder meeting. He explained that it is a mandatory requirement of UN for explaining and sharing the benefits of CDM with the Stakeholders.
11. Mr. Manzar started the presentation by explaining green house gases effects in a very simple manner to the general public, he further elaborated impacts of green house gases on the Ozone layer.
12. He also explained the negative effects of CO₂ and other gases due to increased industrialization and related commercial activities. He further added that due to above reasons global warming, change in weather, rise in sea level and health hazards are on rise.
13. He also introduced the role of UNFCCC and history of Kyoto Protocol with

respect to clean development mechanism.

14. He informed the audience that Pakistan ratified the Kyoto Protocol on January 11, 2005.
15. Mr. Manzar explained about the CERs which is a measuring unit for emission reduction. He stressed upon the fact that the CERs should get the real and measurable benefits to the community where project has to be developed.
16. In addition he told that whole CDM process has to be verified by a third party for Kyoto Protocol compliance.
17. He shared the reasons behind the preference of thermal over hydel projects in Pakistan due to less upfront cost in developing such projects.
18. He informed that according to the CDM criteria the projects are classified as regular size projects such as Patrind and small size projects which are less than 15 MW in capacity.

4.4.5 Question and Answer session

After the completion of presentation Mr. Manzar invited the audience for the comments, questions and suggestions.

- i. Director EPA-AJK specifically asked about the difference between CDM and International Emission Trading

Mr. Manzar explained that International Emission Trading can be conducted independently by two companies anywhere in the world while in case of CDM there is a standardize mechanism needs to be followed according to the standards of UNFCCC.

- ii. Mr. Javaid from Wildlife and Fisheries Department asked the question that what is more favorable among thermal, hydel and nuclear from CERs point of view.

Mr. Manzar replied only hydel, nuclear and wind power projects come under CDM regime, while fuel/thermal based projects can only be considered if they become efficient and result in emission reduction.

- iii. Mr. Shafiq Abbasi from EPA AJK put an important question with relation to Additionality concept in CDM.

Mr. Qureshi in very detail and comprehensive manner elaborated the concept of Additionality to the audience. He argued that non conventional projects to be considered for CDM. He also gave an example of Nepal where these kind of run-of-the-river projects are very common and therefore could not be considered Additional by CDM Executive Board. Conversely in Pakistan such projects are still not common and therefore

stand as strong candidates to enjoy benefits of CDM.

- iv. Director EPA Mr. Ahsan asked question that as too many hurdles and requirements are in place in CDM projects implementation. Why don't we go for other projects like coal projects which is available in abundance in Pakistan.

Mr. Manzar replied that only non typical projects such as run-of-the-river are not common in Pakistan therefore such barriers in implementing these projects would not be much difficult as in other countries.

- v. Mr. Shafiq Abbasi from EPA AJK put a question if project is being financed by strong sponsors and world renowned lenders then why CDM revenues are needed?

Mr. Qureshi explained that lenders make sure CDM is being followed by project developers. He further clarified if two projects are under consideration they have to opt for that which follows CDM.

- vi. Mr. Abbasi asked whether the CDM revenues will be the part of debt amount coming from lenders or not.

Mr. Manzar told that these revenues are over and above from the project financing amount.

- vii. Director EPA Mr. Ehsan asked about the beneficiary of the CDM revenues.

Mr. Qureshi elaborated that according to the CDM criteria the revenues will be shared with the project proponent. Indirect way it will help the country in shape of foreign exchequer. He further added that according to the Pakistan prevailing Power Policy these revenues will be shared between the project proponents and the power purchaser.

- viii. Director EPA asked about the duration of CERs revenue?

Mr. Manzar explained there are two options available. First is one time commitment period of 10 years while the other option is 7 years term recurring 3 times.

- ix. Director EPA Mr. Ahsan asked will the project require NOC from EPA for CDM.

Mr. Qureshi replied that NOC from both the EPAs (AJK and KP) is a pre-requisite for CDM.

- x. Mr. Javaid Ayub from Forest Department pointed out that no poverty alleviation plan mentioned in EIA which requires company's consideration. In addition he also pointed out that no baseline survey on fisheries has been conducted and the sponsor should conduct this survey

on fisheries.

Mr. Ali Shan replied that community development plan is under consideration and will be finalized with the help of government authorities.

On the question of baseline data on fisheries Mr. Atif informed that the baseline survey of fisheries is being conducted by the consultants (PES) and will be completed by the end of next month so will be available if and when required.

- Xi Noorzaman Qureshi resident of village Tarchela told that only verbal commitments have been made by the company which we expect to be honored. Also a public park on Tarchela side is demanded for entertainment of the locals. He further demanded that technical college should be established by the company.

Mr. Ali Shan answered that these issues will be discussed with the higher management.

- xii. Mohammad Shabir from Patrind village raised the question that the name of project in Urdu should be written correctly. He asked about the construction start and end date.

Mr. Ali Shan told that the construction is going to start in next month. While total construction time is 48 months from the Financial Close date.

In the end Director EPA on behalf of Govt. of AJ&K appreciated the efforts of the project company for investing in AJ&K and its seriousness for the implementation of Patrind Hydropower Project. He further thanked Mr. Qureshi for sharing knowledge on CDM in a very comprehensive and simplistic manner.

He addressed the audience and motivated them that this project is very important for the country in this period of electricity shortage and is one of the best environmentally viable project. He in addition informed the locals that the NOC which has been issued to the company is only for environmental compliance which does not cover the land purchase issues. This matter will be addressed by the Revenue Department of Muzaffarabad.

Lastly Mr. Ali Shan thanked all the participants for attending the meeting.

Table 4.3: List of Participants for CDM Stakeholders Meeting held on September 27, 2010 in AJK

Sr. No.	Name	Address
1	Muhammad Shafique Abbasi (AD AJK-EPA)	AJK-EPA, P&D Kashmir Plan House Muzaffarabad.
2	Javed Ayub (Director Wildlife & Fisheries)	Block F, Room No. 1, Ground Floor New Distt. Complex Muzaffarabad. AJK.
3	Arshad Iqbal (Assistant Director AJK)	AJK-EPA Muzaffarabad.
4	Tanveer Ahmed	Village Allrah, Muzaffarabad.
5	Ahmed Hussain Shah	
6	Sarfaraz Abbassi	Bamaqam Alrah
7	Muhammad Aslam	Bamaqam Alrah
8	Noor Zaman Qureshi	Tarcheela
9	Riazat Khan	Tarcheela
10	Haider Zaman	Tarcheela
11	Mir Shabbir Qureshi (Secretary General, Bright Future Society)	Patrind
12	Ahsan Qureshi	Tarcheela
13	Ali Rehman	Tarcheela
14	Muhammad Shabbir (President, Bright Future Society.)	Patrind
15	Rashid	Muzaffarabad
16	Abdul Rauf	Tarcheela
17	Abid Ali	Tarcheela
18	Zaheer Abbas	Alrah
19	Muhammad Murad Hussain	Tarcheela, Patrind

Sr. No.	Name	Address
20	Muhammad Ramzan Qureshi	Tarcheela, Patrind
21	Muhammad Naseem Qureshi	Tarcheela, Patrind
22	Habib-ur-Rehman	Tarcheela
23	Zaheer Qureshi	Sund Gali, Dobail
24	Ishaq Chaudhry	Garhi Dupatta
25	Gul Khatab	Garhi Dupatta, Noor Garan
26	Noor Ahmed Meer	Amboor Camp
27	Muhammad Abbas Abbasi	Alrah
28	Shakeel Azam	Sund Gali
29	Muhammad Parvez	Village Soran
30	Muhammad Munsif	Soran
31	Raja Naseem	Chattar
32	Kala Khan	Hassan Abad
33	Muhammad Parvez	Alrah
34	Faisal Ashraf	Alrah
35	Sohail Ahmed	Alrah
36	Muhammad Asghar	Sund Gali
37	Muhammad Adeel	Tarcheela
38	Muhammad Asim	Tarcheela
39	Saien Muhammad Qureshi	Tarcheela
40	Rizwan Qureshi	Tarcheela
41	Abid Qureshi	Sund Gali
42	Javed Qureshi	Alrah
43	Akhtar Haider Qureshi	Alrah
44	Muhammad Riaz Qurehsi	Tarcheela, Patrind
45	Abdul Haseeb Ahsan	Tarcheela, Patrind
46	Gulrez Qureshi	

Sr. No.	Name	Address
47	Muhammad Azam	
48	Qadeer Ahmed	Tarcheela, Patrind
49	Tariq	Tarcheela
50	Muhammad Tayyab Qureshi	Tarcheela
51	Muhammad Javed	Tarcheela
52	Aurangzeb	Hassanabad, Alrah
53	Nisar Ahmed S/o Muhammad Ashraf	Alrah
54	Waqar Ahmed S/o Muhammad Ashraf	Alrah
55	Muhammad Aslam	Dhani
56	Muhammad Arif Abbas	Dhani
57	Naseer Ahmed	Dhani
58	Raja Muhammad Javed Iqbal Khan	Nala Sahai
59	Abid Nazir Kiani	Naran Sharif
60	Zahid Aziz	Wadi Liah
61	Rashid Qureshi	Alrah
62	Tanveer Abbasi	Alrah
63	Muhammad Aslam Abbasi	Alrah
64	Syed Husnain Bukhari	AJK University
65	Muhammad Saeed	Soran
66	Mazhar Qureshi	Tarcheela
67	Irfan Ahmed	Tarcheela

4.5 CDM STAKEHOLDERS MEETING AT BARBEIN - KP

Date of Hearing: 28th September 2010

Time of Hearing: 1000hrs – 1500hrs

KP Representation:

Mr. Noman Rasheed (Assistant Director, EPA - KP)

Mr. Naveed Anjum (Monitoring Inspector, EPA – KP)

Mr. Abrar Ahmed (Monitoring Inspector, EPA – KP)

Hagler Bailly Pakistan Representation:

Mr. Manzar Naeem Qureshi (Manager Energy Programmes)

SHPL Representation:

Mr. Ali Shan (GM Admin & HR)

Mr. Sohail Alam (Finance Manager)

Mr. Atif Ali Shah (Manager Civil)

Mr. Abdul Wahab (Accounts Executive)

4.5.1 Minutes of the Meeting:

Main points/minutes of the Consultative Stakeholders Meeting for CDM held at Barbein village, Iqra Model High School, Boi Road, Gari Habibullah, Khyber Pakhtunkhwa:

1. The meeting started with recitation of Holy Quran.
2. Mr. Ali Shan started the proceeding with a welcome note and thanked the guests for attending the meeting.

4.5.2 Presentation on Project Overview by SHPL

3. Mr. Ali Shan made a presentation on overview of Patrind Project, its sponsors and the EPC Contractor. He briefed the participants about the basic features of Patrind Hydropower Project.
4. He also stressed that although this is a hydropower project but it is quite different from the other hydropower projects under operation in Pakistan like Terbela and Mangla. He informed that both these projects are storage type projects while Patrind hydropower Project is a run-of-river project and not much area will be submerged because of the storage behind the weir.

5. Mr. Ali Shan also explained the purpose of the meeting to the participants by differentiating the stakeholder meeting for CDM from the Public hearing of EIA which was held on 5th August 2010.
6. He informed the participants that the bridge across the Jhelum river shall be permanent and will be utilized by the company and the locals as well which will be a highly beneficial for the local residents of village ALDA. He shared that by constructing the bridge the life of the locals will be changed because of the fact that there will be a major development in this area and the village will become a part of the city Muzaffarabad.
7. SHPL also showed its commitment towards environmental compliance and stressed upon the importance of the trees and other environmental and social aspects. Mr. Ali Shan explained the participants that the number of trees given in the presentation and in the EIA can be changed after the detail survey from the forest department and all of them will not be cut down, only few will be removed because of construction of roads. The trees will also be planted during the annual tree plantation campaign arranged by the provincial governments annually.
8. SHPL ensured that graveyards, mosques and schools shall be protected as also been committed in the public hearing, in relation to this matter a survey was also conducted by the consultants (PES) in presence of the local residents and was confirmed that no cultural heritage is being damaged by the head pond.

4.5.3 Presentation on CDM by HB

After completion of the presentation by Mr. Ali Shan he invited Mr. Manzar Naeem Qureshi for the presentation on CDM.

9. Mr. Manzar introduced himself and thanked the public for showing up in the consultative stakeholder meeting.
10. Mr. Manzar again clarified the confusion between Public Hearing and CDM Stakeholder meeting. He explained that it is a mandatory requirement of UN for explaining and sharing the benefits of CDM with the Stakeholders.
11. Mr. Manzar started the presentation by explaining green house gases effects in a very simple manner to the general public, he further elaborated impacts of green house gases on the Ozone layer.
12. He also explained the negative effects of CO₂ and other gases due to increased industrialization and related commercial activities. He further added that due to above reasons global warming, change in weather, rise in sea level and health hazards are on rise.

13. He also introduced the role of UNFCCC and history of Kyoto Protocol with respect to clean development mechanism.
14. He informed the audience that Pakistan ratified the Kyoto Protocol on January 11, 2005.
15. Mr. Manzar explained about the CERs which is a measuring unit for emission reduction. He stressed upon the fact that the CERs should get the real and measurable benefits to the community where project has to be developed.
16. In addition he told that whole CDM process has to be verified by a third party for Kyoto Protocol compliance.
17. He shared the reasons behind the preference of thermal over hydel projects in Pakistan due to less upfront cost in developing such projects.
18. He informed that according to the CDM criteria the projects are classified as regular size projects such as Patrind and small size projects which are less than 15 MW in capacity.

4.5.4 Question and Answer session

After the completion of presentation, Mr. Ali Shan from SHPL and Mr. Manzar invited the audience for the comments, questions and suggestions.

- i. Mr. Mohammad Iqbal, a resident from Deedal Meera complained that the meeting should have been conducted in Deedal village as it is closer to weir site and the number of affectees is more than in Barbein village.
- ii. He also pointed out that villagers from Deedal want to know exact number of affectees and what plan is in place for managing affectees by SHPL.
- iii. The last point by Mr. Iqbal was that the Project Company should take in to confidence the residents of nearby villagers as not much plan and details of the construction have been shared by the Company.

Mr. Ali Shan explained that first he looked for such place in Deedal village but due to lack of availability of plain land and corn crop was not harvested, no such place was available. Also Barbein village is not too far from Weir site either as not more than 500 meters away from Deedal village. He also satisfied the public that Company will send technical advisor's personnel in order to share the exact details and they will elaborate all technical details including rise of water after Weir construction etc.

- iv. A question in relation to amount of water available after construction of Weir was asked by a participant.

Mr. Ali Shan responded that a minimum of 70.6 cusec amount of water shall be available even in low flow season which is considered adequate for usage by the locals.

- v. Another question raised from the Participant was about the scenario that as the current capacity of the Project is 150 MW but what if later on increased by the Project Company and rise in level of water by such

expansion?

Mr. Ali explained that the project feasibility has long been conducted and approved by the Government. As per feasibility study the maximum generation capability is 150 MW so no increase later on can be envisaged and therefore the future expansion is not a practical imagination.

- vi. Mr. Ali ur Rehman from Deedal Meera asked that villagers want to get exact details of how many number of affectees, exact location of submerging areas and part of road shall go under water by constructing the Weir.

The Company informed that as per presentation earlier given to public, only one house will be needed to relocate while no other major structures will be submerged by rise of water. However a survey by our technical advisor is under progress which shall exactly locate the level of water rise and such point will be physically highlighted by various highlighters and colors etc.

- vii. Where the colony and compound for construction staff and personnel would be built?

Mr. Ali Shan told the audience that all staff colonies including staff from Pakistan and Korea shall be built in AJ&K part and therefore people on KP side need not to worry about privacy aspects.

- viii. Mr. Mohammad Siddiq from Deedal Meera also reiterated about taking in to confidence people of the village as lots of insecurities are present amongst them. He asked that whether the Patrind Project is joint ownership of Pakistan and AJ&K?

Mr. Ali Shan explained the sharing of Water Use Charge and also elaborated the Concessionary framework to general public.

- ix. Villagers from Deedal Meera also demanded similar meeting to be held in Deedal Meera. They also demanded that in next meeting, they should be informed about construction details and schedule in addition to exact number of affectees and areas.

- x. A villager, Mr. Malik Iman raised the concern that the proposed location of crushing plant is in populated area and it should be relocated somewhere else.

Mr. Ali Shan explained that the area designated for crushing is not located in populated area so people may need not to worry and should not feel endangered by crushing activity since selection of location has been made after due consideration.

Table 4.4: List of Participants for CDM Stakeholders Meeting held on September 28, 2010 in KP.

Sr. No.	Name	Address
1	Hafiz Adil Ali (Imam Mosque)	Distt. Tehsil Abbotabbad Village
2	Obaid Abdul Latif Awan Dedal Nakka	Barbein
3	Khani Roman Awan	Dedal Nakka
4	Abdul Majeed	Barbein
5	Abdul Latif Chairman Iqra Model School	Barbein
6	Muhammad Mubarak Abbasi	Dalola
7	Khalid Irfan	Deedal
8	Umar Zaheer	Barbein
9	Muhamad Jamil	Barbein
10	Mohsin Latif	Barbein
11	Abdul Waheed	Deedal
12	Muhammad Sajid	Dandi Deel
13	Muhammad Yasir	Deedi Sayyal
14	Muhammad Danish	Deedi Sayyal
15	Muhammad Ijaz Khan	Barbein
16	Shanid Khan	Barbein
17	Syed Gillani	Dhani
18	Alam Zaib Abbadi General Corner Boi	Barbein
19	Jamil Ahmad Sir Syed MPS Barbian	Barbein
20	Waheed Qureshi	Barbein
21	Mir Sarfraz	Deedal
22	Faxal-ul-Rahman	Meera
23	Fiaz Muhammad	Mansehra
24	M. Ahsan (Director AJK EPA)	
25	Jhangir Khan	Sayyan Di Bandi
26	Saeed Ahmad Qureshi	Barbein

Sr. No.	Name	Address
27	Muhammad Ashraf Abbasi	Barbein
28	Muhammad Iqbal Qureshi	Barbein
29	Muhammad Adil	Dedal Meera
30	Haider Zaman	Tarcheel
31	Muhammad Javed	Barbein
32	Haji Khalil-ur-Rahman	Malik Aaman
33	Baji Gull	Sayyan Di Bandi
34		Barbein
35	Khurram Iqbal	Barbein
36	Syed Munir Hussain Shah	Motor Tanki
37	Muhammad Arshaf Awan	Khas Deedal Kamal Garan
38	Muhammad Fiaz Abbadi	Dalola
39	Abdul Qayyum	Bandi Samandar
40	Muhammad Rafiq	Bandi Samandar
41	Ali Khan	Barbein
42	Ghulam Sarwar	Barbein
43	Muhammad Suleman	Barbein
44	Haji Malik Aman	Village Tetrri
45	Mir Qad Zaman	Cholpeed
46	Muhammad Yousaf	Deedal Susrati
47		
48	Muhammad Salim	Barbein
49	Ali Awan	Rahmanabad (Reedal)
50	Nauman rasheed	Asstt. Director
51	Naveed Anjum	Monitoring Officer (PAF)
52	Abrar Ahmad	Monitoring Officer (PAF) Regional Office Abbottabad
53	Syed Riaz Ahmad	Zameendari
54	Nauman Khan	Regional Officer Wild Life Kaghaan

Sr. No.	Name	Address
55	Muhammad Amjad	SDPO Wild Life Mardan C/o Chief Coordinator M/L K.Pur
56	Ehsan Hameed	Village Rabbani
57	Aamir Naeem	Barbein
58	Akhlaq Abbas	Barbein
59	Muhammad Siddique	Sarai
60	Muhammad Shahbaz	Sarai
61	Muhammad Naseem	Village Dhanni
62	Muhammad Salim	Village Sareeq
63	Muhammad Rashid	Village Sarai
64	Muhammad Bashir	Village Deedal
65	Jamil	Barbein
66	Yasin Irm Muhammad Saeed	Dhani
67	Muhammad Arshad	Village Deedal
68	Haji Ghulam Bari	Village Deedal
69	Amanat Hussain	Village Deedal Geera
70	Muhammad Saeed Awan	Village Deedal
71	Muhammad Bashir	Village Deedal
72	Khan Weez	Village Deedal
73	Anwar Khan	Village Deedal
74	Abdur Rasheed	Abdur Rasheed
75	Muhammad Arif	Abdur Rasheed
76	Muhammad Atique	
77	Khabir Ahmad	Village
78	Muhammad Saddique Deedal	Village Deedal
79	Zubair Shabbir	Deedal
80	Naseer	Deedal Nady
81	Taufeeq	Dalola
82	Muhammad Junaid	Meera
83	Abdul Qadeer Abbas	Dalola Mohallah Faridabad
84	Wajid Hussain	Deedli Thelee

Sr. No.	Name	Address
85	Muhammad Iqbal	Barbein
86	Muhammad Sadiq	Deedal
87	Muhammad Adil	Barbein
88	Ammad Ali	Barbein
89	Muhammad Naseem	Narjhela Tareend
90	Asad	Narjhela Tareend
91	Ishtiaq	Narjhela Tareend
92	Ashfaq Abbasi	Barbein
93	Habib Gillani	Dhani
94	Madar Khan Shah	Tangi
95	Abdul Aqeeb	Zeeda
96	Ali Maroon	Pal
97	Muhammad Azeem Khan	Deedal
98	Aurangzeb	Sarai Deedal
99	Abdur Rahman	Sarai
100	Muhammad Azeem S/o Ali Khan	Deedal
101	Muhammad Saeed	Deedal
102	Mir Adil S/o Bashir	Deedal
103	Amaad S/o Alimarda	Sarai
104	Faizan S/o Shabir	Sarai
105	Muhammad Shafi Sadiq S/o Muhammad Miskeen	Motri Gagan
106	Muhammad Zaman S/o Gul Zaman	Bandi Kassi
107	Muhammad Tanveer S/o Bashir Ahmad	Mohri
108	Abdul Qayyum Wazir Gull Zaman	Deedal Meera
109	Satha Ali Khan	Deedal Nakar
110	Muhammad Sharif	Deedal Maks
111	Muhammad Suleman	Deedal Meera
112	Muhammad Majeed	Deedal Meera
113	Muhammad Azeem	Deedal Naroka
114	Abdur Razzaq	Sarai
115	Muhammad Sajjad	Sonetti

4.6 PUBLIC CONSULTATION AND DISCLOSURE PLAN DURING CONSTRUCTION AND OPERATION PHASE

4.6.1 Information Disclosure

In promoting transparency and accountability, the Company will continue to provide relevant information to the stakeholders in a timely manner in a form and language that are understandable and accessible to them. At the same time, the Company will continue the regular consultation process.

To date, Company has disclosed the following EIA report and related documents to Environmental Protection Agencies of AJ&K and Khyber Pakhtunkhwa. EIA report has also been disclosed at the ADB's website. The local community have also been provided with the EIA report and project information at different stages of the consultation, including public hearings for EIA approval in AJ&K and stakeholders meetings for CDM in both AJ&K and Khyber Pakhtunkhwa.

Overall, the consultation activities and disclosure plan is designed so as to maximize community awareness of the project and to create reasonable opportunities for community input and involvement. The indications from the public meetings are that the community now has a high level of awareness about the project and actively participates in the consultative process.

4.6.2 Company's Disclosure Policy

Going forward, the Company has formulated the Disclosure Policy, which will guide the future information sharing and consultation process. The Disclosure Policy includes General Principles and Specific Provisions. Essentially General principles form the basis for Specific Provisions.

4.6.3 General Principles

The fundamental principle of the Disclosure Policy will be to disclose relevant and necessary information to relevant stakeholders in a timely manner and in a form and language that is understandable. In order to convert this fundamental principle into a framework, the following general principles will provide guiding path.

Physical Accessibility

The information must be made available in locations that are easily accessible to stakeholders. Depending upon the capacity of a stakeholder and nature of the information to be disseminated, such locations can be local villages/towns/cities,

project site office, Company offices, government department or local government setup. However, where a stakeholder's ability to transcend physical proximity is possible through the use of electronic media, such physical proximity may not be required.

Disclosure Media

The information can be disclosed in various forms and ways. The choice of the media should be made keeping in view the urgency of disclosure, nature of disclosure and the type of information. The following are some of the important ways to disseminate the information.

Form of Communication

Information can be disclosed in various forms such as fliers, leaflets, letters, books, media releases, electronic mail, telephonic calls, facsimile messages and public address systems etc. The form of communication should be decided keeping in view the urgency of the disclosure, requirements of the law, the ability of the recipient and the nature of information.

Personal Contact

Personal contact with the stakeholders creates a direct interaction. Such contact also provides the stakeholders an opportunity to hear from the Company directly and get clarifications/explanations immediately. The Company can also hear stakeholders' concerns without any intermediary. The Company must assign a responsible official for such contacts and such official must remain available to the stakeholders at designated hours in a suitable location. If the Company has to share information with stakeholders through personal contact, it should be carried out only by the authorised official.

Language

The choice of language and structure of communication should be established keeping in view the language skills of the recipient, requirements of the law and the common practice of the area. The purpose of the language and structure should be to allow the recipient to understand the disclosed information easily and without ambiguity.

Proactive communication

The Company must proactively seek to disseminate relevant information. Lack of timely and relevant information can lead to misunderstandings and misgivings on the part of stakeholders.

Effective Reporting

Minutes of all meetings must be taken and shared with the participants through various media. If necessary and suitable, the decisions of such meetings may be shared with general public through press releases.

Monitoring Mechanism

Monitoring by an independent party should be planned to ensure the effectiveness of the Disclosure Plan. Feedback from that independent party should form the basis for improvement of the plan or its implementation.

4.6.4 Specific Provision

The Information Disclosure Plan covers the whole life of the project, divided into two phases: Construction phase; and the Operation Phase. The following specific provisions shall apply during the relevant phase.

Construction Phase**i. Social uplift plan**

- a. In accordance with the conditions of the EIA approval, progress on social uplift plan will be shared with EPA AJK quarterly through written report. HSE Manager will prepare such report and the Company's CEO will approve the report.
- b. The progress on Social Uplift Plan will be shared with the local community quarterly through personal contact. HSE Manager will be responsible for such activity.
- c. From time to time, the Company will arrange press briefings, including release of reports and site visits. HSE Manager and Administration department shall be responsible for such visits. All visits and press releases must be approved by CEO.

ii. Accidents/Incidents intimation

- a. In case of any accident, resulting in any kind of loss, immediate intimation shall be given to the relevant governmental authorities. Administration department and HSE Manager will coordinate with each other for such reporting.
- b. In case such accident requires disclosure for local community, whether to an individual or to public, such disclosure will be made in a proper and respectful manner. The approval for such disclosure shall be given by CEO.
- c. Information Disclosure to the press shall be made by HSE Manager through formal press release only after approval of CEO in the matters of accident or any untoward incident.

iii. Change in Traffic Management Plan

If there is any change in the traffic management plan the locals and the relevant government authorities will be informed immediately regarding the change and its implementation through official letters and personal contact.

iv. General information of Project Progress

- a. EPA will be updated on the progress of the project on quarterly basis. Technical and Commercial Department shall be responsible for such reports.
- b. Relevant government agencies, including Private Power Cell AJ&K, Private Power And Infrastructure Board (PPIB) of Government of Pakistan and the Power Purchaser, shall be updated on the progress of the project through monthly/quarterly reports, as the case may be. Technical and Commercial Department shall be responsible for such reports.
- c. From time to time, the Company will arrange press briefings, including release of reports and site visits. Technical and Commercial Department shall be responsible for such reports. All visits and press releases must be approved by CEO.

v. Grievance Redress

Grievance redress will be done through relevant mechanism proposed in Section 5.3 of this document.

vi. Compliance report

Reports on the fulfilment of conditions of the EIA approval by relevant EPAs will be prepared by HSE Manager and submitted to relevant EPA after approval of CEO. The frequency of such report shall be as per the relevant approval.

vii. Construction related matters

HSE Manager, after receiving information from Technical and Commercial Department, will keep local community, relevant government agencies and other stakeholders informed about the construction related matter directly impacting them. The form and frequency of communication will vary.

viii. Monitoring Mechanism

The monitoring on the implementation of the Informaiton Disclosure Plan shall be done by Lenders' Engineer on quarterly basis. Lenders' engineers shall be given access to local community and other relevant stakeholders on need to access basis.

Operation Phase

i. Compliance report

Reports on the fulfilment of conditions of the EIA approval by relevant EPAs will be prepared by HSE Manager and submitted to relevant EPA after approval of CEO. The frequency of such report shall be as per the relevant approval.

ii. Reservoir operation information

For any reservoir operation requiring major releases of water, downstream communities will be informed prior to such release the loudspeakers of the mosques and also through phone contact with the local government officials.

iii. Accidents/Incidents intimation

a. In case of any accident, resulting in any kind of loss, immediate intimation shall be given to the relevant governmental authorities. Administration department and HSE Manager will coordinate with each other for such reporting.

b. In case such accident requires disclosure for local community, whether to an

individual or to public, such disclosure will be made in a proper and respectful manner. The approval for such disclosure shall be given by CEO.

- c. Information Disclosure to the press shall be made by HSE Manager through formal press release only after approval of CEO in the matters of accident or any untoward incident.

iv. Operation related matters

HSE Manager, after receiving information from Technical and Commercial Department, will keep local community, relevant government agencies and other stakeholders informed about the operation related matter directly impacting them. The form and frequency of communication will vary.

v. Monitoring Mechanism

The monitoring on the implementation of the Information Disclosure Plan shall be done by Lenders' Engineer on quarterly basis. Lenders' engineers shall be given access to local community and other relevant stakeholders on need to access basis.

CHAPTER – 5

ASSESSMENT OF ENVIRONMENTAL IMPACTS

5.1 INTRODUCTION

Patrind Hydropower Project design has incorporated a weir instead of a dam. The topography of the project area, combined with the elevation difference between head pond on Kunhar river and the powerhouse tailrace discharging into Jhelum river has made it possible to generate electrical energy which would otherwise have been possible only with a dam about three times the height of the proposed weir. By adjusting project design in terms of reduction in head pond elevation, the inundation area and largely the negative environmental impacts, have been minimized. The environmental and social costs have also been considerably reduced by incorporating cost effective corrective measures in the planning and design of the project components.

5.2 ENVIRONMENTAL RESOURCES UNDER PROJECT IMPACT

- The impacts regarding population displacement and land acquisition exist though to a small degree and are discussed in this Chapter.
- The vegetation study conducted in September 2010 revealed that the project area falls in Guzara forest category. The locals have their own rights of cutting firewood/timber trees. The access roads built for the project and the head pond will not cause inroads into the watershed by timber exploiters and hunters etc. as these roads will only provide linkage between the villages. Moreover reserved forests are about 3-5 km away from the project site hence these access roads will not accelerate losses in forests and wildlife as well as facilitate and accelerate encroachment into the watershed above the head pond. Therefore, protection and enhancement of environmental resources in the form of forests, wildlife habitat, parks etc. in the upper watershed is not visualized.
- There are no historical, cultural monuments shrines, mosques requiring salvaging.
- Sediment load in terms of watershed erosion/ silt runoff may affect the life of the head pond if allowed at excessive filling rate. The weir design provides a limited control of sediment load by sluicing during flood flows. Sand trap has also been provided ahead of intake of the headrace.
- The environmental problems due to project construction would require EPC contractor to provide safety of workers against accidents, workers camp sanitation, prevention and control of water-borne diseases, dust, odour, fumes, noise and vibrations resulting from drill-blasting operations.
- The environmental problems related to the diminution of river flow

downstream of the weir at Patrind are not significant in terms of the downstream beneficial uses as the Kunhar river is not used for agriculture irrigation or drinking water supply. Numerous streams both large and small join Kunhar river in the reach between weir site and the confluence of Kunhar with Jhelum river.

- Head pond management would be essential to control water pollution, eutrophication, water quality, insect vector disease hazards, and head pond bank stability.

Table 5.2 at the end of this chapter has been prepared as Checklist of Environmental Issues and Impacts of Patrind Hydropower Project

5.3 PROJECT LOCATION IMPACTS

5.3.1 Land Area Requirements

Land for Construction of Access Roads

Implementation of the project for sites accessibility represents a significant impact on ecology of the mountainous region. No direct access road or communication infrastructure is available from the existing roads to get to the sites of the weir, surge chamber, powerhouse and switchyard. To build access roads would amount to soil erosion at specific locations. This infrastructure of access roads including bridges required during construction phase will remain an essential part of the project operation and maintenance. Table 1.3 gives details of proposed roads in the project area requiring 1.27 Ha of land area.

Land for Project Structures

Land area of appropriate size is required for the project structures like the weir, intake for headrace tunnel, sand trap, surface surge chamber, temporary diversion channel and power house. Land requirements for project structures discussed in Chapter 5 add up to 15 acres. Construction camps (12.62 acres and storage area (9.45 acres) will require additional 22.07 acres of the land. Land acquisition for these structures will not affect significantly any agricultural areas, forests or wildlife habitats.

Submergence of Land by Headpond

Major impacts on land would be due to submergence of land under the head pond estimated at 141.3 acres (57.2 hectares).

Construction Corridors

Construction corridors are only temporary parts of the construction phase and required only for related activities. Thus after finalisation of the construction activity, the areas of construction corridors will be rehabilitated in their original ecological status.

Workers Camp and Storage Areas

During construction phase, areas for residential colonies for professional staff and labour as well as equipment storage sites would be needed. Due to the mountainous character of the region suitable land areas are rare. However, it is pointed out that most of the work force would daily commute between construction sites and nearby villages or towns (Mansehra, Garhi Habibullah or Muzaffarabad) considerably reducing the requirement of housing needs at the sites of project construction. The land required for construction camps (12.62 acres) and for storage area (9.45 acres) has been estimated as 22.07 acres.

5.3.2 Spoil Material

Excavation work including drill-blasting will result in spoil material. This will be used as fill material, as far as possible, for structure of weir, powerhouse and the stabilization of the head pond banks, embankment of access roads, coffer dams and for terracing of hill slopes. The surplus amount will be disposed off at sites discussed in subsequent chapter.

5.3.3 Sanitary Wastewaters

In order to manage sanitary wastewater from the construction camps a system of sewers would be laid leading to on-site wastewater treatment and disposal. This would be essential to prevent pollution of Kunhar and Jhelum rivers.

5.3.4 Noise and Pollution due to Vehicles Exhaust

Noise, gaseous emission and dusty atmosphere will result from movement of heavy vehicles for transportation of equipment and construction materials. Similar effects would be caused by drill-blasting for the tunnel, pressure shaft and caverns. Tarcheela and Patrind villages are at a distance of 100m to 300m from the weir site and settlements of Alora village having a primary school located at about 100-200m from the powerhouse site. These localities and the school are expected to be affected by the construction activities like noise, dust and vibration etc. The EPC contractor would be required to control noise and exhaust pollution by construction management techniques which are sensitive to these effects such as;

- Provision of moisture cover,
- Avoid use of second hand machinery,
- Movement of vehicles within speed limit,
- Controlled blasting and excavation and orderly dumping of excavated material under cover of moisture, and

- Ensure blasting during daytime, any blasting during night time (2200-070hrs) to be prohibited within a distance of 200m from houses and settlements.

5.4 IMPACTS ON PHYSICAL ENVIRONMENT

The project impacts on physical environment are described with respect to water resources, water quality, land use, and landscape in the following sections.

Water Resources

For the weir site it would be necessary to establish dry pit condition to carry out construction work across Kunhar river bed. It is planned that during low flow season (December to April) Kunhar river flow will be directed into diversion tunnel until the construction of weir is completed. During this period Kunhar river reach between the coffer dam and the outlet of the diversion tunnel will remain almost dry except for replenishment by nullah/ spring flows normally taking place within this reach. This change in river regime over a short reach will be temporary and of short duration.

At the powerhouse site, the construction work will no way impact on the Jhelum river flow regime. The rock formation along right bank of Jhelum river will prevent backflow of river water through the tailrace alignment reaching the powerhouse complex under construction.

Water Quality

It is expected that river water quality will deteriorate during construction phase. This will mainly be due to the increase of suspended solids, turbidity and waste. This change in water quality will be temporary and over a short distance of the reach which, as pointed out in section 4.2, will not be significant because the reach is neither used for agricultural irrigation nor for drinking water supply. During operation phase river water quality, particularly in Kunhar river, will undergo cyclical changes due to restricted flow. However water quality monitoring will be included in the regular monitoring programme.

Landscape

The construction and operation of the project will affect the landscape and aesthetic value of the project area. Besides roads, construction sites and vehicular traffic, landscape will also be affected by construction camps, storage areas and dust generation. However, this will be temporary and lasting for project construction period only.

5.5 BIOLOGICAL ENVIRONMENT

Impacts on biological environment of the project area with respect to forest, wildlife, fishery and protected areas/ reserves are discussed in the following sections.

Forests

The project area was laying in the Guzara/Community owned forests and was far away from the Reserved/Protected forests. On left bank of river Kunhar in Muzaffarabad District there exists no reserved forest anywhere nears the project area. While the Reserved forests on the right bank of river Kunhar in Abbotabad District, Doga Reserve Forest and Shoal Reserve Forests are at least about 3-5 km away from the project area. Thus the project has no influence on Reserved/Protected forests.

Most of the Chir trees in the area to be submerged were found in Pole stage (age 20-30 years) with few at tree stage. The same is the case with other broadleaved species. So all in all not much cutting was found involved due to the implementation of the project.

The vegetation does not contain any species which was declared as endangered, threatened or rare. As far as the conservation status of the vegetation species (Grasses, herbs, shrubs, trees and medicinal plants) is concerned none of the species was found endangered either for Pakistan or in the world. Only two species *Celtis austarlus* (Tree of Heaven) and *Ficus carica* (Fig) were found rare in Pakistan but they are listed as common for the rest of the world. The presence of these two species will not be disturbed as they were found above the submerged area and away from the area where trees needed to be felled down. The rest of the vegetation species were found protected and common in Pakistan and for the rest of the world. So it can be easily concluded that there will be no negative impacts of Patrind Hydropower Project on conservation status of the vegetation of the area.

It was also observed that most of the submerged area comprised of rangelands of Guzaras forest area with few trees here and there. The project area consisted of Guzara forests owned by the people/community and they exploit it according to their needs of timber, firewood and fodder for livestock rather than visualizing its protective/environmental role. Due to this the area was in degraded form. Heavy uncontrolled grazing and clearance of area for cultivation also affected the area badly.

The present status of vegetation does not depend upon the river Kunhar water

but it depends on precipitation available in the area. So reduction in water regime down stream will not affect the vegetation of the area.

The average biomass that will be submerged under water after the construction of weir was calculated as 3468 Kg/ha comprising of all the vegetation types like trees, herbs, shrubs and grasses.

Economic Trees

Economic trees, and to a limited extent bushes and scrub forest, may be affected by construction activity at the sites of weir, powerhouse and surface surge chamber. While impact on bushes and scrub forest, because of their scope and extent, may be insignificant, the economic trees to be submerged in the project head pond have to be given due consideration because of their number and economic cost. Table 6.6 and 8.3 shows the number of such trees belonging to private owners. They will be compensated according to the type and size of the tree. The ecological impact resulting from loss of these trees will be offset by tree plantation around the periphery of the project head pond, proposed to be part of annual tree plantation campaign undertaken by Forest Department of the Government of Khyber Pakhtunkhwa.

Wildlife

The wildlife will be affected to the extent that project requirements of land for construction of roads, building structures, construction corridors and dumping of excavated material will have to be met. As discussed earlier the head pond would submerge a land area of 141.37 acres and the project components would require a total of 38.34 acres including land required for construction camps, storage areas and access roads. Occupation of land for project implementation will result in loss of habitats for flora and fauna in head pond area like trees, reptiles and insects etc. which do not include any endangered species; thus establishment of wildlife protection area is not needed as a mitigation measure because reptiles and similar fauna will move to safer places during sub-mergence. The on-going annual tree plantation campaigns by the Provincial Forest Department as well as creation of wildlife habitat along the river at least 10m away from the river bank can be seen on mitigation measures for wildlife habitats rehabilitation. Finally heavy vehicular traffic for transportation of men and material, as well as blasting and construction noise will drive out animals from their habitats for a temporary and short period.

Fishery

Kunhar river in the project area does not support fishery on a commercial scale nor there is any anglers' activity at any time in the area. Therefore the impacts of construction and operation activities on fishery would be insignificant.

Changes in the flow regime of the river will affect the composition and abundance of plank-tonic and benthic communities, thus affecting the food supply of fish. These changes may eventually influence the species composition of the fish population in the project area but due to the no availability of fish fauna in the project area as shown by the study results seemed to remain unaffected by this kind of impact on significant level.

The netting data and discussion with people indicated that the occasional fishing in the project area is not an occupation but a hobby due to little availability of fish fauna. The fishing activity was practiced more in winter due to lesser speed, low turbidity and depth of the river. The same position persists from the head pond area to the confluence of river Kunhar with river Jehlum as far as the availability of fish and angling is concerned according to local people. When asked about the availability of trout, the answer of majority of the public was no with occasional evidences of trout availability in the project area after many years. They revealed that the Trout was restricted mainly above the Balakot area of KP.

The pond area behind the weir upstream will create a deep, still water aquatic habitat, replacing about 7km of existing riverine habitat. Water quality in the reservoir was found suitable for the protection of aquatic ecosystems. The most productive parts of the reservoir will be the shallower sections where light is able to penetrate to the bottom and allow the growth of attached aquatic macrophytes. Experience from similar projects shows that omnivorous and planktivorous species, such as Katle, are likely to be dominant after impoundment. The population of cold water species is likely to decline or completely disappear from the proposed reservoir. The creation of the pond behind weir will provide a large open water fish habitat that could be used for promotion of fish culture. The harvesting of fish culture, if it proves viable will be an offset to the lost production. This will also increase the fish fauna and their density to be exploited locally for the socio-economic uplift of local communities.

Reserves and Protected Areas

Reserved forests on the right bank of river Kunhar in Abbotabad District are Doga Reserve Forest and Shoal Reserve Forests which are at least about 3-5 km away from the project area. Whereas no reserved forest exists on left bank of river Kunhar in Muzaffarabad District nears the project area. Thus the project has no

influence on Reserved/Protected forests.

Ayubia National Park is located far away (about 40 Km air distance) from weir site and about 7 Km from powerhouse site with elevations differing from 765 m amsl at weir site and about 2000 m amsl for Ayubia National Park. As such no significant impacts are expected on the physical, biological or socio-economic environment of the Ayubia National Park. Manshi wildlife sanctuary (2,321 hectares) is located upstream of the weir site. The weir site is at about 765m amsl whereas the sanctuary has an average elevation of 1,500m amsl and at air distance of 20 Km from the weir site. It is therefore concluded that none of project components will have any significant impact on the sanctuary.

5.6 IMPACTS ON SOCIO-ECONOMIC ENVIRONMENT

The impacts during construction and operation of the project on socio-economic environment relate to land acquisition, houses, economic trees, culture, infrastructure, women and indigenous groups in the project area.

Loss of Houses and Population Displacement

A total of 13 (thirteen) houses will be taken over to construct the powerhouse on the right bank of Jhelum river and 1 (one) house on the weir side of the project. These houses are occupied by 146 persons who constitute the population which is subject to displacement.

There is no impact on commercial assets except for a small water mill (1/2 acre) which will be inundated by the project head pond.

Infrastructure

There is no infrastructure like roads, village tracks, telephone/ transmission lines which will be subject to inundation by the project head pond.

Compensation

To prepare an effective framework for compensation of lost assets, a comprehensive plan has been drawn up in accordance provisions of ADB Handbook on Resettlement Policy. The details of the compensation plan are described in Chapter 6 of this report.

Economy

Project implementation in terms of construction and operation will create employment opportunities which will help mitigate local opposition. This will also stimulate local economy. This will reduce population emigration and help find

work for local unskilled workers. Also local market will benefit from increase in demand for consumer goods. Increased income in the project area will encourage the formation and growth of local businesses resulting in new indirect employment opportunities.

Infrastructure

During project operation weir and a new bridge on powerhouse site will serve as a bridge between the settlements of right bank and left bank. Currently there is no proper access between these two settlements. New access roads will also provide linkage between the communities of the area. Therefore, it will improve the existing accessibility of the area in terms of social and cultural uplift of the people of the area.

Culture

Historical and cultural sites in the form of mosques, shrines, graveyards or of archaeological significance will not be affected as the same do not exist at the sites of the project components or the head pond area.

Women in Project Area and Indigenous People

During the construction phase an inflow of outside workers will disturb the local socio-cultural life of the project area. As a result women could be restricted by a more strict application of purdah. There are no other vulnerable groups, nor any indigenous people in the project area.

5.7 UPSTREAM / DOWNSTREAM IMPACTS OF FUTURE PROJECTS

Since Patrind Hydropower Project draws water from Kunhar river and releases in Jhelum river after power generation, the cumulative impact of projects on both rivers are discussed. At present there is no hydropower in operation on Kunhar river. However, apart from Patrind project, 680MW Suki Kinari Project is planned upstream. Both Patrind and Suki Kinari are, in principle run of river projects with very small reservoirs. The impacts of Suki Kinari project will remain restricted to the project area and will not be accentuated or mitigated by the Patrind Project. And since Suki Kinari Project does not involve extraction of water outside the Kunhar river, the inflows into Patrind project, which is situated downstream of Suki Kinari, are not affected. In essence, the impacts of the both projects are mutually exclusive and hence there is no multiplier effect.

The tail race of Patrind project is located 8km upstream of the confluence of Kunhar and Jhelum rivers. Quite a few hydropower projects downstream on Jhelum river are planned but due to their significant distance from the tail race,

no cumulative impact is expected. On the upstream, three major projects are in different stages of development. These include 969MW Neelum-Jhelum Project (under construction), 1100MW Kohala Project (in feasibility stage) and 139MW Chakkothi-Hattian project (in feasibility stage). While Chakkothi-Hattian has no cumulative effect, Neelum-Jhelum and Kohala projects directly impact the flow of Jhelum river at the tail race of Patrind project. These projects will divert waters of Neelum river (a tributary of Jhelum river) and Jhelum river respectively upstream of Patrind project tail race and release them into Jhelum river downstream of the Jhelum-Kunhar confluence. Based on information received from EPA AJ&K, the collective release of environmental flow (though in practice both will operate independently) will be in the range of 30-40cumecs. Consequently, the city of Muzaffarabad will be impacted as the flow in Jhelum river will be reduced considerably from its present levels. However, Patrind project will have beneficial impact as it would release a substantial amount of water from its tail race into Jhelum river. This release will positively benefit the water supplies of the city of Muzaffarabad and the 8km stretch between the tail race and the Jhelum-Kunhar confluence.

For reference, location map of hydropower development projects in Pakistan is attached as Figure 5.1.

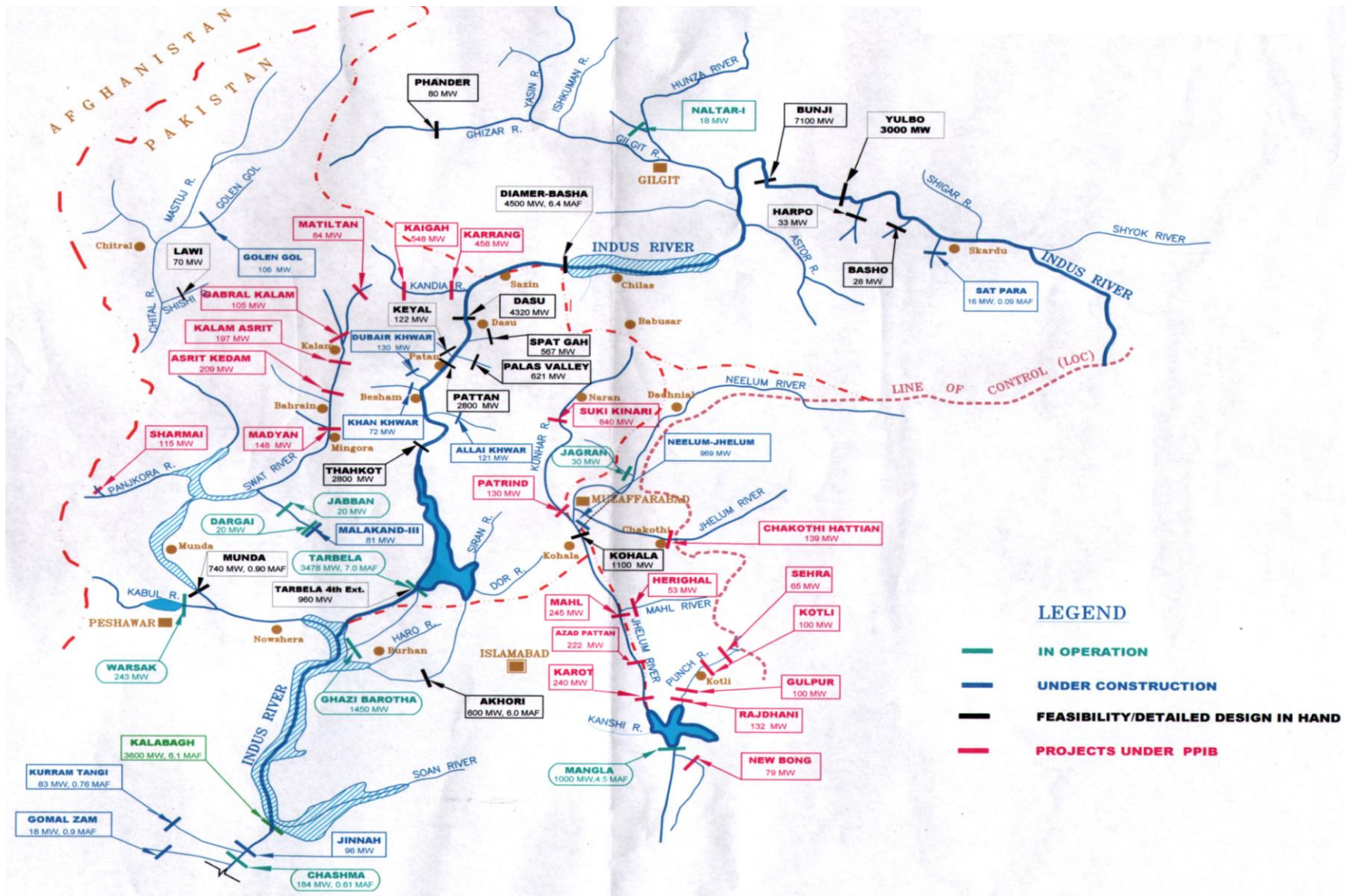


Figure 5.1: Proposed Future Hydropower Development Projects in Pakistan

Table 5.2 Checklist of Environmental Issues and Impacts of Patrind Hydropower Project

Environmental and Social Issues			Impacts	No Significant Effect	Significant Effect		
					Small	Moderate	Major
A. Pre-Construction Stage							
	1.	Land Acquisition	Permanent Land Acquisition for: - Reservoir impounding 57.2 Ha - Construction of weir structure 0.59 Ha - Powerhouse 5.46 Ha - Access/ Maintenance Roads 0.53 Ha - Surge Tank 0.04 Ha Temporary Land Acquisition for: - Construction camps at weir and powerhouse site 5.11 Ha - Storage camps at weir and powerhouse site 3.82 Ha - Dumping area for excavated material 18.6 Ha	X X X X X X X	—		
	2.	Loss of Houses	13 Nos. houses on Powerhouse site 01 No. house on weir site		—	—	
	3.	Loss of Commercial Assets	01 Small water mill	X			

Environmental and Social Issues	Impacts	No Significant Effect	Significant Effect		
			Small	Moderate	Major
4. Displacement of People	- No. of APs due to loss of houses 146 - No. of APs due to land acquisition - Due to permanent land acquisition 62 - Due to temporary land acquisition 50 - No. of APs due to loss of commercial assets 01	X X X		—	
B. Construction Stage					
1. Reservoir impounding	- Loss of cultivated land - Loss of wildlife habitat - Rise of water table around pond periphery	X X			+
2. Loss of Vegetation	- Reservoir impounding no. of trees 222 - Powerhouse site no. of trees 263 - Construction camp at weir site and powerhouse site no. of trees 106 - Access/Maintenance roads no. of trees 33		— — — —		
3. Soil erosion/silt runoff	Impairment of water quality and land values	X			
4. Water quality	- Damage to fish culture - Sedimentation in reservoir	X X			

Environmental and Social Issues	Impacts	No Significant Effect	Significant Effect		
			Small	Moderate	Major
5. Water rights	Downstream water uses	X			
6. Migrating fish species	NIL	X			
7. Other Construction Hazards					
(a) Safety of workers	(a) hazards to workers health/ safety		—		
(b) sanitation at workers camp	(b) hazards to health of worker and nearby communities		—		
(c) Solid waste disposal	(c) Environmental degradation		—		
(d) water-oriented diseases	(d) Water pollution/ malaria		—		
(e) blasting and hauling	(e) Noise and air pollution		—		
(f) environmental aesthetics	(f) Environmental degradation due to construction activity		—		
8. Privacy of the locals	- Restriction on women movement - Privacy of houses		—		
9. Movement of vehicle and heavy machinery	- Dust, Noise, air pollution, vibration - Displacement of fauna, birds and wildlife		—		
10. Dumping of spoil material	- Obstruction in movement - Dust may affect human and animal health		—		
11. Encroachment on historical/cultural values	NIL	X			

Environmental and Social Issues	Impacts	No Significant Effect	Significant Effect		
			Small	Moderate	Major
12. Infrastructure	- Improvement of access roads - Construction of bridges				+
13. Change in socio-economic status of the community	- Employment opportunity - Commercial activities				+
C Operation Stage					
1. Downstream flow variations	Disturbance to downstream fisheries, navigation and other uses	X			
2. Groundwater hydrology	Improvement in water level and quality			+	
3. Village water supply	Improvement of water supplies from springs to locals				+
4. Depreciation of downstream inundation fisheries	Loss of fisheries formerly growing in inundated fields	X			
5. Downstream erosion	Erosion of banks and river bottom damaging downstream riverside facilities	X			
6. Lack of reservoir management	Reservoir bank stability	X			
7. Landslide	Catchment stability		–		
8. Oil spill etc	Soil & water contamination		–		
9. Eutrophication (aquatic weeds)	Water pollution, impairment of fishing	X			

Environmental and Social Issues	Impacts	No Significant Effect	Significant Effect		
			Small	Moderate	Major
10 Downstream water quality	Impairment of downstream water quality from flow restrictions	X			
11 Insect vector disease hazards	Community health hazard	x			
12 Reservoir bank stability	Reduction in reservoir life	X			
13 Reservoir fishery enhancement	Considerable extra reservoir fishery potential realized			+	
14 Submergence of agriculture	Reduction in cultivated area 9.3 ha.	X	—		
15 Downstream community water supply	NIL	X			
16 Forestry/wildlife reserve	Damage to forest / wildlife	X			
16 Downstream aquaculture	Nil	X			
17 Recreation	Improvement in quality of community life, including the poor				+
18 Rural electrification	Improving quality of life for rural poor				+
19 Endangering of species	NIL	X			
20 Change in economic status of the locals	Employment Commercial activities				+

CHAPTER – 6

LAND ACQUISITION AND RESETTLEMENT PLAN

6.1 INTRODUCTION

This chapter addresses issues resulting from socio-economic impacts of the Project particularly those relating to land acquisition, population displacement, loss of housing/ farm produce as well as loss of income and of income resources. The issues have been discussed within the framework of Asian Development Bank, the World Bank/ International Finance Corporation, AJK Environmental Protection Act 2000 as well as those of Pakistan Environmental Protection Act 1997.

6.2 RESETTLEMENT POLICY OBJECTIVES

The following policy objectives have been used to develop resettlement plan for the Project.

- Involuntary resettlement is an integral part of project design to be dealt with from the earliest stage of project planning.
- Involuntary resettlement should be avoided or minimized wherever feasible.
- Community participation should be encouraged in the planning and implementation of resettlement programme.
- Timely compensation for lost assets at replacement cost as well as redress of grievances of Affected Persons should be provided.
- The compensation process should be fully transparent.

6.2.1 Procedure and Structure of Investigation

Resettlement process aims at ensuring an equitable and uniform treatment of affected persons resulting from implementation of development projects. The valuation of assets, determination of amount of compensation and procedure for its payment form essential components of resettlement process. The experience gained from implementation of development projects at national level has shown that people should be at the centre of all development processes. To achieve long term goals the people must be consulted, and compensated for losses. Very often affected people are poor and vulnerable, and therefore unable to absorb adverse impacts of development projects in their lives.

The survey work consisted of collection of data for land acquisition and

resettlement. Contacts with concerned officials of Government departments, and undertaking consultations with affected persons and communities in the villages were undertaken. This survey was conducted using pre-designed proforma, Annexure - IV. The Urdu version of the questionnaire asked from the locals during field surveys on various aspects of land acquisition and resettlement plan is given in Annexure - V.

The visits and meetings for accomplishing the scope of work were performed from last week of March to 1st week of April 2010 in addition to the surveys conducted earlier in the year 2006, Annexure - VI. In order to collect the required data and information relevant authorities and NGO's have been met, Annexure - VII. Task of the site visit was to investigate the planning area and impacts of the project layout on the environmental and socio-economic aspects. All collected data are based on the status of the EPC Contractor design of 2010.

6.3 RESETTLEMENT – RELATED BASELINE DATA

6.3.1 Land acquisition

The team of environmentalists visited sites of head pond, weir, powerhouse, spoil deposit areas, access roads and construction camps. They identified the types of land to be acquired at these sites, the number of houses and families directly affected, and the number of trees that would be lost as a result of project implementation.

The following table is a list of owners (made anonymous for privacy purpose) whose land will be acquired for the construction of the components of the Patrind Hydropower Project.

Table 6.1 Land Acquisition for Implementation of Patrind Hydropower Project

Sr. No.	Code No.	Land Acquisition (Kanals) *			
		Farmland	Riverbed	Wasteland	Total
Submergence of Land Areas by Headpond					
1.	HP.1	7	-	26	33
2.	HP.2	5	-	12	17
3.	HP.3	25	-	22	47

Sr. No .	Code No.	Land Acquisition (Kanals) *			
		Farmland	Riverbed	Wasteland	Total
4.	HP.4	6	-	32	38
5.	HP.5	3	-	24	27
6.	HP.6	8	-	21	29
7.	HP.7	6	-	12	18
8.	HP.8	4	-	19	23
9.	HP.9	3	-	17	20
10	HP.10	20	-	32	52
11	HP.11	20	-	15	35
12	HP.12	6	-	13	19
13	HP.13	12	-	8	20
14	HP.14	12	-	20	32
15	HP.15	3	-	20	23
16	HP.16	19	-	-	19
17	HP.17	-	-	23	23
18	HP.18	-	-	17	17
19	HP.19	-	-	31	31

Sr. No	Code No.	Land Acquisition (Kanals) *			
		Farmland	Riverbed	Wasteland	Total
20	HP.20	-	-	15	15
21	HP.21	-	-	18	18
22	HP.22	-	-	16	16
23	HP.23	-	-	18	18
24	HP.24	-	-	12	12
25	HP.25	-	-	18	18
26	HP.26	2	-	19	21
27	HP.27	1	-	22	23
28	HP.28	2	-	20	22
29	HP.29	1	-	17	18
30	HP.30	1	-	16	17
31	HP.31	1	-	16	17
32	HP.32	4	-	18	22

Sr. No .	Code No.	Land Acquisition (Kanals) *			
		Farmland	Riverbed	Wasteland	Total
33	HP.33	4	-	16	20
34	HP.34	8	-	19	27
35	State Owned	-	324	-	324
	Sub Total	183.0	324.0	624.0	1131.
Land Acquisition for Powerhouse Site					
1.	P.1	-	-	5	
2.	P.2	-	-	10	
3.	P.3	-	-	5	
4.	P.4	-	-	10	
5.	P.5	-	-	18	
6.	P.6	-	-	2	
7.	P.7	-	-	19	
8.	P.8	-	-	11	
9.	P.9	-	-	8	
10	P.10	-	-	8	
11	P.11	-	-	12	
	Sub Total	-	-	108.0	108.0
Land Acquisition for Weir					

Sr. No .	Code No.	Land Acquisition (Kanals) *			
		Farmland	Riverbed	Wasteland	Total
1.	W.1	2.0	5.7	4.0	11.7
	Sub Total	2.0	5.7	4.0	11.7
Land Acquisition for Surge Chamber					
1.	State Owned Land	-	-	0.75	0.75
	Sub Total	-	-	0.75	0.75
Construction Camp at Weir Site on Left Side of Kunhar River					
1.	C.1	15.0	-	-	15.0
2.	C.2	15.0	-	-	15.0
3.	C.3	4.0	-	-	4.0
4.	C.4	3.0	-	-	3.0
	Sub Total	37.0	-	-	37.0
Storage Camp near Patrind Village at Weir Site Left Side of Kunhar River					
1.	SCP.1	2.0	-	-	2.0
2.	SCP.2	2.0	-	-	2.0
3.	SCP.3	1.0	-	-	1.0
4.	SCP.4	2.0	-	-	2.0
5.	SCP.5	1.0	-	-	1.0
6.	SCP.6	3.0	-	-	3.0
7.	SCP.7	1.0	-	-	1.0
8.	SCP.8	1.0	-	-	1.0
9.	SCP.9	1.0	-	-	1.0
10	SCP.10	1.0	-	-	1.0
11	SCP.11	1.0	-	-	1.0

Sr. No .	Code No.	Land Acquisition (Kanals) *			
		Farmland	Riverbed	Wasteland	Total
12	SCP.12	1.0	-	-	1.0
13	SCP.13	1.0	-	-	1.0
14	SCP.14	1.0	-	-	1.0
15	SCP.15	1.0	-	-	1.0
16	SCP.16	1.0	-	-	1.0
17	SCP.17	1.0	-	-	1.0
18	SCP.18	1.0	-	-	1.0
19	SCP.19	1.0	-	-	1.0
20	SCP.20	1.0	-	-	1.0
21	SCP.21	1.0	-	-	1.0
22	SCP.22	1.0	-	-	1.0
23	SCP.23	1.0	-	-	1.0
24	SCP.24	1.0	-	-	1.0
25	SCP.25	1.0	-	-	1.0

Sr. No .	Code No.	Land Acquisition (Kanals) *			
		Farmland	Riverbed	Wasteland	Total
26	SCP.26	1.0	-	-	1.0
27	SCP.27	1.0	-	-	1.0
	Sub Total	32.0			32.0
Construction Camp at Powerhouse Site on Left Side of Jehlum River					
1.	State Owned Land	-	64.0	-	64
	Sub Total	-	64	-	64
Storage Camp at Powerhouse Site on Left Side of Jehlum River					
1.	State Owned Land	-	43.6	-	43.6
	Sub Total	-	43.6	-	43.6
Maintenance Road to Construction Camp, Weir Site and Storage Camp on Left Side of Kunhar River					
1.	MR.1	1.0	-	-	1.0
2.	MR.2	1.0	-	-	1.0
3.	MR.3	1.0	-	-	1.0
4.	MR.4	0.5	-	-	0.5
5.	MR.5	0.4	-	-	0.4
6.	MR.6	0.4	-	-	0.4
7.	MR.7	0.2	-	-	0.2
8.	MR.8	0.5	-	-	0.5
9.	MR.9	0.5	-	-	0.5
10	MR.10	0.3	-	-	0.3

Sr. No .	Code No.	Land Acquisition (Kanals) *			
		Farmland	Riverbed	Wasteland	Total
11	MR.11	0.2	-	-	0.2
12	MR.12	0.3	-	-	0.3
13	MR.13	0.4	-	-	0.4
14	MR.14	0.5	-	-	0.5
	Sub Total	7.2	-	-	7.2
Access Road along the Right Bank of Kunhar River to Weir Site					
1.	AR.1	3.3	-	-	3.3
	Sub Total	3.3			3.3
Land Acquisition for Dumping Site for Spoil Material at Weir Site					
1.	DS.1	-	-	8	8
2.	DS.2	-	-	8	8
3.	DS.3	-	-	8	8
4.	DS.4	-	-	8	8
5.	DS.5	-	-	8	8
6.	DS.6	-	-	1	1
7.	DS.7	-	-	1	1
8.	DS.8	-	-	1	1
9	DS.9	-	-	5	5
	Sub Total			48.0	48.0
Land Acquisition for Dumping Site for Spoil Material at Weir Site					
1.	SM.1	-	-	40	40
2.	SM.2	-	-	40	40
3.	SM.3	-	-	8	8
4.	SM.4	-	-	4	4
5.	SM.5	-	-	4	4

Sr. No .	Code No.	Land Acquisition (Kanals) *			
		Farmland	Riverbed	Wasteland	Total
6.	SM.6	-	-	8	8
7.	SM.7	-	-	4	4
8.	SM.8	-	-	4	4
9.	SM.9	-	-	4	4
10	SM.10	-	-	4	4
	Sub Total			120	120
Land Acquisition for Dumping Site for Spoil Material at Powerhouse Site					
1.	State Land	-	-	200	200
	Sub Total	-	-	200	200
Land Acquisition for Diversion Channel at Powerhouse Site					
1.	State Land			80	
	Sub Total			80	
	Total	264.5	437.3	1,184.	1,886.55

* 1 Ha = 10,000 m² = 2.471 Acre 1 Acre = 8 Kanal = 4047 m²

The total of land areas amounting to 1,806.5 kanals is sub-divided into land areas to be acquired in Muzaffarabad district (1280.15 Kanals) and in Abbottabad district (526.4 Kanals).

6.3.2 Permanent Land Acquisition

In total 1261.9 kanals (63.8 ha) of riverbed, farmland and wasteland will be acquired permanently for constructing the Patrind Hydropower Project as shown in Table 6.2 below.

Table 6.2 Permanent Land Acquisition by Type and Extent of Land

Sr. No.	Project Component	Affected Land (Kanals*)			
		State owned Land / Riverbed	Farmland	Wasteland	Total
1.	Reservoir Impounding	324.0	183.0	624.0	1,131.0
2.	Weir Structures	5.7	2.0	4.0	11.7
4.	Powerhouse	-	-	108.0	108.0
5.	Surface Surge Chamber	-	-	0.75	0.75
6.	Maintenance Road to Construction Camp, Weir site and storage camp	-	7.2	-	7.2
7.	Access Road along the Right Bank of Kunhar river to weir site	-	3.3	-	3.3
Total Permanent Land Acquisition		329.7	195.5	736.75	1261.95

* 1 Ha = 10,000 m² = 2.471 Acre

1 Acre = 8 Kanal = 4047 m²

6.3.3 Temporary Land Acquisition

There is need for temporary acquisition of land for the construction camp, storage camp and temporary disposal of excavated material in the vicinity of the weir site and powerhouse site. The following Table 6.3 shows the details of the land area proposed for temporary acquisition.

Table 6.3 Temporary Land Acquisition by Type and Extent of Land

Sr. No.	Project Component	Affected Land (Kanals)			
		State owned / Riverbed	Farmland	Wasteland	Total
1.	Construction Camp at Weir Site	-	37.0	-	37.0
2.	Storage Camp at Weir Site	-	32.0	-	32.0
3.	Construction Camp at Powerhouse Site	64.0	-	-	64.0
4.	Storage Camp at Powerhouse Site	43.6	-	-	43.6
5.	Dumping Sites	200.0	-	168.0	368.0
6.	Diversion Channel	80			
Total Temporary Land Acquisition		387.6	69.0	168.0	624.6

* 1 Ha = 10,000 m² = 2.471 Acre

1 Acre = 8 Kanal = 4047 m²

6.3.4 Value of Land

Market assessment in the project area as well as consultation with district revenue department officials were undertaken to arrive at prices of land. The land values given by the revenue department officials were slightly lower than market prices. The market prices were assessed on the basis of recent market transactions and consultation with the affected persons and other community members; in most cases transactions are verbal and not documented. The rates used in preparation of resettlement costs are given in Table 6.4.

Table 6.4 Land Prices in the Project Area

Sr. No.	Type of Land	Rate / Acre* (Rs.)	Rate / Acre** (USD)
1.	Farmland	1,920,000	22,857
2.	Wasteland	640,000	7,619
3.	State owned/ Riverbed Land	400,000	4,762

* Rate/ acre of land costs include 15% CAS for involuntary resettlement.

** Exchange rate 1 USD=84 Rs.

6.3.5 Crop Compensation

The land areas where construction of workers and storage camps is to take place are cultivable. The construction of these camps may result in damage to standing crops. Where possible by the construction schedule, farmers will be permitted to harvest crops. Where this is not possible, compensation will be awarded on the basis of market value of the crop. Depending upon the crops, an assessment of market prices of the crops was conducted in consultation with officials of revenue department and agriculture department as well as local people. An average value of Rs. 15,000 per acre has been used as compensation for crops. This will apply to the land area of 69 Kanals which will be subject to temporary acquisition for construction of the camps.

6.4 Affected Houses

While considering project layout alternatives and selecting areas for deposition of excavated material, efforts have been made to avoid overtaking of houses. However, 13 houses will be directly affected due to construction of powerhouse displacing 129 persons in village Alora. In addition, one house on Weir side will be directly affected displacing 17 persons. Table 6.5 give details of all these houses, names of their owner and number of occupants subject to displacement.

Table 6.5 Houses Directly Affected by Project Implementation

Sr. No.	Owner's Name	No. of Houses	No. of Occupants	No. of Rooms			No. of Kitchen	No. of Bathroom
				Type B	Type C	Type D		
Power House								
1.	H.1	1	30	5	7	2	3	3
2.	H.2	1	2	-	2	-	1	-
3.	H.3	1	3	-	-	2	1	1
4.	H.4	1	7	-	1	-	1	-
5.	H.5	1	8	5	-	-	1	1
6.	H.6	1	17	1	-	-	-	1
7.	H.7	1	5	-	7	-	1	1
8.	H.8	1	8	4	3	2	1	2

Sr. No.	Owner's Name	No. of Houses	No. of Occupants	No. of Rooms			No. of Kitchen	No. of Bathroom
				Type B	Type C	Type D		
9.	H.9	1	9	2	-	-	1	1
10	H.10	1	6	-	-	2	1	1
11	H.11	1	15	2	3	2	1	2
12	H.12	1	12	6	-	-	1	2
13	H.13	1	7	2	5	-	1	1
Diversion Tunnel at Weir Site								
14	H.14	1	17	-	7	-	1	1
	Total	14	146	27	35	10	15	17

* Room Type B – Brick Masonary: mud mortar, roof: iron girders, RCC batons and bricks

* Room Type C – Bricks in mud mortar/ plaster, tin roof, wooden beams/planks, mud cover

* Room Type D – No bricks, wooden beams, mud cover

6.5 RELOCATION OPTIONS FOR PHYSICAL RESETTLEMENT

The following are the six options available for relocation and physical resettlement of displaced population.

- No Resettlement**

The option of no resettlement should be considered if alternatives are too expensive or policy objectives cannot be met.

- On-Site Resettlement**

Where the population densities are relatively low, it may be possible to consolidate members of an affected community in a single area thus making room for project facilities without having to relocate the community to another site.

- Partial Resettlement**

Where the whole site is not required for project facilities, it may be possible to minimize or isolate land take. As a result, only a fraction of

the affected community may require physical relocation.

- **Resettlement to Nearby and Multiple Site**

Where full resettlement is necessary, the impact of displacement can be minimized by relocating affected people to several small sites near the affected area; the extent to which this type of resettlement is possible or desirable depends on the structure of the community and on the land market.

- **Resettlement to Margins of Developed Area**

The margins of developed areas offer cheaper land than more central locations but normally still have access to utilities and infrastructure.

- **Resettlement to Distant Sites**

Land cost and availability considerations often favour the selection of resettlement sites far from project facilities, but the disadvantages of such sites include lack of employment and business opportunities and of wider social support networks; the cost of infrastructure provision is likely to be high; and social services will likely have to be specially provided.

Patrind Hydropower Project

The project implementation will directly affect 14 houses displacing 146 persons. During field surveys, persons/ communities affected by Patrind Hydropower Project were individually as well as collectively interviewed to gather their opinion for resettlement and relocation. All owners of land and of houses directly affected by the project showed their interest in receiving cash compensation. None of them opted to receive land for land compensation or land for construction of new houses. As a result no resettlement sites have been identified or investigated.

6.6 COMMERCIAL ASSETS

The project implementation does not involve loss of any commercial assets except for water mill located in the headpond area. It will be submerged after the creation of headpond. It belongs to Mr. Muhammad Hussain of Schian village of Muzaffarabad district.

6.7 AFFECTED TREES

As shown in the following Table, it is estimated that a total number of 222 out of 624 trees will be submerged because of ponding behind the weir. All these trees may not be cut as many trees may withstand periodic shallow submergence. However, the compensation will be paid for all the trees. Remaining 402 trees would need to be felled for constructing various components of the Project. Composition of 624 trees include 126 mixed fruit, 31 timber and 498 firewood trees.

Table 6.6 Number of Affected Trees

Sr. No.	Name of Trees		Type of Trees	Numbers
	Common Name	Botanical Name		
Reservoir Impounding				
1.	Sherol	<i>Alnus nitida</i>	Firewood	30
2.	Shahtoot	<i>Morus alba</i>	Fruit	22
3.	Dhraik	<i>Melia Azadrach</i>	Firewood	16
4.	Wallnut	<i>Juglans regia</i>	Fruit	4
5.	Daraba	<i>Cedrela serrata</i>	Firewood	14
6.	Angeer	<i>Ficus carica</i>	Fruit Tree	16
7.	Nim	<i>Azadirachata indica</i>	Firewood	6
8.	Balkald	-	Firewood	25
9.	Kau	<i>Olea cuspidate</i>	Firewood	23
10.	Chir	<i>Pinus roxburglii</i>	Timber	14
11.	Shesham	<i>Dilbergia sisso</i>	Timber	6
12.	Pipal	<i>Ficus religiosa</i>	Firewood	8
13.	Kiker	<i>Acacia nilotica</i>	Firewood	6
14.	Phulai	<i>Acacia modesta</i>	Firewood	7
15.	Beence	-	Firewood	6
16.	Deodar	<i>Cedrus deodara</i>	Timber	11
17.	Phagwar	<i>Ficus palmate</i>	Firewood	8

Sr. No.	Name of Trees		Type of Trees	Numbers
	Common Name	Botanical Name		
Sub Total				222
Powerhouse Site				
1.	Sherol	<i>Alnus nitida</i>	Firewood	200
2.	Phagwar	<i>Ficus palmate</i>	Firewood	19
3.	Wallnut	<i>Juglans regia</i>	Fruit Tree	9
4.	Mixed Fruit Trees	-	Mixed Fruit Trees	35
Sub Total				263
Construction Camp at Weir Site on Left Side of Kunhar River				
1.	Apricot	<i>Prunus armeniace</i>	Fruit tree	34
2.	Pear	<i>Pyrus cummunis</i>	Fruit tree	16
Sub Total				50
Maintenance Road to Construction Camp, Weir Site and Storage Camp on Left Side of Kunhar River				
1.	Dhraik	<i>Melia Azadrach</i>	Firewood	6
2.	Shesham	<i>Dilbergia sisso</i>	Firewood	1
3.	Bhala	<i>Gymnosporia spp.</i>	Firewood	6
4.	Sharool	<i>Alnus nitida</i>	Firewood	6
5.	Phagawar	<i>Ficus palmate</i>	Firewood	2
Sub Total				21
Access Road along the Right Bank of Kunhar River to Weir Site				
1.	Sherol	<i>Alnus nitida</i>	Firewood	7
2.	Phagwar	<i>Ficus palmate</i>	Firewood	5
Sub Total				12
Construction of Storage Camp near Patrind Village at Weir Structures Left Side of Kunhar River				
1.	Dhraik	<i>Melia Azadrach</i>	Firewood	20
2.	Phagwar	<i>Ficus palmate</i>	Firewood	10

Sr. No.	Name of Trees		Type of Trees	Numbers
	Common Name	Botanical Name		
3.	Dravia	<i>Cederela serrata</i>	Firewood	14
4.	Apricort	<i>Prunus armeniace</i>	Fruit Tree	12
Sub Total				56
Total				624

6.8 ORGANISATIONAL SETUP

The resettlement of people affected by Patrind Hydropower Project is the responsibility of the Sponsor. The Company will, therefore, play a key role in implementing the resettlement components of the project. For the monitoring of assessment and compensation implementation activities, an Environmental Management and Monitoring Unit (EMU), headed by an Environmental and Social Expert, will be created. Head EMU will be responsible for above board and timely implementing compensation activities as follows:

- Ensure proper, timely and transparent payment of compensation to Affected Persons.
- Ensure EPC contractor(s) compliance requirements of safeguards for construction safety, occupational health, traffic management, dust suppression, solid waste disposal, wastewater disposal, air pollution, noise and vibration, biodiversity, occupational safety, transportation, storage of flammable and explosive materials etc.
- Ensure construction sites are screened to avoid dispersion of dust/ pollutants in the surrounding atmosphere.
- Avoid or control unauthorised cutting of trees by EPC Contractor(s) in the project area.
- Liaise with neighbouring communities for their concerns about disturbance/ disruption due to construction activities.
- Ensure proper disposal of construction spoil.
- Ensure quick disposal of grievances.

6.8.1 Institutional Arrangements

Keeping in view the resettlement related baseline data and scope of resettlement activities, head EMU will have adequate staff.

The record of land and of land ownership is maintained in the District Revenue Departments in Abbottabad and Muzaffarabad. To initiate and proceed with land acquisition, District Revenue Officer (DRO) of each district will be designated as Land Acquisition Collector (LAC). In the capacity of LAC, the DRO will depute adequate number of revenue officials to work with EMU staff for performance of functions in acquisition of land/ assets required for Patrind Hydropower Project implementation.

Under Land Acquisition Act 1894 (LAA) only persons officially registered with land revenue department as owners or those who possess formal lease agreement are considered eligible for compensation. The process of land acquisition will, however, be shortened by replacing formal LAA method with direct negotiation with land owners because LAA process often takes too long due to legal formalities and court interventions. Method of direct negotiation with owners is more practical and minimizes the subsequent grievances and lengthy litigation often involved in land acquisition cases. By using direct negotiations, the decisions have to be made in consensus with the Affected Persons. Thus it is a participatory approach to land acquisition by which Affected Persons concerns and interest can be taken care of beforehand.

6.8.2 Compensation Payment Procedure

The institutional arrangements as explained in Section 6.7.1 above can be followed as the basis of procedure for payment of compensation for acquisition of land and other assets. The compensation payment procedure under this arrangement will consist of the following steps.

- Company will develop and maintain computer based Management Information System (MIS) to deal with resettlement related data and activities.
- The resettlement related baseline data as prepared for Resettlement Plan of the project will be studied/ assessed by EMU/ LAC staff.
- The staffs of EMU will spot check and monitor field surveys undertaken

by physically identification of the land/ other assets to be acquired for project implementation.

- Ownership of land/ assets will be confirmed with reference to District Revenue Department records as well as by using all other available means.
- After valuation of land and other assets has been completed by Land Valuation Committee (LVC), payment of compensation will be made to the Affected Persons out of the Compensation Fund.
- In addition to compensation payment the affectee would be allowed to take the debris
- Exact details/procedures (SOP) would be finalized with the respective governments for the purpose of Land acquisition.

6.9 VALUATION OF ASSETS

The assets which are lost due to implementation of development projects include land, houses/ built-up property, commercial assets, crops and trees.

In case of Patrind Hydropower Project, most significant is the loss of land with reservoir impounding claiming the largest proportion. Valuation of land for compensation begins with determining market value of land. In determining market value of land, following criteria can be used.

- The opinion of the valuers or experts
- The price paid within a reasonable time in bonafide transactions of lands in the neighbourhood and possessing similar advantages like location, type of usage, and level of productivity.
- By capitalizing the net annual income from the land.

It is proposed to achieve fair and timely compensation for lost assets through establishment of Land Valuation Committees (LVC) for each area, which will be charged with the responsibility of determining fair prices of land and assets in that area and recommending them to the Land Acquisition Collector for adoption in the award.

The Land Valuation Committee will consist of the following members.

- A representative of District Co-ordination Officer (DCO), who will serve as Chairman of LVC

- EMU representative
- SHPL representative
- Two representatives of Affected Persons (APs) from the concerned area, to be nominated by the AP's

LAC may join the Committee, but only as an observing member, with no voting rights. It is to be noted that LVC will be an advisory committee. However, LAC, who has the authority to fix the market value, will in most instances accept the recommendations of LVC, and thus in effect provide legal sanction to the Committee.

In order to determine realistic market value of land, LVC will consider the following aspects.

- One year averages of land sales in the concerned area for the year immediately prior to the data of commencement of land acquisition.
- Location of land i.e. proximity to settlements, roads, etc.
- Type of land usage i.e. residential, agricultural, orchards, grazing land, waste land or other.
- Any other factor considered pertinent.

The weightage to be given to each of these aspects will be decided by the Committee of each village. The Committee will determine fair market values on the basis of the above and recommended them to LAC for a decision. An additional 15% of the market value of the land will be paid to the owners as Compulsory Acquisition Surcharge (CAS) for involuntary acquisition. Any AP if dissatisfied with the compensation award will have the right of appeal before the Grievance Redress Committee.

6.9.1 Valuation of Houses/ Crops/ Trees

Assets like built-up property will be valued at full replacement cost i.e. the amount sufficient to replace lost asset plus transition cost. In applying replacement cost method, depreciation of structures/ asset should not be taken into account.

In case farmers are not permitted to harvest crops on land already acquired, due to exigency of construction schedule, cash compensation based on market value of crop will be made.

6.10 ENTITLEMENT PACKAGE

The project is committed to provide entitlements to persons who lose their land or other assets or to those others whose livelihood is directly affected by the acquisition of land. These entitlements will be supplemented by EMU through project activities such as training, work opportunities and facilitation for obtaining credit. The work opportunities provided to Affected Persons will consist of priority in project employment with construction contractor(s) through issuance of work permits.

6.11 CERTIFICATES OF COMPENSATION

EMU will prepare signed Certificate of Compensation for each landowner or other affectee. Following particulars will be noted on each certificate.

- Name of owner of land or other asset
- Physical details of land/ asset including name of village
- Value of land/ asset to be acquired and compensation due
- Terms on which such compensation will be made

Copies of Certificate of Compensation will be provided to LAC and the village elder to ensure both transparency and subsequent cross checking of actual payments. This is essential for equitable treatment of affectees.

6.11.1 Transparency of Compensation Process

Following measures will be adopted to ensure transparency of the compensation process.

- Representation of affectees on Land Valuation Committee
- Issuance of Certificates of Compensation to each affectee and public availability of these Certificates
- Payment of compensation directly into bank accounts of the affectees.

These measures will greatly help in minimising the possibility of affectees not receiving full compensation.

6.12 GRIEVANCE REDRESS

Regardless of its scale, involuntary resettlement inevitably gives rise to grievances among the affected population over issues ranging from entitlements, rates of compensation and eligibility criteria. Timely redress of

such grievances is vital to the satisfactory implementation of resettlement and to the completion of the project on schedule. The Project therefore must ensure that affected persons have access to grievance redress procedures and that such procedures are in place to allow them to lodge a complaint or a claim.

Grievances are best redressed through project management, local civil administration, or other channels of mediation acceptable to all parties. Such channels of mediation may involve customary and traditional institutions of dispute resolution. The project management should make every effort to resolve grievances at the community level. Recourse to the legal system should be avoided except as a last resort.

In the case of Patrind Hydropower Project, major grievances that might require mitigation include the following:

- AP's not enlisted
- Compensation inadequate
- Dispute about ownership
- Delay in disbursement of compensation

This requires that a Grievance Redress Committee (GRC) is constituted to resolve such issues and provide AP's a public forum to address and resolve such issues adequately. The GRC may be comprised of the following members.

- District Revenue Officer, as the Chairman
- Union Council Nazim, as Principal Member
- Three Affected Community Representatives, as Members
- SHPL representative

The GRC will meet twice a month and discuss the existing problems. It shall deliver its decision within two to four weeks of registration of the case. The decision of GRC would be final.

6.13 RESETTLEMENT DATABANK

Management Information System (MIS) proposed in Section 6.7.2 of this Chapter will be used to maintain a computerised data involving information related to resettlement activities. This will include socio-economic status of AP's, information of acquired land, inventory of losses by individual AP's,

compensation and entitlements and payments made as well as work permits issued to AP's who will be given priority in employment with Project Contractor(s).

The databank will form the basis of information for implementation, monitoring and reporting purposes and facilitate efficient resettlement management.

6.14 RESETTLEMENT PLAN AND IMPLEMENTATION

Resettlement Plan consists of the following activities as given in Table 6.7.

The agency responsible for implementation of resettlement activities is shown against each activity.

Table 6.7 Resettlement Activities and Agencies Responsible for Patrind Hydropower Project

Sr. #	Resettlement Plan Activity	Agency Responsible
1.	Establishment of Environment Management Unit (EMU) and Appointment of DRO as LAC.	STAR Hydropower
2.	Establishment of Compensation Fund with DRO.	STAR Hydropower
3.	Monitoring of Land Acquisition, Resettlement and compensation.	EMU
4.	Submission of Land Acquisition Request to DRO.	EMU
5.	Resettlement Training Workshop and Issuance of Work Permits	SHPL
6.	Verification survey for Identification of Affected Persons/Land/Assets.	EMU/ DRO
7.	Preparation of Land Acquisition Plan.	LAC,SHPL
8.	Community Consultation and Disclosure of Land/ Assets Acquisition/ Entitlements and Resettlement Plan to Affected Persons and the Community.	SHPL, EMU
9.	Grievance Redress	GRC
10.	Compensation Award and Payment of Compensation.	SHPL/ DRO
11.	Possession of Acquired Land/ Assets.	STAR Hydropower
12.	Handover of Acquired Land to Contractors for Construction.	STAR Hydropower

LAC: Land Acquisition Collector, EMU: Environment Management Unit, WAPDA: Water and Power Development Authority, DRO: District Revenue Officer, GRC: Grievance Redress Committee

6.15 IMPLEMENTATION SCHEDULE FOR RESETTLEMENT

Section 6.13 has enumerated resettlement activities and corresponding

agencies responsible for their completion. Within the project cycle, the implementation schedule provides the time frame for commencement and completion of the resettlement activities. Table 6.8 is the Implementation Schedule for Resettlement Plan of Patrind Hydropower Project.

Table 6.8 Implementation Schedule / Responsibilities for Resettlement Plan of Patrind Hydropower Project

Sr. No.	Resettlement Plan Activity	Responsibility		Year 0	Year 1				Year 2				Year 3				Year 4			
		Primary	Secondary	Pre-Project	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
1	Community Consultations	EMU	LAC																	
2	RP Disclosure - Brochure in Urdu	EMU	-																	
3	Site Demarcation of Affected Lands	EMU	LAC																	
4	Request to LAC for Initiating Process	EMU	LAC																	
5	Notification under LAA Section 4	LAC	EMU																	
6	Inventory - taking of Lands/ Assets	LAC	EMU																	
7	Compensation Assessment (Revised)	LAC	EMU																	
8	Payment of Compensation	DRO	EMU																	
9	Grievance Redress	GRC	-																	
11	Possession of Land/ Assets for Project Works	LAC	EMU																	
12	Start of Preliminary Works	Contractor																		
13	Contractor Receives Approval for Main Contract	Contractor																		
14	Construction Works	Contractor	EMU																	
AP :	Affected Person																			
LAC :	Land Acquisition Collector																			
EMU :	Environmental Management Unit																			
RP:	Resettlement Plan																			
DRO:	District Revenue Officer																			

CHAPTER – 7

MITIGATION MEASURES

7.1 INTRODUCTION

The purpose of a mitigation programme is to manage the environmental effects resulting from implementation of the Project in a manner that minimizes adverse impacts and maximizes secondary benefits. It is a planning step that has evolved naturally from the process of identifying and assessing potential impacts. Considerations have been kept in view throughout the planning process, so that it is more effective for changes to be made at the least cost. The strategy for planning process, therefore, has involved overall siting decisions such as the avoidance of centres of human population as well as modifications in project design, construction and operation. As discussed in Chapter 3 and 6, planning of Patrind Hydropower Project has duly considered this approach by focusing on environmental and socio-economic parameters. Besides, the project operation will be required to maximize the power output keeping ecological disruption the minimum. In this context a broad overview of the mitigation measures for the Project is given in Table 9.1.

The mitigation measures are discussed in the following sections with reference to physical and biological environment of the project area. The mitigation measures for the socio-economic environment are discussed in Chapter 6 titled “Land Acquisition and Resettlement Plan”.

7.2 PHYSICAL ENVIRONMENT

The issues regarding the physical environment of the project area requiring mitigation related to disposal of excavated material, variations of flow downstream of the weir, environmental pollution control and public health and safety of workers.

7.2.1 Mitigation Measures for Excavated Material

Table 7.1 shows quantities of excavated material and fill material for project implementation. It shows that for the Coffor Dams on Kunhar river, fill requirements (21,767 m³) are more than cut (11,014 m³) obviating any requirement for disposal of surplus spoil in case of coffer dams. About 16,000 m³ of the total 100,100 m³ of the excavated material from Diversion Channel will be used for the coffer dams on Jhelum river. The rest of the excavated material will be stacked on the embankments of the diversion channel, thus there will be no need for

any extra disposal site. The coffer dams will be removed after the completion of the required works and the material used in coffer dams and on the embankments of the diversion channel will be used for the reinstatement of the site to its original position after the construction of permanent bridge across Jhelum river. The surplus material on the weir side requiring disposal is 604,287 m³ and surplus material requiring disposal on the powerhouse side is 401,217 m³.

Table 7.1: Quantities of Excavation Work/Fill Material for Project Implementation

Sr. #	Project Component	Excavation (m ³)			Fill (m ³)	
		Overburden	Rock Open Slope Cut	Rock Underground	Overburden	Rock
Coffer Dam						
1.	Coffer Dam at Kunhar River	11,014	-	-	12,975	8,792
Weir Side Structures						
2.	Diversion Tunnel	-	7,773	14,696	-	-
3.	Weir Structure	160,586	225,193	-	-	8,370
4.	Headrace Intake and Sand Trap	44,878	220,249	2,262	-	63,680
Sub Total (2+3+4)		205,464	453,915	16,958	-	72,050
Powerhouse Side Structures						
5.	Headrace / Pressure Tunnel, Pressure Shaft and Surge Chamber	-	15,667	157,884	228	-
6.	Power House	51,065	110,717	-	17,988	-
Sub Total (5+6)		51,065	126,384	157,884	18,276	-

Weir side surplus requiring disposal is thus $205,464 + 453,915 + 16,958 - 72,050 = 604,287 \text{ m}^3$ and powerhouse side surplus requiring disposal is thus $51,065 + 126,384 + 157,884 - 18,276 = 317,059 \text{ m}^3$.

Disposal of surplus excavated material into any of the two rivers may cause a number of environmental problems and is, therefore, unacceptable. In order to facilitate and economise the transportation costs, the excavated material will be disposed off in the vicinity of its production. Locations for the disposal of surplus excavated material in the vicinity of weir and powerhouse site have been proposed. The

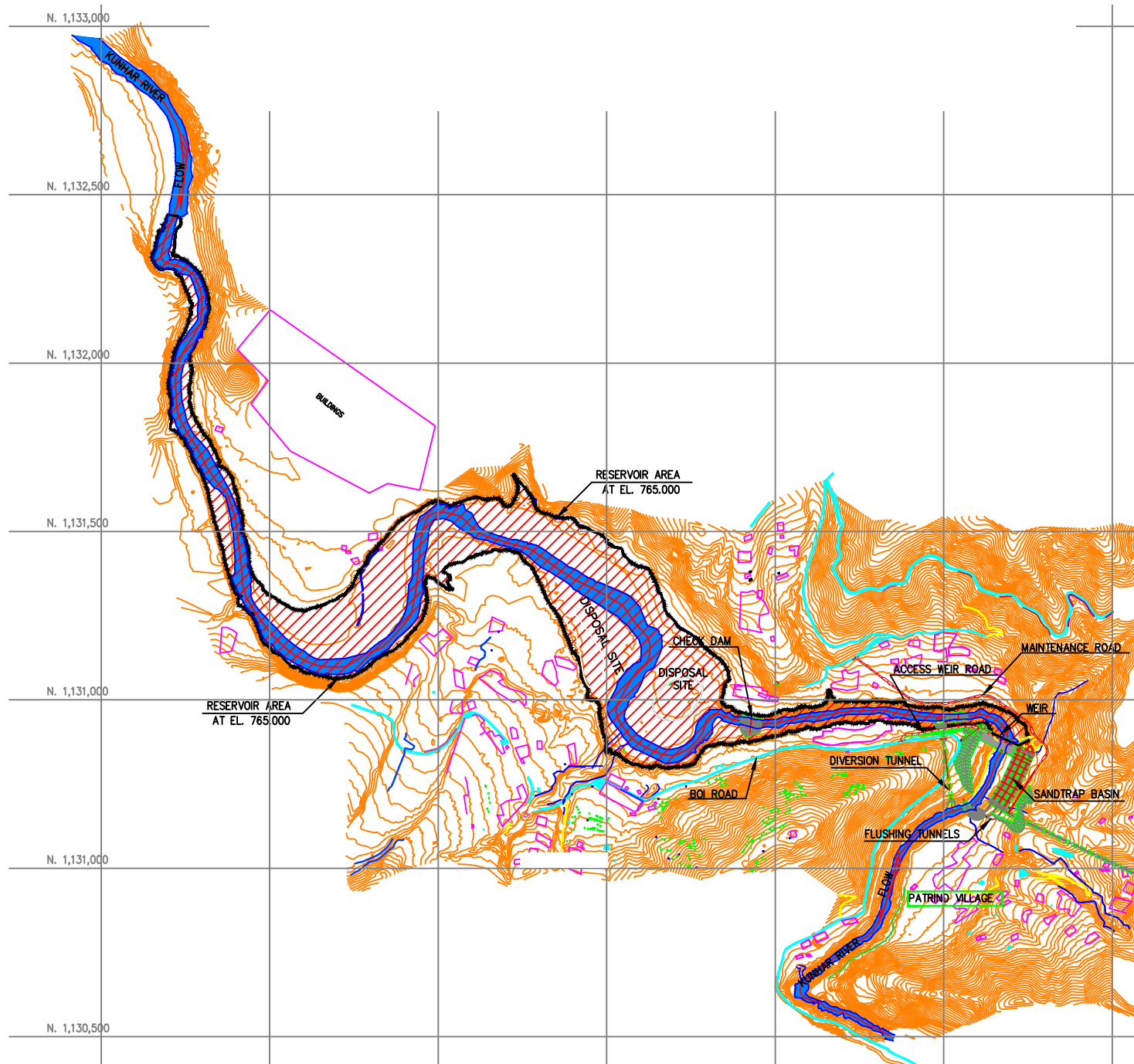


Figure 7.1 : Sites for Disposal of Excavated Material near Weir Site

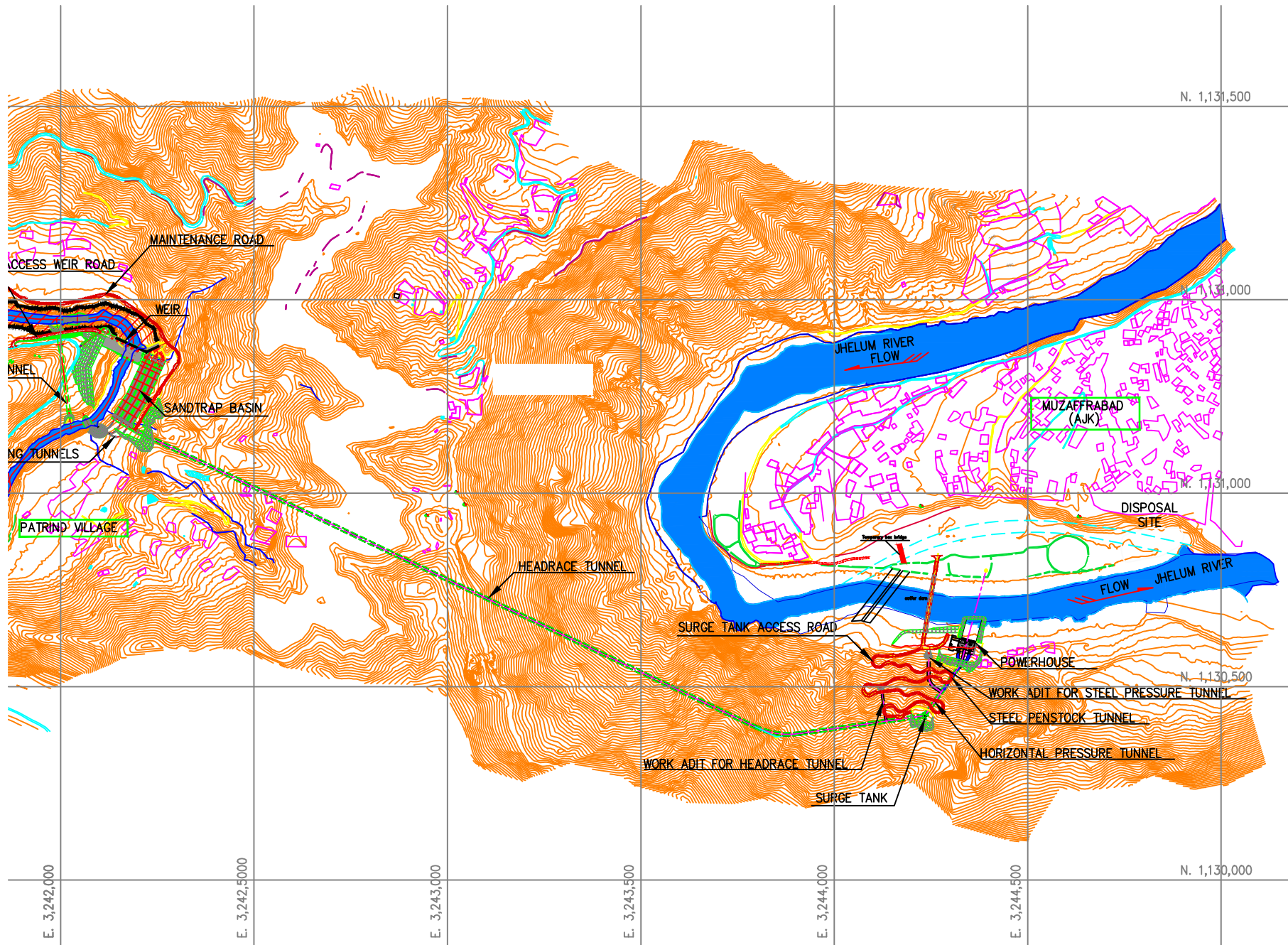


Figure 7.2 Sites for Disposal of Excavated Material near Power House Site

proposed land area for disposal of excavated material has been estimated at 21 acres for weir side and 25 acres for powerhouse side. The land areas available in the vicinity of weir and powerhouse site are shown in Figures 7.1 and 7.2. The proposed disposal sites have easy access. The weir side area is a low lying area having requisite capacity to accommodate the surplus excavated material.

7.2.2 Mitigation Measures for Erosion Control

Considering the site conditions and the various erosion control methods like vegetation and forestation are the most effective and economical. These methods are recommended as the preferred options for erosion control. The affected areas should be planted with grass cover, tiny bushes and trees. Furthermore, land construction slope should be kept as flat as is reasonably possible. Methods such as slope rounding, terracing or contouring to minimize erosion and to promote plant growth will be adopted.

The commonly available erosion control processes are listed below:

- Grading
- Terracing
- Compaction
- Vegetation
- Surfacing and pitching
- Soil stabilization (chemical, stone surface pitching)
- Hydrographic modification (channelling, diversion, culverts, stream crossing)
- Retaining structures

The mitigation plan for soil erosion during construction and in the post construction period must include the following principles;

- Training programme for the construction crew will be arranged to create awareness regarding soil erosion.
- Plan the alignment and construction activities to fit the topography, soils, waterways and natural vegetation at the site.
- Expose the smallest area of the land for work over shortest possible time.
- Apply soil erosion control practices as first line of defence against

the offsite damage.

- Maintenance programme after completion of construction.
- Protect and preserve forest and vegetation cover as much as possible through proper control and management of the site.
- Construction and maintaining temporary drainage channels around areas where major construction activity and construction spoils are located. The drainage system should preferably lead the water to a temporary pool or swamp before it is properly discharged in the river, to settle extra suspended material related to construction activity.

7.2.3 Mitigation of Flow Variations Downstream of Weir

It should be noted that the topography of Kunhar river valley downstream of weir is characterized by high banks with relatively deeper bed levels preventing use of Kunhar river for agricultural irrigation and drinking water supplies.

The operation of the project for hydropower generation will result in reduction of flow downstream of weir. Minimum 2 cumecs of water from the headpond will be released as ecological flow throughout the year. This flow (2 cumecs) is in addition to substantial flow which joins Kunhar river in the form of large and small streams downstream of the weir thus providing mitigation measures for aquatic flora and fauna in the reach downstream of the weir. Principles adopted for determining the ecological flow are explained in section 3.2.6.

7.2.4 Environmental Pollution Control

In order to offset the noise and dust pollution-related impacts during the construction period, the equipment that is expected to produce noise levels above NEQS/ WB Guidelines should preferably be operated during the day time and under confined conditions. This should be made part of the construction planning schedule. Although it is expected that noise levels may be violated but they can be minimized through effective management, monitoring and maintenance of construction equipment and vehicles.

Sprinkling of water to settle dust should be practiced frequently in areas where equipment like compressors, blowers, dumpers and excavators would be in use. All dust emitting activities should be sited at least 300 – 400 m away from residential areas and construction workers should be

provided with necessary masks to protect them from any adverse health effects.

7.2.5 Water Supply, Sanitation and Solid Waste Management

To meet the demand of the drinking water supply and sanitation during the construction period, it is recommended that proper water supply system should be provided at the site using water from springs. For proper sanitation facilities, pour flush type latrines with septic tanks are recommended. Also proper arrangements of solid waste management should be made in construction camps. All such facilities are to be provided by the EPC Contractors.

7.3 BIOLOGICAL ENVIRONMENT

7.3.1 Tree Cutting

The project in no way affects the reserve forest areas as they occur in the far upper reaches. Trees would be cut which at present exist on the land designated for the headpond, powerhouse, construction and storage camps as well as those along the alignment of roads. The cutting of trees will affect the ecological balance of the area and enhance soil erosion and landslide potential. As a mitigation measure, it is recommended that only the smallest possible number of trees should be cut to clear the land for construction. In order to restore the ecological balance of the area, the EPC contractor/project sponsor should plant as many trees as will be cut down during the project implementation. The agreement with the EPC Contractor should include specific provision for the same.

Access roads are proposed for weir, powerhouse and surge tank opening up areas which hitherto are inaccessible. Under this situation establishment of additional check posts by Departments of Forest and Wildlife at vulnerable points and more strict vigilance for loggers and poachers will help mitigate impacts on forests and wildlife.

7.3.2 Tree Cutting / Scenic Value

The scenic beauty impaired by cutting of trees for the project implementation can be restored by landscaping and planting of trees at specific places of the project area. This will be achieved by making use of the annual tree plantation campaigns in which about 10,000 plants are planted annually by the Provincial Forest Departments free of cost.

7.3.3 Mitigation Measures for Wildlife Protection

- Disposal areas of surplus spoil on the weir side area should be covered with top soil. This will help vegetation growth which may

ultimately result in the creation of new habitats for wildlife.

- Lubricants, waste oil and other chemical wastes should be collected and disposed off safely.
- Labour and supervisory staff associated with the project should be properly educated to protect wildlife.
- Any stray animal found may be handed over to Wildlife Department officials.
- Noise related to blasting and construction activity should be kept within levels prescribed in NEQS/ World Bank Guidelines values through necessary management and control measures.

7.3.4 Mitigation Measures for Livestock

No mitigation is required for livestock. However, the villagers living near the inlet and outlet portals of the headrace tunnel should be informed well in advance when blasting work takes place to avoid any damage to livestock. Drivers hauling the excavated material or using any other vehicle may ensure the safe road crossing of the livestock. Construction waste especially lubricants may be disposed away from range lands. Similarly airborne dust may be minimized by periodic sprinkling.

7.3.5 Mitigation of Stress Effect on River Ecology

There is no exact way of quantifying and mitigating this effect. Monitoring is thus the best alternative. The requisite water flow should be available in the affected reach as discussed under the topic “reserved flow” in Section 3.2.6.

Pollution control measures for rivers by human activity should be promoted as much as possible by providing sanitation facilities to the people living in the areas of affected reach.

7.4 PUBLIC HEALTH AND SAFETY OF WORKERS

The contractor shall provide on-site safety induction training for his personnel upon starting of construction work.

- The contractor shall provide personal protective equipment, including hard hats gloves, safety shoes, and such other equipment as required, and shall take all measures or actions for the protection and safety of contractor personnel.
- Non-metallic hard hats shall be worn at all times by all personnel at work site with the exception of those areas where the engineer has

indicated it not necessary to do so.

- Safety glasses if required shall meet international standards and be available for use and worn in specified worksites areas. As a minimum, safety glasses shall be worn for the following types of work, hammering, chipping, welding, grinding, use of electricity powered or pneumatic equipment, insulation handling, spray painting, working with solvents, and other jobs where the potential of an eye injury exists.
- Personnel shall not be permitted to work whilst wearing personal clothing or footwear likely to be hazardous to themselves or others.
- Hearing protection, including muffs, plugs or a combination thereof, shall be provided for all personnel operating in areas where the noise level exceeds 90 decibels.
- The contractor shall encourage employees to wear substantial work gloves whenever it is practical and is safe to do so.

7.4.1 Community Health, Safety and Security

Public health and safety measures will also be undertaken such as barriers and warning signs at required places. All safety, health, environmental and other safety notices and signs shall be clearly displayed and written in both Urdu and English.

7.5 SOCIO-ECONOMIC UPLIFT

The project implementation is expected to raise hopes of the project area population for their general welfare. It is therefore, necessary that EPC Contractor/Project Sponsor may provide facilities in the form of education and health to the people of the project area.

CHAPTER – 8

RESETTLEMENT BUDGET AND FINANCING

8.1 INTRODUCTION

The Land Acquisition and Resettlement Plan as in Chapter 6 has been developed keeping in view the Guidelines of ADB, safeguard policies, World Bank Guidelines OP/BP 4.12 (2004), Land Acquisition Act (1894), Draft National Resettlement Policy of Pakistan (2002) and Guidelines of World Commission on Dams (1997). This Chapter deals with resettlement budget and financing plan of Patrind Hydropower Project. The Company has to defray the actual costs incurred in carrying out resettlement/ environmental actions and to provide funds in a timely manner.

8.2 ASSETS SUBJECT TO SUBMERGENCE BY HEAD POND

Head pond Area

Figure 1.6 shows elevation-capacity-surface area curves for the head pond behind the weir at Patrind village. Figure 1.7 shows the head pond to be created behind the weir at elevation 765 m above mean sea level submerging an area of 141.37 acres which consists of privately-owned wasteland (61.2%), Kunhar river bed (24.2%) and privately-owned agricultural fields (14.6%). There are neither any human settlements nor any built-up property like residential houses which would be subject to submergence by the head pond.

Commercial Assets

Except for a small water mill, no commercial assets exist in the head pond area. The ownership and cost of the water mill is given in Table 7.4.

Infrastructure

No infrastructure requiring relocation like roads, village tracks, electrical transmission lines, telephone lines etc. exist in the head pond area.

Cultural Property

There are no graveyards, mosques, shrines or sites of archaeological importance in the area to be submerged by the head pond.

8.3 RESETTLEMENT / ENVIRONMENTAL COSTS

The items constituting the environmental costs are as follows:

- i. Land area subject to submergence by Head pond – Permanent Land Acquisition
- ii. Land required for construction of Project Structure – Permanent Land Acquisition
- iii. Land for Construction Camps, Storage Areas and Residential Colonies – Temporary Land Acquisition
- iv. Land for Disposal of Excavated Material – Temporary Land Acquisition
- v. Compensation for Houses and Commercial Assets
- vi. Compensation for Economic Trees

Items (i), (ii) and (v) require permanent acquisition of land whereas items (iii) and (iv) require temporary land acquisition during construction phase which is estimated as 4 years.

8.3.1 Permanent Land Acquisition

For Patrind Hydropower Project, permanent land acquisition cost is Rs. 122,345,000 of the resettlement/ environmental cost, which is the highest component at 63 % of the total.

Table 8.1: Cost of Permanent Land Acquisition

Sr. #	Owner Name	Type of Land / Property Affected	Affected Area (Kanal) *	Rate / Kanal (Rs.)	Estimated Cost (Rs.)	Total Cost (Rs.)
Cost of Land to be Acquired for Headpond Impounding						
1	HP.1	Farm Land	7	240,000	1,680,000	3,760,000
		River bed	-	-	-	
		Waste Land	26	80,000	2,080,000	
2	HP.2	Farm Land	5	240,000	1,200,000	2,160,000
		River bed	-	-	-	
		Waste Land	12	80,000	960,000	
3	HP.3	Farm Land	25	240,000	6,000,000	7,760,000
		River bed	-	-	-	
		Waste Land	22	80,000	1,760,000	
4	HP.4	Farm Land	6	240,000	1,440,000	4,000,000
		River bed	-	-	-	
		Waste Land	32	80,000	2,560,000	

Sr. #	Owner Name	Type of Land / Property Affected	Affected Area (Kanal) *	Rate / Kanal (Rs.)	Estimated Cost (Rs.)	Total Cost (Rs.)
5	HP.5	Farm Land	3	240,000	720,000	2,640,000
		River bed	-	-	-	
		Waste Land	24	80,000	1,920,000	
6	HP.6	Farm Land	8	240,000	1,920,000	3,600,000
		River bed	-	-	-	
		Waste Land	21	80,000	1,680,000	
7	HP.7	Farm Land	6	240,000	1,440,000	2,400,000
		River bed	-	-	-	
		Waste Land	12	80,000	960,000	
8	HP.8	Farm Land	4	240,000	960,000	2,480,000
		River bed	-	-	-	
		Waste Land	19	80,000	1,520,000	
9	HP.9	Farm Land	3	240,000	720,000	2,080,000
		River bed	-	-	-	
		Waste Land	17	80,000	1,360,000	
10	HP.10	Farm Land	20	240,000	4,800,000	7,360,000
		River bed	-	-	-	
		Waste Land	32	80,000	2,560,000	
11	HP.11	Farm Land	20	40,000	4,800,000	6,000,000
		River bed	-	-	-	
		Waste Land	15	80,000	1,200,000	
12	HP.12	Farm Land	6	240,000	1,440,000	2,480,000
		River bed	-	-	-	
		Waste Land	13	80,000	1,040,000	
13	HP.13	Farm Land	12	240,000	2,880,000	3,520,000
		River bed	-	-	-	
		Waste Land	8	80,000	640,000	
14	HP.14	Farm Land	12	240,000	2,880,000	4,480,000
		River bed	-	-	-	
		Waste Land	20	80,000	1,600,000	
15	HP.15	Farm Land	3	240,000	720,000	2,320,000
		River bed	-	-	-	
		Waste Land	20	80,000	1,600,000	

Sr. #	Owner Name	Type of Land / Property Affected	Affected Area (Kanal) *	Rate / Kanal (Rs.)	Estimated Cost (Rs.)	Total Cost (Rs.)
16	HP.16	Farm Land	19	240,000	4,560,000	4,560,000
		River bed	-	-	-	
		Waste Land	-	-	-	
17	HP.17	Farm Land	-	-	-	1,840,000
		River bed	-	-	-	
		Waste Land	23	80,000	1,840,000	
18	HP.18	Farm Land	-	-	-	1,360,000
		River bed	-	-	-	
		Waste Land	17	80,000	1,360,000	
19	HP.19	Farm Land	-	-	-	2,480,000
		River bed	-	-	-	
		Waste Land	31	80,000	2,480,000	
20	HP.20	Farm Land	-	-	-	1,200,000
		River bed	-	-	-	
		Waste Land	15	80,000	1,200,000	
21	HP.21	Farm Land	-	-	-	1,440,000
		River bed	-	-	-	
		Waste Land	18	80,000	1,440,000	
22	HP.22	Farm Land	-	-	-	1,280,000
		River bed	-	-	-	
		Waste Land	16	80,000	1,280,000	
23	HP.23	Farm Land	-	-	-	1,440,000
		River bed	-	-	-	
		Waste Land	18	80,000	1,440,000	
24	HP.24	Farm Land	-	-	-	960,000
		River bed	-	-	-	
		Waste Land	12	80,000	960,000	
25	HP.25	Farm Land	-	-	-	1,440,000
		River bed	-	-	-	
		Waste Land	18	80,000	1,440,000	
26	HP.26	Farm Land	2	240,000	480,000	2,000,000
		River bed	-	-	-	
		Waste Land	19	80,000	1,520,000	

Sr. #	Owner Name	Type of Land / Property Affected	Affected Area (Kanal) *	Rate / Kanal (Rs.)	Estimated Cost (Rs.)	Total Cost (Rs.)
27	HP.27	Farm Land	1	240,000	240,000	2,000,000
		River bed	-	-	-	
		Waste Land	22	80,000	1760,000	
28	HP.28	Farm Land	2	240,000	480,000	2,080,000
		River bed	-	-	-	
		Waste Land	20	80,000	1,600,000	
29	HP.29	Farm Land	1	240,000	240,000	1,600,000
		River bed	-	-	-	
		Waste Land	17	80,000	1,360,000	
30	HP.30	Farm Land	1	240,000	240,000	1,520,000
		River bed	-	-	-	
		Waste Land	16	80,000	1,280,000	
31	HP.31	Farm Land	1	240,000	240,000	1,520,000
		River bed	-	-	-	
		Waste Land	16	80,000	1,280,000	
32	HP.32	Farm Land	4	240,000	960,000	2,400,000
		River bed	-	-	-	
		Waste Land	18	80,000	1,440,000	
33	HP.33	Farm Land	4	240,000	960,000	2,240,000
		River bed	-	-	-	
		Waste Land	16	80,000	1,280,000	
34	HP.34	Farm Land	8	240,000	1,920,000	3,440,000
		River bed	-	-	-	
		Waste Land	19	80,000	1,520,000	
35	State Owned Land	Farm Land	-	-	-	16,200,000
		River bed	324	50,000	16,200,000	
		Waste Land	-	-	-	
Sub Total						110,040,000
Cost of Land to be Acquired at Power House Site						
1	P.1	Farm Land	-	-	-	400,000
		River bed	-	-	-	
		Waste Land	5	80,000	400,000	
2	P.2	Farm Land	-	-	-	
		River bed	-	-	-	

Sr. #	Owner Name	Type of Land / Property Affected	Affected Area (Kanal) *	Rate / Kanal (Rs.)	Estimated Cost (Rs.)	Total Cost (Rs.)
		Waste Land	10	80,000	800,000	800,000
3	P.3	Farm Land	-	-	-	
		River bed	-	-	-	
		Waste Land	5	80,000	400,000	400,000
4	P.4	Farm Land	-	-	-	
		River bed	-	-	-	
		Waste Land	10	80,000	800,000	800,000
5	P.5	Farm Land	-	-	-	
		River bed	-	-	-	
		Waste Land	18	80,000	1,440,000	1,440,000
6	P.6	Farm Land	-	-	-	
		River bed	-	-	-	160,000
		Waste Land	2	80,000	160,000	
7	P.7	Farm Land	-	-	-	
		River bed	-	-	-	
		Waste Land	19	80,000	1,520,000	1,520,000
8	P.8	Farm Land	-	-	-	
		River bed	-	-	-	
		Waste Land	11	80,000	880,000	880,000
9	P.9	Farm Land	-	-	-	
		River bed	-	-	-	
		Waste Land	8	80,000	640,000	640,000
10	P.10	Farm Land	-	-	-	
		River bed	-	-	-	
		Waste Land	8	80,000	640,000	640,000
11	P.11	Farm Land	-	-	-	
		River bed	-	-	-	
		Waste Land	12	80,000	960,000	960,000

Sr. #	Owner Name	Type of Land / Property Affected	Affected Area (Kanal) *	Rate / Kanal (Rs.)	Estimated Cost (Rs.)	Total Cost (Rs.)
Sub Total						8,640,000
Cost of Land to be Acquired for Weir Structures						
1.	W.1	Farm Land	2	240,000	480,000	1,085,000
		River bed	5.7	50,000	285,000	
		Waste Land	4	80,000	320,000	
Sub Total						1,085,000
Cost of Land to be Acquired for Surface Surge Chamber						
1	State Owned Land	Farm Land		-	-	60,000
		River bed		-	-	
		Waste Land	0.75	80,000	60,000	
Sub Total						60,000
Cost of Land to be Acquired for Access/ Maintenance Roads						
1.	MR.1	Farm Land	3.3	240,000	792,000	792,000
		River bed	-	-	-	
		Waste Land	-	-	-	
2.	MR.2	Farm Land	1.0	240,000	240,000	240,000
		River	-	-	-	
		Water Land	-	-	-	
3.	MR.3	Farm Land	1.0	240,000	240,000	240,000
		River	-	-	-	
		Water Land	-	-	-	
4.	MR.4	Farm Land	1.0	240,000	240,000	240,000
		River	-	-	-	
		Water Land	-	-	-	
5.	MR.5	Farm Land	0.5	240,000	120,000	120,000
		River	-	-	-	
		Water Land	-	-	-	
6.	MR.6	Farm Land	0.4	240,000	96,000	96,000

Sr. #	Owner Name	Type of Land / Property Affected	Affected Area (Kanal) *	Rate / Kanal (Rs.)	Estimated Cost (Rs.)	Total Cost (Rs.)
		River	-	-	-	
		Water Land	-	-	-	
7.	MR.7	Farm Land	0.4	240,000	96,000	
		River	-	-	-	96,000
		Water Land	-	-	-	
8.	MR.8	Farm Land	0.2	240,000	48,000	
		River	-	-	-	48,000
		Water Land	-	-	-	
9.	MR.9	Farm Land	0.5	240,000	120,000	
		River	-	-	-	120,000
		Water Land	-	-	-	
10.	MR.10	Farm Land	0.5	240,000	120,000	
		River	-	-	-	120,000
		Water Land	-	-	-	
11.	MR.11	Farm Land	0.3	240,000	72,000	
		River	-	-	-	72,000
		Water Land	-	-	-	
12.	MR.12	Farm Land	0.2	240,000	48,000	
		River	-	-	-	48,000
		Water Land	-	-	-	
13.	MR.13	Farm Land	0.3	240,000	72,000	
		River	-	-	-	72,000
		Water Land	-	-	-	
14.	MR.14	Farm Land	0.4	240,000	96,000	
		River	-	-	-	96,000
		Water Land	-	-	-	
15.	MR.15	Farm Land	0.5	240,000	120,000	120,000

Sr. #	Owner Name	Type of Land / Property Affected	Affected Area (Kanal) *	Rate / Kanal (Rs.)	Estimated Cost (Rs.)	Total Cost (Rs.)
		River	-	-	-	
		Water Land	-	-	-	
Sub Total						2,520,000
Total Permanent Land Acquisition Cost (Rs.)						122,345,000

* 1 Ha = 10,000 m² = 2.471 Acre = 8 Kanal

8.3.2 Cost of Affected Houses

As a result of project implementation, a total of 14 houses will be affected. The compensation shall be given to the owners on prevailing market prices. The detail is given in Table 8.2 below.

Table 8.2: Cost of Affected Houses

Sr. No.	Owner's Name	No. of Houses	No. of Rooms			No. of Kitchen	No. of Bathroom	Total Cost (Rs.)
			Type B	Type C	Type D			
Cost of Affected Houses at Powerhouse Site								
1	H.1	1	5	7	2	3	3	6,000,000
2	H.2	1	-	2	-	1	-	1,100,000
3	H.3	1	-	-	2	1	1	1,000,000
4	H.4	1	-	1	-	1	-	1,000,000
5	H.5	1	5	-	-	1	1	2,500,000
6	H.6	1	1	-	-	-	1	1,300,000
7	H.7	1	-	7	-	1	1	1,500,000
8	H.8	1	4	3	2	1	2	4,200,000
9	H.9	1	2	-	-	1	1	1,500,000
10	H.10	1	-	-	2	1	1	1,000,000
11	H.11	1	2	3	2	1	2	3,700,000
12	H.12	1	6	-	-	1	2	4,000,000
13	H.13	1	2	5	-	1	1	3,300,000
Cost of Houses at Diversion Tunnel Weir Site								
14	H.14	1	-	7	-	1	1	4,100,000
Total Cost of Affected Houses (Rs.)								36,200,000

8.3.3 Cost of Economic Trees

A total of 624 trees will be affected by the project implementation. The trees are generally of younger age, between 3 – 16 years. It is estimated that a single tree on an average would yield about 70 cu. ft. of wood. According to local market the cost of Kiker, Beence, Shahtoot is

Rs. 260. per cu.ft., Walnut, Tali, Deodar, Cheer at Rs. 900 per cu.ft. and the remaining trees like Dhraik, Daraba, Nim, Balkald, Kau, Pipel, Phulai, Phagwar, Sherol at Rs 100 per cu.ft. The fruit trees like Angeer is rated at Rs. 10,000 per tree whereas apricot and pear @ Rs. 12,000 per tree each. Accordingly the total cost of 624 trees to be cut due to project implementation is estimated at Rs. 7,462,300 for compensation as detailed in Table 8.3.

Table 8.3: Cost of Trees

Name of Trees	Type of Trees	Numbers	Cu. ft.	Rs. / Cu. ft.	Total Cost (Rs.)
Trees in Reservoir Impounding					
Sherol	Firewood	30	70	100	210,000
Shahtoot	Fruit	22	70	260	400,400
Dhraik	Firewood	16	70	100	112,000
Wallnut	Fruit	4	70	900	252,000
Daraba	Firewood	14	70	100	98,000
Fig	Fruit	16	-	10000/Tree	160,000
Nim	Firewood	6	70	100	42,000
Balkald	Firewood	25	70	100	175,000
Kau	Firewood	23	70	100	161,000
Cheer	Timber	14	70	900	882,000
Tali	Timber	6	70	350	147,000
Pipal	Firewood	8	70	100	56,000
Kikar	Firewood	6	70	260	109,200
Phulai	Firewood	7	70	100	49,000
Beence	Firewood	6	70	260	109,200
Deodar	Timber	11	70	900	693,000
Phagwar	Firewood	8	70	100	56,000
Sub Total		222			3,711,800
Trees at Power House Site					
Sherol	Firewood	200	70	100	1,400,000
Phagwar	Firewood	19	70	100	133,000
Wallnut	Fruit	9	70	900	567,000
Mixed Fruit Trees	Fruit	35	0	10000	350,000
Sub Total		263			2,450,000
Trees at Construction Camp at Weir Site					
Apricot	Fruit	34		12000	408,000
Pear	Fruit	16		12000	192,000

Name of Trees	Type of Trees	Numbers	Cu. ft.	Rs. / Cu. ft.	Total Cost (Rs.)
Sub Total		50			600,000
Trees at Storage Camp at Weir Site					
Dhraik	Firewood	20	70	100	140,000
Phagwar	Firewood	10	70	100	70,000
Dravia	Firewood	14	70	100	98,000
Apricoat	Fruit	12	0	12000	144,000
Sub Total		56			452,000
Trees at Maintenance Road					
Dhraik	Firewood	6	70	100	42,000
Tali	Timber	1	70	350	24,500
Bhala	Firewood	6	70	100	42,000
Sherol	Firewood	6	70	100	42,000
Phagwar	Firewood	2	70	100	14,000
Sub Total		21			164,500
Trees at Access Road					
Sherol	Firewood	7	70	100	49,000
Phagwar	Firewood	5	70	100	35,000
Sub Total		12			84,000
Total Cost of Trees (Rs.)		624			7,462,300

8.3.4 Temporary Land Acquisition

An estimated area of 68 acres would be needed for temporary acquisition for a period of four years during project implementation as given in Table 6.3. Out of which 22 acres (Farmland = 8.6 acres and state owned land 13.4 acres) would be required for construction of storage camps and worker camps, and 46 acres of land for disposal of excavated material from construction of powerhouse, diversion tunnel, headrace tunnel, power shaft and surge chamber and 10 Acres (State Owned) land will be required for the construction of temporary diversion channel for a period of about 4 months. Cost of temporary land acquisition is given in Table 8.4.

8.3.5 Resettlement / Environmental Costs

Table 8.4 below summarises resettlement / environmental costs of Patrind Hydropower Project.

Table 8.4: Resettlement and Environmental Cost Estimate

Sr. #	Item	Unit	Land Area (Acres)	Rate Rs./Unit	Estimated Cost Rs.
1.	Permanent Land Acquisition	Acre			
	• Reservoir Impounding				
	- Cultivated Land		22.875	1,920,000	43,920,000
	- Waste Land		78.0	640,000	49,920,000
	- State Owned / River Bed Land		40.5	400,000	16,200,000
	• Project Structures	Acre			
	i) Weir Structures				
	- Cultivated Land		0.25	1,920,000	480,000
	- Waste Land		0.5	640,000	320,000
	- State Owned / River Bed Land		0.7	400,000	280,000
	ii) Power House and Surge Chamber	Acre			
	- Waste Land		13.6	640,000	8,704,000
	iii) Access Road at Weir Site	Acre			
	- Cultivated Land		0.41	1,920,000	787,200
	iv) Access Road to Powerhouse Site	Acre			
	- State Land		0.1	400,000	40,000
	v) Maintenance Road at Weir Site	Acre			
	- Cultivated Land		0.9	1,920,000	1,728,000
	Sub-Total	Rs.			122,379,200
2.	Cost of Houses				
	Houses	No.	14	Variable	36,200,000
	Sub Total	Rs.			36,200,000
3.	Cost of Commercial Assets	No.			
	Small Water Mill		1	400,000	400,000
4.	Cost of Trees	No.			

Sr. #	Item	Unit	Land Area (Acres)	Rate Rs./Unit	Estimated Cost Rs.
	Firewood Trees		445	Variable	3,242,400
	Timber Trees		31	Variable	1,746,500
	Mixed Fruit Trees		148	Variable	2,473,400
	Sub Total		624		7,462,300
5.	Temporary Land Acquisition				
	i. Workers and Storage Camps at Weir Site	Acre			
	- Cultivated Land		8.6	Rs. 15,000/ Acre/Year	580,500
	ii. Workers and Storage Camps at Power House Site	Acre			
	- State Owned / River Bed Land		13.45	400,000	24,210,000
	iii. Diversion Channel at Powerhouse Site	Acre			
	- State Owned		10.0	Rs. 200,000	2,000,000
	iv. Dumping Sites near Weir	Acer			
	- Waste Land		21.0	Rs. 5,000/ Acre/Year	472,500
	v. Dumping Sites near Power House	Acre			
	- Waste Land		25.0	Rs. 5,000/ Acre/Year	562,500
	Sub Total				27,825,500
Total Resettlement and Environmental Cost Rs.					194,267,000
US\$					2,312,702.38 *

*Conversion Factor 1US\$ = Rs. 84.0

The total environmental costs add up to Rs. 168,459,625 (US\$ 2,005,472). The cost of permanent land acquisition Rs. 122,379,200 (73%) is the largest component of the environmental costs followed by

Rs. 36,200,000 (22 %) for cost of houses.

8.4 RESETTLEMENT FINANCING

The outlay of resettlement budget as given above amounts to Rs. 168,459,625 (US\$ 2,005,472) The Company is committed to provide funding for the estimated amount of Rs. 168.5 million (US\$ 2.0 million). The Company will assure that the amounts of money assessed and finally approved for compensation and financial assistance are paid to the genuine persons losing land, houses and other economic assets well in advance of actual possession of land/assets and also well in advance from the start of the construction.

CHAPTER – 9

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

9.1 MANAGEMENT AND MONITORING

The environmental analysis of Patrind Hydropower Project has identified and assessed a number of environmental and socio-economic impacts related to planning, design, construction and operation phases. A plan to mitigate them has been presented. Some areas, however, will require monitoring which provides effective guarantees of the Company's commitment to safeguard and enhance the social, environmental and economic quality of the affected area. Monitoring involves measurement and recording of environmental, social and economic variables associated with project impacts providing information on characteristics and functions of variables in time and space. Monitoring can improve project management. It can also be used as an early warning to identify adverse trends in the project area before it is too late to take mitigation measures. Monitoring can also provide a reliable data base which can be used in mediation between interested parties.

Patrind Hydropower Project is located in the administrative domain of Khyber Pakhtunkhwa (KP) and the state of Azad Jammu and Kashmir (AJK). It is proposed that one representative each of AJK Hydroelectric Board (AJK HEB), Provincial Environmental Protection Agency Khyber Pakhtunkhwa and DG Environment AJK may look over the performance of the key players in the implementation of the management and monitoring strategy. The key players, of course, are the Company, EPC Contractor, Environmental and Social Management Unit (EMU) and Supervisory Consultant (SC). The SC to be selected by ADB will undertake visits on as and when required basis for independent assessment/ evaluation till the end of the project. SC will review the status of implementation in the light of targets, budget and duration laid down in the schedule of resettlement plan as given in Table – 6.8.

9.2 ENVIRONMENTAL MANAGEMENT PLAN

Chapter 7 deals with measures to mitigate potential negative impacts during construction and operation stages of the project. Details of management plan and responsibilities are given in Table 9.1. Chapters 6 along with relevant provisions in the tender documents provide the basis of environmental management and monitoring plan. Details of the contractor's obligations to be incorporated in the tender documents will include compliance with regulations as well as public health and safety requirements.

Details of specific provisions to be included in the contract document to adopt the mandated health and safety measures to minimize accidents and avoid fatalities during the construction activities fall into the following categories:

- Proper management and disposal of construction waste
- Control measures for waste, fuel oil, lubricants and smoke
- Reduction of noise and dust levels
- Rehabilitation of areas used for roads for access/ maintenance and sites for temporary storage of construction materials/ equipments
- Provision of first aid kit
- Usage and proper maintenance of equipment with appropriate noise and smoke abatement controls.
- Provision of fire fighting equipment

It is therefore recommended that following provisions should be made in the contract document to be signed with the EPC Contractor.

The EPC Contractor shall:

- Draw up and submit a site plan, plan of works clearly defining the facilities to be created both on and off-site for project implementation.
- Ensure that Contractor's work plan minimizes the disturbance to the environment.
- Execute site restoration upon completion of work according to the site restoration plan. This plan shall include photographs, preferably a recorded video tape, showing the pre-project stage of all the sites used during the construction phase.

Special attention of the EPC Contractor shall be drawn towards contract specifications to:

- Save and protect the trees during stock piling of materials and planting at least two trees for the one destroyed.
- Restore the site environment at Contractor's own expense before submission of the completion report.
- Cooperate with the supervisor to compile and submit a report certifying that site restoration work has been completed satisfactorily.
- Employ local unskilled labour.

Table 9.1 Environmental Management Plan and Responsibility

Impacts		Mitigation Measures	Mitigation Strategy	Responsibly
A. Pre-Construction Stage				
1.	Land Acquisition Permanent Land Acquisition for: - Reservoir impounding 57.2 Ha - Construction of weir structure 0.59 Ha - Powerhouse 5.46 Ha - Access/ Maintenance Roads 0.53 Ha - Surge Tank 0.04 Ha Temporary Land Acquisition for: - Construction camps at weir and powerhouse site 5.11 Ha - Storage camps at weir and powerhouse site 3.82 Ha - Dumping area for excavated material 18.6 Ha	- Payment of compensation for acquisition of land areas up to the level of restoration - Prompt payment to affectees before start of construction work - Job opportunities to affectees and locals - Payment of compensation for acquisition of land areas up to the level of restoration - Prompt payment to affectees before start of construction work - Job opportunities to affectees and locals	Compensation to the level of restoration in accordance with Asian Development Bank Policy Statement 2009 & 2010/The World Bank Guidelines/Land acquisition Act 1894/RP of Pakistan 2002 Draft Compensation to the level of restoration in accordance with Asian Development Bank Policy Statement 2009 & 2010/The World Bank Guidelines/Land acquisition Act 1894/RP of Pakistan 2002 Draft	SHPL, LRD, C SHPL, LRD, C

Impacts	Mitigation Measures	Mitigation Strategy	Responsibly
2. Loss of Houses 13 Nos. houses on Powerhouse site 01 No. house on weir site	- Payment of compensation for acquisition of land areas up to the level of restoration - Prompt payment to affectees before start of construction work - Job opportunities to affectees and locals	Compensation to the level of restoration in accordance with Asian Development Bank Policy Statement 2009 & 2010/The World Bank Guidelines/Land acquisition Act 1894/RP of Pakistan 2002 Draft	SHPL, LRD, C
3. Loss of Commercial Assets 01 Small water mill	- Payment of compensation for acquisition of one small water mill to the level of restoration - Prompt payment to the affectee before start of construction work - Job opportunities to the affectee	Compensation to the level of restoration in accordance with Asian Development Bank Policy Statement 2009 & 2010/The World Bank Guidelines/Land acquisition Act 1894/RP of Pakistan 2002 Draft	SHPL, LRD, C
4. Affected Persons - No. of APs due to loss of houses 146 - No. of APs due to land acquisition - Due to permanent land acquisition 62 - Due to temporary land acquisition 50 - No. of APs due to loss of commercial assets 01	- Payment of compensation for acquisition of land areas up to the level of restoration - Prompt payment to affectees before start of construction work - Job opportunities to affectees and locals	Compensation to the level of restoration in accordance with Asian Development Bank Policy Statement 2009 & 2010/The World Bank Guidelines/Land acquisition Act 1894/RP of Pakistan 2002 Draft	SHPL, LRD, C

Impacts	Mitigation Measures	Mitigation Strategy	Responsibly
B. Construction Stage			
1. Destruction of Vegetation - Reservoir impounding no. of trees 222 - Powerhouse site no. of trees 263 - Construction camp at weir site and powerhouse site no. of trees 106 - Access/Maintenance roads no. of trees 33	Plantation programme. Planting at least two trees for the one removed.	Fair/negotiated compensation to tree owners Vegetation and reforestation and tree plantation under annual tree plantation campaigns of the provincial governments	SHPL, C, Forest Deptt.
3. Endangered Species	Not Applicable	–	–
4. River water pollution from construction and waste disposal	Sound construction management to avoid river water pollution Training to create awareness for water pollution control to avoid sedimentation in the reservoir. Careful location of camps, buildings, borrow pits, spoil and disposal sites	Compliance with NEQS/ADB/ World Bank Guidelines for on-site waste treatment and disposal facilities	SHPL, C
5. Noise Air Pollution due to: - Construction activities - Dumping of spoil material - Movement of vehicle and heavy machinery - Blasting and hauling	- Warding of the activity area - Provision of moisture cover - Avoid use of second hand machinery - Movement of vehicles within speed limit - Controlled blasting and excavation and orderly dumping of excavated material under cover of moisture	- Contractors plan for disposal of excavated material - Contractors traffic management plan - Enforcement of noise standards by contractor	SHPL, C

Impacts	Mitigation Measures	Mitigation Strategy	Responsibly
	- Ensure blasting during daytime - Any blasting during night time (2200-070hrs) to be prohibited within a distance of 200m from houses and settlements		
6. Soil erosion/Sedimentation	Precautions to minimize erosion	Grading, compaction, pitching, retaining structures and terracing	SHPL, C
7. Soil and water Contamination	Avoid oil spillage Proper disposal of sewage water	- Oil stores should be cemented - Proper ceiling of vehicles - Place impervious sheet before oil change - Adequate sanitation facilities	SHPL, C
8. Hazards to workers health and safety	- Personal protective equipments and field clinic for workers and provision of protection against accidents/diseases	- Provision of muffles, steel hats, boots, first aid kits, fire fighting equipments	
9. Sanitation at workers camps	- Provision of sewerage and sewage treatment systems for sanitary waste water and solid waste management system for construction camp	- Proper sanitation facilities - Disposal of solid waste on properly located landfills	
10. Communicable diseases brought by outside construction workers	- Regular check up/vaccination of workers	-	

Impacts	Mitigation Measures	Mitigation Strategy	Responsibly
11 Obstruction of right-of-way	- Proper muck disposal and provision of diversion where ever needed	-	
12 Loss of historic, cultural or aesthetic features by inundation	NA	No archaeological, historical or cultural property affected	—
13 Loss of fauna, birds and wildlife habitat	Strict prohibition of netting, catching, hunting of fauna, birds and animals Maintaining speed limit of vehicles	Creating awareness and imparting training to construction crew to avoid loss of fauna, birds and animals habitat	SHPL, C
14 Social disruption and decrease in standard of living of resettled people	Uplift of standard of living by ensuring access to parks, provision of health and social services. Adequate compensation of lost assets	Adequate Compensation provided in the resettlement plan. Social uplift programme as given in EMP	SHPL, C
15 Privacy of the locals	- Provision of privacy measures - Movement of workers restricted to camp areas		
16 Environmental degradation from increased pressure on land	Provision of recreational parks to enhance environmental aesthetics. Increase of productivity through improved management of land (agricultural, range, forestry improvements) to off set effects of land taken for project implementation	Minimum land/houses/trees taken for the project implementation	SHPL, C
17 Disruption/destruction of tribal/indigenous groups	NA	—	—
18 Village water supply	Construction of water tanks to collect spring water for distribution in the	Easy access of good water quality	SHPL, C

Impacts	Mitigation Measures	Mitigation Strategy	Responsibly
	village		
C. Operation Stage			
1. Proliferation of aquatic weeds in reservoir and downstream impairing weir discharge and fisheries	Clearance of woody vegetation from inundation zone prior to flooding Provide weed control measures Harvest of weeds for compost or fodder. Regulation of water discharge and manipulation of water levels to discourage weed growth	Development of fishery in the reservoir creating opportunities of income for local population	SHPL
2. Deterioration of water quality in reservoir	Clearance of woody vegetation from inundation zone prior to flooding Control of land uses, wastewater discharges, and agricultural chemical use in watershed.	Cutting of necessary trees/shrubs/ grasses etc. in inundation zone Watershed monitoring and management for water pollution control	SHPL EPA, EMU, Forest Deptt.
	Limit retention time of water in reservoir Provision for multi-level releases to avoid discharge of anoxic water	Reservoir operation to be coordinated with management of river discharges/ outflows for energy generation Under sluicing Provided	SHPL SHPL
3. Sedimentation of reservoir and loss of storage capacity	Control of land use in watershed (especially prevention of conversion of forests to agriculture)	Watershed management to control deforestation	SHPL, Forest Deptt
	Reforestation and/or soil conservation activities in watersheds	Watershed management to promote reforestation and soil conservation	SHPL, Forest Deptt

Impacts	Mitigation Measures	Mitigation Strategy	Responsibly
	Hydraulic removal of sediments (flushing, sluicing, release of density currents)	activities Under sluicing provided	SHPL
4. Formation of sediment deposits at reservoir entrance creating backwater effect and flooding	Sediment flushing, sluicing	Under sluicing provided	SHPL
5. Scouring of riverbed below dam	Design of trap efficiency and sediment release (e.g., sediment flushing, sluicing) to increase silt content of released water	Under sluicing provided	SHPL
6. Reduction in cultivated land	Increase of productivity through improved management of land (agricultural, range, forestry improvements) to off set effects of land taken for project implementation	Minimum land taken for the project implementation	SHPL, C
7. Disruption of riverine fisheries due to changes in flow and changes in water quality and limnology	NA	Existing fishery potential is not significant. Development of future reservoir fishery potential proposed for implementation by provincial department of fisheries	SHPL, Fishery Deptt.
8. Snagging of fishing nets in submerged vegetation in reservoir	Construction of water tanks to collect spring water for distribution in the village	At present no fishing activity exists	SHPL
9. Increase of water-related diseases	Vector control	Vector control, and treatment discussed for a public health protection	SHPL, Health Deptt.

Impacts	Mitigation Measures	Mitigation Strategy	Responsibly
		plan with KP Department of Health, Mansehra	
10 Conflicting demands for water use	NA	Water is not put to use below weir site	–
11 Poor land use practices in catchment areas above reservoir resulting in increased siltation and changes in water quality	Afforestation programmes to be urged/promoted by SHPL	Forest Deptt, has regular working plans to preserve the area and to control silt loss by tree plantation	SHPL, Forest Deptt. EPA
12 Reservoir bank stability	Plantation of trees along the banks and construction of spurs where required	To enhance the reservoir life	C, SHPL

9.3 MONITORING PLAN

The objectives of environmental monitoring during the various phases of the proposed project will be as follows:

- To ensure that the mitigation measures included in the EIA are being implemented completely
- To ensure the effectiveness of the mitigation measures in minimizing the project's impacts on social and environmental resources

To achieve these objectives the following monitoring plan will be implemented.

9.3.1 Monitoring Parameters, Location, Frequency and Responsibility

A comprehensive list of the factors to be monitored in terms of Environmental Monitoring Plan is reproduced in the following Table 9.2. The Table indicates the roles of the Company, Supervisory Consultant (SC), Provincial Environmental Protection Agency (EPA) Khyber Pakhtunkhwa and EPA of Azad Jammu and Kashmir.

9.4 PERFORMANCE INDICATORS

Performance indicators have been discussed which are to be judged with the progress of work. Implementation schedule for acquisition of land starting from the community consultation has been given in Table 6.8. Who is responsible to implement, who is responsible to monitor and whether the implementation has been done in accordance with the agreed terms and conditions. Time schedule for implementation has also been developed. Grievance redress mechanism has been institutionalized.

Other parameters needed to be monitored like acquisition of property, statutory requirements, physical, biological and socio-economic conditions as well as health safety of workers and nearby communities along with the responsibilities and frequency of monitoring is given in Table 9.2. These parameters have been divided into i) Pre- Construction, ii) Construction and iii) Operation phases of the project.

Table 9.2: Environmental Monitoring Plan – Patrind Hydropower Project

FEATURE / ISSUE	PARAMETER/S MONITORED	LOCATION	RESPONSIBILITY	FREQUENCY
PRE-CONSTRUCTION PHASE				
Survey of Required Land/Houses/commercial Assets/Flora Fauna	- Assessment of land/houses/commercial assets costs - No. of affected persons - No. of affected trees	Project sites	SHPL, EPA	Once
Acquisition of Land/Houses/Commercial Assets/Tress	Payments to Affectees, complaints	Project sites	EMU, SHPL, LRD, EPA	Monthly till finalization
CONSTRUCTION PHASE				
Statutory Requirements	Compliance with license and permit conditions	Project sites	EMU,EPA	Weekly
Landslides	Catchment stability	Weir and powerhouse catchment	EMU,EPC	Once after monsoon
Vegetation Clearance	Progressive vegetation clearance within marked sites	Project sites	EMU,EPC	Weekly
Erosion and Sediment	- Extent of erosion and sedimentation - Topsoil stripped and covered or seeded if stockpiled for longer than one month or during the monsoon - Batter stability	Project sites	EMU,EPC	Daily
		Project sites	EMU,EPC	Weekly
		Project sites	EMU,EPC	Weekly

FEATURE / ISSUE	PARAMETER/S MONITORED	LOCATION	RESPONSIBILITY	FREQUENCY
Muck Disposal	- Reuse of spoil/muck within Project areas where possible - Correct disposal of surplus spoil/muck in designated areas	Project sites	EMU, EPC	Daily
		Disposal areas	EMU,EPC	Daily
Hydrology	River flow volumes	Kunhar River at weir site	EMU	Daily
Water Quality	- Wastewater treated prior to river discharge - Temperature, dissolved oxygen, pH, conductivity, turbidity, total phosphorous, inorganic phosphorous, total nitrogen, ammonia nitrogen, nitrogen oxides, biochemical oxygen demand and faecal coliforms	Construction sites and camps upstream and downstream of weir and powerhouse	EMU EMU	Quarterly Quarterly
Waste Management	- Waste materials reused or recycled on-site where possible - Non-recyclable wastes disposed of appropriately	Project sites Project sites	EMU, EPC EMU,EPC	Monthly
Hazards/Risk	- Workers provided with appropriate safety equipment and regular safety training - Storage of hazardous goods in bunded areas or in secure sheds - Explosives stored in guarded bunkers - Use of hazardous goods according to manufacturers' specifications	Project sites	EMU,EPC	Weekly Weekly Weekly Weekly At time of use
Workers Health and Safety	- Enforcement of workforce rules and regulations - Provision of alternative fuels for cooking, heating and light - Provision of adequate and well maintained services and facilities	Project sites Workforce camps Project sites	EMU,EPC EMU,EPC EMU,EPC	Weekly Weekly Weekly

FEATURE / ISSUE	PARAMETER/S MONITORED	LOCATION	RESPONSIBILITY	FREQUENCY
Aquatic Ecology	Fish and Aquatic populations	Kunhar River – upstream and downstream of weir	EMU, Fishery Department	Quarterly
Flora	Direct observation of surrounding vegetation	Within 1,000 m of Project sites	EMU, Forest Department	Monthly
Noise and Vibration	- Maintenance of equipment in accordance with manufactures' specifications - Controlled blasting	Project sites Construction sites	EMU,EPC EMU,EPC	Weekly Daily
Air Quality	- Air quality in confined areas - Water sprayed regularly to minimise dust generation - Exhaust emissions from machinery – visual inspection	Tunnels and power station Project sites Project sites	EMU, EPA EMU, EPA EMU,EPA	Weekly Weekly Weekly
Traffic/Access	- Enforcement of speed limits on Project roads - Noise - Traffic Signs	Access and approaches roads	EMU,EPC	Weekly
Complaints	All complaints replied to	Project sites	EMU,SHPL	Weekly
OPERATION PHASE				
Statutory Responsibilities	Compliance with licence and permit conditions	Project sites	Supervisory Consultant, Operation Contractor, EPA	Biannually
Hydrology	River flow volume	Downstream of weir and tailrace outlet	Supervisory Consultant, Operation Contractor	Daily
Village Water Supply	Effectiveness of water supply schemes	Tercheela Village	Contractor	Quarterly

FEATURE / ISSUE	PARAMETER/S MONITORED	LOCATION	RESPONSIBILITY	FREQUENCY
River Bed Degradation	River bed degradation	Kunhar River bed from weir to confluence	Supervisory Consultant Operation Consultant	Quarterly
Headpond Stability	Banks stability	Headpond	Operation Contractor	Quarterly
Water Quality	Temperature, dissolved oxygen, pH, conductivity, turbidity, total phosphorous, inorganic phosphorous, total nitrogen, ammonia nitrogen, nitrogen oxides, biochemical oxygen demand and faecal coliforms	Headpond and downstream of river	Operation Contractor SC	Quarterly
Aquatic Ecology	Habitat availability and seasonal fish species and populations	Upstream and downstream of weir	SC, Fishery Department	Quarterly
Hazards	- Monitor landslides - Structural soundness	Catchment of project site and project structures	Operation Contractor SC	Annually Biannually
Noise	Noise levels	Powerhouse site	OC,SC	Quarterly
Solid Waste Disposal	Visit disposal sites	Project staff colonies	SC	Quarterly
Waste Water Discharge	Waste water Quality in accordance with NEQS	Project staff colonies	SC	Quarterly
Soil Contamination	Soil leachate	Powerhouse site	SC	Yearly
Workers Health and Safety	WAPDA safety codes for powerhouse	Powerhouse site	OC,SC	Quarterly

CHAPTER – 10

CONCLUSIONS AND RECOMMENDATIONS

10.1 INTRODUCTION

The Environmental Impact Assessment (EIA) and Resettlement Plan (RP) study has been conducted in line with the relevant guidelines of Asian Development Bank (ADB), World Bank (WB), International Finance Company (IFC) as well as Pakistan Environmental Protection Act 1997. The objective of the study is to identify and assess the potential environmental and social impacts of the Patrind Hydropower Project. The Report also includes Public Consultation with the communities in the project area in order to apprise them of the project activities and to obtain their views and concerns. This Chapter presents the conclusions/ key findings and recommendations for further actions.

10.2 CONCLUSIONS

The major conclusions of the EIA/ RP are;

- During the Project implementation, environmental and social impacts are experienced primarily during the construction phase. The operation phase will have mostly insignificant impacts on the social, physical and biological environment of the area. This has been confirmed during field surveys for the environmental and social assessment as part of this report.
- The potential impacts during the construction phase of the project include land acquisition (resulting in loss of cultivated land, houses and economic trees), soil erosion, water pollution, effect on ambient air quality caused by vehicle exhaust and kicked-up dust, noise pollution, safety hazards and public health concerns for the nearby communities.
- The key environmental issues during the operation phase of the project include downstream flow variations, waste disposal, safety hazards for the plant staff.
- All the recommended mitigation measures are contained in the Environmental Management and Monitoring Plan (EMMP), which will need to be made part of the EPC Contract. The plan provides for the requisite structure of the organization during the project implementation, defining roles and responsibilities of key players. The plan defines the mitigation actions, and monitoring agencies.
- A Resettlement Plan (RP) has also been developed and made part of the report to provide framework to address the involuntary resettlement issues and to guide through the compensation assessment and

disbursement process. The relevant provisions of RP will also be made part of the EPC Contract.

- The proposed mitigation measures adequately address all the concerns raised by the stakeholders.
- The project is unlikely to cause any significant, lasting impact on the social, physical and biological environment of the area.
- The overall findings of the environmental impact assessment and resettlement plan shows that the project is environmentally and socially viable provided that the proposed activities are carried out as mentioned in this report, and the mitigation measures are completely and effectively implemented.

10.3 RECOMMENDATIONS

On the basis of the environmental and social impact assessment and the conclusions as discussed above it is recommended that:

- The Environmental and Social Management Plan should be made a part of the EPC Contract awarded by the Company for implementation of the project.
- The Company should follow the RP for addressing the involuntary resettlement issues primarily pertaining to land acquisition and compensation for houses and other economic assets.
- The Company should ensure adherence to the environmental legislation and regulations.
- Company and its contractor(s) should employ local labour as far as possible.

ANNEXURES

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**PAKISTAN ENVIRONMENTAL
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PART I

Acts, Ordinances, President's Orders and Regulations

SENATE SECRETARIAT

Islamabad, the 6th December 1997

No. F. 9(46)/97-Legis.- The following Acts of Majlis-e-Shoora (Parliament) received the assent of the Acting President on 3rd December, 1997 are hereby published for general information :-

Act No. XXXIV of 1997

An Act to provide for the protection, conservation, rehabilitation and improvement of the environment, for the prevention and control of pollution, and promotion of sustainable development

WHEREAS it is expedient to provide for the protection, conservation, rehabilitation and improvement of the environment, prevention and control of pollution, promotion of sustainable development, and for matters connected therewith and incidental thereto;

1. Short title, extent and commencement.---(1) This Act, shall be called the Pakistan Environmental Protection Act, 1997

(2) It extends to the whole of Pakistan.

(3) It shall come into force at once.

2. Definitions.---In this Act, unless there is anything repugnant in the subject or context,--

(i) "adverse environmental effect" means impairment of, or damage to, the environment and includes--

(a) impairment of, or damage to, human health and safety or to biodiversity or property;

(b) pollution; and

(c) any adverse environmental effect as may be specified in the regulations;

(ii) "agricultural waste" means waste from farm and agricultural activities including poultry, cattle farming, animal husbandry residues from the use of fertilizers, pesticides and other farm chemicals;

(iii) "air pollutant" means any substance that causes pollution of air and includes soot, smoke, dust particles, odour, light, electro-magnetic, radiation, heat, fumes, combustion exhaust, exhaust gases, noxious gases, hazardous substances and radioactive substances;

(iv) "biodiversity" or "biological diversity" means the variability among living organisms from all sources, including inter alia terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part, including diversity within species, between species and of ecosystems;

(v) "Council" means the Pakistan Environmental Protection Council established under section 3;

(vi) "discharge" includes spilling, leaking, pumping, depositing, seeping, releasing, flowing out, pouring, emitting, emptying or dumping;

(vii) "ecosystem" means a dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit;

(viii) "effluent" means any material in solid, liquid or gaseous form or combination thereof being discharged from industrial activity or any other source and includes a slurry, suspension or vapour;

(ix) "emission standards" means the permissible standards established by the Federal Agency or a Provincial Agency for emission of air pollutants and noise and for discharge of effluent and waste;

(x) "environment" means—

(a) air, water and land;

(b) all layers of the atmosphere;

(c) all organic and inorganic matter and living organisms;

(d) the ecosystem and ecological relationships;

(e) buildings, structures, roads, facilities and works;

(f) all social and economic conditions affecting community life; and

(g) the inter-relationships between any of the factors specified in sub-clauses (a) to (f);

(xi) "environmental impact assessment" means an environmental study comprising collection of data, prediction of qualitative and quantitative impacts, comparison of alternatives, evaluation of preventive, mitigatory and compensatory measures, formulation of environmental management and training plans and monitoring arrangements, and framing of recommendations and such other components as may be prescribed;

(xii) "Environmental Magistrate" means the Magistrate of the First Class appointed under Section 24 ;

(xiii) "Environmental Tribunal" means the Environmental Tribunal constituted under section 20 ;

(xiv) "Exclusive Economic Zone" shall have the same meaning as in the Territorial Waters and Maritime Zones Act, 1976 (LXXXII of 1976);

(xv) "factory" means any premises in which industrial activity is being undertaken;

(xvi) "Federal Agency" means the Pakistan Environmental Protection Agency established under section 5, or any Government Agency, local council or local authority exercising the powers and functions of the Federal Agency;

(xvii) "Government Agency" includes—

(a) a division, department, attached department, bureau, section, commission, board, office or unit of the Federal Government or a Provincial Government;

(b) a developmental or a local authority, company or corporation established or controlled by the Federal Government or Provincial Government; and

(c) a Provincial Environmental Protection Agency.; and

(d) any other body defined and listed in the Rules of Business of the Federal Government or a Provincial Government.

(xviii) "hazardous substance" means—

(a) a substance or mixture of substances, other than a pesticide as defined in the Agricultural Pesticides Ordinance, 1971 (II of 1971), which, by reason of its chemical activity or toxic, explosive, flammable, corrosive, radioactive or other characteristics,

causes, or is likely to cause, directly or in combination with other matters an adverse environmental effect; and

(b) any substance which may be prescribed as a hazardous substance;

(xix) "hazardous waste" means waste which is or which contains a hazardous substance or which may be prescribed as hazardous waste and includes hospital waste and nuclear waste;

(xx) "historic waters" means such limits of the waters adjacent to the land territory of Pakistan as may be specified by notification under section 7 of the Territorial Waters and Maritime Zones Act, 1976 (LXXXII of 1976);

(xxi) "hospital waste" includes waste medical supplies and materials of all kinds, and waste blood, tissue, organs and other parts of the human and animal bodies, from hospitals, clinics and laboratories;

(xxii) "industrial activity" means any operation or process for manufacturing, making, formulating, synthesising, altering, repairing, ornamenting, finishing, packing or otherwise treating any article or substance with a view to its use, sale, transport, delivery or disposal, or for mining, for oil and gas exploration and development, or for pumping water or sewage, or for generating, transforming or transmitting power or for any other industrial or commercial purpose;

(xxiii) "industrial waste" means waste resulting from an industrial activity;

(xxiv) "initial environmental examination" means a preliminary environmental review of the reasonably foreseeable qualitative and quantitative impacts on the environment of a proposed project to determine whether it is likely to cause an adverse environmental effect for requiring preparation of an environmental impact assessment;

(xxv) "local authority" means any agency set up or designated by the Federal Government or a Provincial Government, by notification in the official Gazette, to be a local authority for the purposes of this Ordinance;

(xxvi) "local council" means a local council constituted or established under a law relating to local government;

(xxvii) "motor vehicle" means any mechanically propelled vehicle adapted for use upon land whether its power of propulsion is transmitted thereto from an external or internal source, and includes a chassis to which a body has not been attached, and a trailer, but does not include a vehicle running upon fixed rails;

(xxviii) "municipal waste" includes sewage, refuse, garbage, waste from abattoirs, sludge and human excreta and the like;

(xxix) "National Environmental Quality Standards" means standards established by the Federal Agency under clause (e) of sub-section (1) of section 6 and approved by the Council under clause (c) of sub-section (1) of section 4;

(xxx) "noise" means the intensity, duration and character of sounds from all sources, and includes vibration;

(xxxi) "nuclear waste" means waste from any nuclear reactor or nuclear plant or other nuclear energy system, whether or not such waste is radioactive;

(xxxii) "person" means any natural person or legal entity and includes an individual, firm, association, partnership, society, group, company, corporation, co-operative society, Government Agency, non-governmental organization, community-based organization, village organization, local council or local authority and, in the case of a vessel, the master or other person having for the time being the charge or control of the vessel;

(xxxiii) "pollution" means the contamination of air, land or water by the discharge or emission of effluent or wastes or air pollutants or noise or other matter which either directly or indirectly or in combination with other discharges or substances alters unfavourably the chemical, physical, biological, radiational, thermal or radiological or aesthetic properties of the air, land or water or which may, or is likely to make the air, land or water unclean, noxious or impure or injurious, disagreeable or detrimental to the health, safety, welfare or property of persons or harmful to biodiversity;

(xxxiv) "prescribed" means prescribed by rules made under this Act;

(xxxv) "project" means any activity, plan, scheme, proposal or undertaking involving any change in the environment and includes—

(a) construction or use of buildings or other works;

(b) construction or use of roads or other transport systems;

(c) construction or operation of factories or other installations;

(d) mineral prospecting, mining, quarrying, stone-crushing, drilling and the like;

(e) any change of land use or water use; and

(f) alteration, expansion, repair, decommissioning or abandonment of existing buildings or other works, roads or other transport systems, factories or other installations;

(xxxvi) "proponent" means the person who proposes or intends to undertake a project;

(xxxvii) "Provincial Agency" means a Provincial Environmental Protection Agency established under section 8;

(xxxviii) "regulations" means regulations made under this Act;

(xix) "rules" means rules made under this Act;

(xl) "sewage" means liquid or semi-solid wastes and sludge from sanitary conveniences, kitchens, laundries, washing and similar activities and from any sewerage system or sewage disposal works;

(xli) "standards" means qualitative and quantitative standards for discharge of effluent and wastes and for emission of air pollutants and noise either for general applicability or for a particular area, or from a particular production process, or for a particular product, and includes the National Environmental Quality Standards, emission standards and other standards established under this Act and the rules and regulations;

(xlii) "sustainable development" means development that meets the needs of the present generation without compromising the ability of future generations to meet their needs;

(xliii) "territorial waters" shall have the same meaning as in the Territorial Waters and Maritime Zones Act, 1976 (LXXXII of 1976);

(xliv) "vessel" includes anything made for the conveyance by water of human beings or of goods; and

(xlv) "waste" means any substance or object which has been, is being or is intended to be, discarded or disposed of, and includes liquid waste, solid waste, waste gases, suspended waste, industrial waste, agricultural waste, nuclear waste, municipal waste, hospital waste, used polyethylene bags and residues from the incineration of all types of waste.

3. Establishment of the Pakistan Environmental Protection Council.— (1) The Federal Government shall, by notification in the official Gazette, establish a Council to be known as the Pakistan Environmental Protection Council consisting of—

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| (i) Prime Minister or such other person as the Prime Minister may nominate in this behalf. | Chairperson |
| (ii) Minister incharge of the Ministry or Division dealing with the subject of environment. | Vice Chairperson |
| (iii) Chief Ministers of the Provinces. | Members |
| (iii) Ministers Incharge of the subject of environment in the Provinces. | Members |
| (iv) Such other persons not exceeding thirty-five as the federal Government may appoint, of which at least | Members |

twenty shall be non-officials including five representatives of the Chambers of Commerce and Industry and industrial associations and one or more representatives of the Chambers of Agriculture, the medical and legal professions, trade unions, and non-governmental organizations concerned with the environment and development, and scientists, technical experts and educationists

(v) Secretary to the Government of Pakistan, incharge of the Ministry or Division dealing with the subject of environment

Member/
Secretary

(2) The Members of the Council, other than ex-officio members, shall be appointed in accordance with the prescribed procedure and shall hold office for a term of two years.

(3) The Council shall frame its own rules of procedure.

(4) The Council shall hold meetings, as and when necessary, but not less than two meetings, shall be held in a year.

(5) The Council may constitute committees of its members and entrust them with such functions as it may deem fit, and the recommendations of the committees shall be submitted to the Council for approval.

(6) The Council, or any of its committees, may invite any technical expert or representative of any Government Agency or non-governmental organization or other person possessing specialized knowledge of any subject for assistance in performance of its functions.

4. Functions and powers of the Council.—(1) The Council shall—

(a) co-ordinate and supervise enforcement of the provisions of this Act; and

(b) approve comprehensive national environmental policies and ensure their implementation within the framework of a national conservation strategy as may be approved by the Federal Government from time to time;

(c) approve the National Environmental Quality Standards;

(d) provide guidelines for the protection and conservation of species, habitats, and biodiversity in general, and for the conservation of renewable and non-renewable resources.

(e) co-ordinate integration of the principles and concerns of sustainable development into national development plans and policies;

(f) consider the National Environment Report and give appropriate directions thereon;

(2) The Council may, either itself or on the request of any person or organization, direct the Federal Agency or any Government Agency to prepare, submit, promote or implement projects for the protection, conservation, rehabilitation and improvement of the environment, the prevention and control of pollution, and the sustainable development of resources or to undertake research in any aspect of environment.

5. Establishment of the Pakistan Environmental Protection Agency.—(1) The Federal Government shall, by notification in the official Gazette, establish the Pakistan Environmental Protection Agency to exercise the powers and perform the functions assigned to it under this Act and the rules and regulations made thereunder.

(2) The Federal Agency shall be headed by a Director-General who shall be appointed by the Federal Government on such terms and conditions as it may determine.

(3) The Federal Agency shall have such administrative, technical and legal staff, as the Federal Government may specify, to be appointed in accordance with such procedure as may be prescribed.

(4) The powers and functions of the Federal Agency shall be exercised and performed by the Director-General.

(5) The Director-General may, by general or special order, delegate any of the powers and functions to staff appointed under sub-section (3).

(6) For assisting the Federal Agency in the discharge of its functions the Federal Government shall establish Advisory Committees for various sectors and appoint as members thereof eminent representatives of the relevant sector, educational institutions, research institutes and non-governmental organizations.

6. Functions of the Federal Agency.—(1) The Federal Agency shall—

(a) administer and implement this Act and the rules and regulations made;

(b) prepare, in co-ordination with the appropriate Government Agency and in consultation with the concerned sectoral Advisory Committees, national environmental policies for approval by the Council;

(c) take all necessary measures for the implementation of the national environmental policies approved by the Council;

(d) prepare and publish an annual National Environment Report on the state of the environment;

(e) prepare, establish and revise the National Environmental Quality Standards with approval of the Council:

Provided that before seeking approval of the Council, the Federal Agency shall publish the proposed National Environmental Quality Standards for public opinion in accordance with the prescribed procedure; and

(f) ensure enforcement of the National Environmental Quality Standards;

(g) establish standards for the quality of the ambient air, water and land, by notification in the official Gazette in consultation with the Provincial Agency concerned:

Provided that—

(i) different standards for discharge or emission from different sources and for different areas and conditions may be specified;

(ii) where standards are less stringent than the National Environmental Quality Standards prior approval of the Council shall be obtained;

(iii) certain areas, with the approval of the Council, may exclude from carrying out specific activities, projects from the application of such standards;

(h) co-ordinate environmental policies and programmes nationally and internationally;

(i) establish systems and procedures for surveys, surveillance, monitoring, measurement, examination, investigation, research, inspection and audit to prevent and control pollution, and to estimate the costs of cleaning up pollution and rehabilitating the environment in various sectors;

(j) take measures to promote research and the development of science and technology which may contribute to the prevention of pollution, protection of the environment, and sustainable development;

(k) certify one or more laboratories as approved laboratories for conducting tests and analysis and one or more research institutes as environmental research institutes for conducting research and investigation for the purposes of this Act;

(l) identify the needs for and initiate legislation in various sectors of the environment;

(m) render advice and assistance in environmental matters including such information and data available with it as may be required for carrying out the purposes of this Act:

Provided that the disclosure of such information shall be subject to the restrictions contained in the proviso to sub-section (3) of section 12;

(n) assist the local councils, local authorities, Government Agencies and other persons to implement schemes for the proper disposal of wastes so as to ensure compliance with the standards established by it;

(o) provide information and guidance to the public on environmental matters;

(p) recommend environmental courses, topics, literature and books for incorporation in the curricula and syllabi of educational institutions;

(q) promote public education and awareness of environmental issues through mass media and other means including seminars and workshops;

(r) specify safeguards for the prevention of accidents and disasters which may cause pollution, collaborate with the concerned person in the preparation of contingency plans for control of such accidents and disasters, and co-ordinate implementation of such plans;

(s) encourage the formation and working of non-governmental organizations, community organizations and village organizations to prevent and control pollution and promote sustainable development;

(t) take or cause to be taken all necessary measures for the protection, conservation, rehabilitation and improvement of the environment, prevention and control of pollution and promotion of sustainable development; and

(u) perform any function which the Council may assign to it.

(2) The Federal Agency may—

(a) undertake inquiries or investigation into environmental issues, either of its own accord or upon complaint from any person or organization;

(b) request any person to furnish any information or data relevant to its functions;

(c) initiate with the approval of the Federal Government, requests for foreign assistance in support of the purposes of this Act and enter into arrangements with foreign agencies or organizations for the exchange of material or information and participate in international seminars or meetings;

(d) recommend to the Federal Government the adoption of financial and fiscal programmes, schemes or measures for achieving environmental objectives and goals and the purposes of this Act, including—

(i) incentives, prizes awards, subsidies, tax exemptions, rebates and depreciation allowances; and

(ii) taxes, duties, cesses and other levies;

(e) establish and maintain laboratories to help in the performance of its functions under this Act and to conduct research in various aspects of the environment and provide or arrange necessary assistance for establishment of similar laboratories in the private sector; and

(f) provide or arrange, in accordance with such procedure as may be prescribed, financial assistance for projects designed to facilitate the discharge of its functions.

7. Powers of the Federal Agency.—Subject to the provisions of this Act, the Federal Agency may—

(a) lease, purchase, acquire, own, hold, improve, use or otherwise deal in and with any property both moveable and immovable;

(b) sell, convey, mortgage, pledge, exchange or otherwise dispose of its property and assets;

(c) fix and realize fees, rates and charges for rendering any service or providing any facility, information or data under this Act or the rules and regulations;

(d) enter into contracts, execute instruments, incur liabilities and do all acts or things necessary for proper management and conduct of its business;

(e) appoint with the approval of the Federal Government and in accordance with such procedures as may be prescribed, such advisers, experts and consultants as it considers necessary for the efficient performance of its functions on such terms and conditions as it may deem fit;

(f) summon and enforce the attendance of any person and require him to supply any information or document needed for the conduct of any enquiry or investigation into any environmental issue;

(g) enter and inspect and under the authority of a search warrant issued by the Environmental Court or Environmental Magistrate, search at any reasonable time, any land, building, premises, vehicle or vessel or other place where or in which, there are reasonable grounds to believe that an offence under this Act has been, or is being, committed;

(h) take samples of any materials, products, articles or substances or of the effluent, wastes or air pollutants being discharged or emitted or of air, water or land in the vicinity of the discharge or emission;

(i) arrange for test and analysis of the samples at a certified laboratory;

(j) confiscate any article used in the commission of the offence where the offender is not known or cannot be found within a reasonable time:

Provided that the power under clauses (f), (h), (i) and (j) shall be exercised in accordance with the provisions of the Code of Criminal Procedure, 1898 (Act V of 1898), or the rules made under this Act and under the direction of the Environmental Court or Environmental Magistrate; and

(k) establish a National Environmental Co-ordination Committee comprising the Director-General as its chairman and the Director Generals of the Provincial Environmental Protection Agencies and such other persons as the Federal Government may appoint as its members to exercise such powers and perform such functions as may be delegated or assigned to it by the Federal Government for carrying out the purposes of this Act and for ensuring inter provincial co-ordination in environmental policies.

8. Establishment, powers and functions of the Provincial Environmental Protection Agencies.—(1) Every Provincial Government shall, by notification in the official Gazette, establish an Environmental Protection Agency, to exercise such powers and perform such functions as may be delegated to it by the Provincial Government under sub-section (2) of section 26.

(2) The Provincial Agency shall be headed by a Director-General who shall be appointed by the Provincial Government on such terms and conditions as it may determine.

(3) The Provincial Agency shall have such administrative, technical and legal staff as the Provincial Government may specify, to be appointed in accordance with such procedure as may be prescribed.

(4) The powers and functions of the Provincial Agency shall be exercised and performed by the Director-General.

(5) The Director General may, by general or special order, delegate any of the powers and functions to staff appointed under sub-section (3).

(6) For assistance of the Provincial Agency in the discharge of its functions, the Provincial Government shall establish Sectoral Advisory Committees for various sectors and appoint members from amongst eminent representatives of the relevant sector, educational institutions, research institutes and non-governmental organizations.

9. Establishment of the Provincial Sustainable Development Funds.—(1) There shall be established in each Province a Sustainable Development Fund.

(2) The Provincial Sustainable Development Fund shall be derived from the following sources, namely:—

(a) grants made or loans advanced by the Federal Government or the Provincial Governments;

(b) aid and assistance, grants, advances, donations and other non-obligatory funds received from foreign governments, national or international agencies, and non-governmental organizations; and

(c) contributions from private organizations and other persons.

(3) The Provincial Sustainable Development Fund shall be utilized in accordance with such procedure as may be prescribed for—

(a) providing financial assistance to the projects designed for the protection, conservation, rehabilitation and improvement of the environment, the prevention and control of pollution, the sustainable development of resources and for research in any aspect of environment; and

(b) any other purpose which in the opinion of the Board shall help achieve environmental objectives and the purposes of this Act.

10. Management of the Provincial Sustainable Development Fund.—(1) The Provincial Sustainable Development Fund shall be managed by a Board known as the Provincial Sustainable Development Fund Board consisting of—

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| (i) Chairman, Planning and Development Board/Additional Chief Secretary Planning and Development Department | Chairperson |
| (ii) such officers of the Provincial Governments, not exceeding six, as the Provincial Government may appoint including Secretaries incharge of the Finance, Industries and Environment Departments | Members |
| (iii) such non-official persons not exceeding ten as the Provincial Government may appoint including representatives of the Provincial Chamber of Commerce and Industry, non governmental organizations, and major donors. | Members |
| (iv) Director-General of the Provincial Agency | Member/Secretary |

(2) In accordance with such procedure and such criteria as may be prescribed, the Board shall have the power to—

(a) sanction financial assistance for eligible projects;

(b) invest moneys held in the Provincial Sustainable Development Fund in such profit-bearing Government bonds, savings schemes and securities as it may deem suitable; and

(c) take such measures and exercise such powers as may be necessary for utilization of the Provincial Sustainable Development Fund for the purposes specified in sub-section (3) of section 9.

(3) The Board shall constitute committees of its members to undertake regular monitoring of projects financed from the Provincial Sustainable Development Fund and to submit progress reports to the Board which shall publish an Annual Report incorporating its annual audited accounts and performance evaluation based on the progress reports.

11. Prohibition of certain discharges or emissions.—(1) Subject to the provisions of this Act and the rules and regulations no person shall discharge or emit or allow the discharge or emission of any effluent or waste or air pollutant or noise in an amount, concentration or level which is in excess of the National Environmental Quality Standards or, where applicable, the standards established under sub-clause (1) of clause (g) of sub-section (1) of section 6.

(2) The Federal Government may levy a pollution charge on any person who contravenes or fails to comply with the provisions of sub-section (1), to be calculated at such rate, and collected in accordance with such procedure as may be prescribed.

(3) Any person who pays the pollution charge levied under sub-section (2) shall not be charged with an offence with respect to that contravention or failure.

(4) The provisions of sub-section (3) shall not apply to projects which commenced industrial activity on or after the thirtieth day of June, 1994.

12. Initial environmental examination and environmental impact assessment.—(1) No proponent of a project shall commence construction or operation unless he has filed with the Government Agency designated by Federal Environmental Protection Agency or Provincial Environmental Protection Agencies, as the case may be, or, where the project is likely to cause an adverse environmental effects an environmental impact assessment, and has obtained from the Government Agency approval in respect thereof.

(2) The Government Agency shall subject to standards fixed by the Federal Environmental Protection Agency—

(a) review the initial environmental examination and accord its approval, or require submission of an environmental impact assessment by the proponent; or

(b) review the environmental impact assessment and accord its approval subject to such conditions as it may deem fit to impose, require that the environmental impact assessment be re-submitted after such modifications as may be stipulated or reject the project as being contrary to environmental objectives.

(3) Every review of an environmental impact assessment shall be carried out with public participation and no information will be disclosed during the course of such public participation which relates to—

(i) trade, manufacturing or business activities, processes or techniques of a proprietary nature, or financial, commercial, scientific or technical matters which the proponent has requested should remain confidential, unless for reasons to be recorded in writing, the Director General of the Federal Agency is of the opinion that the request for confidentiality is not well-founded or the public interest in the disclosure outweighs the possible prejudice to the competitive position of the project or its proponent; or

(ii) international relations, national security or maintenance of law and order, except with the consent of the Federal Government; or

(iii) matters covered by legal professional privilege.

(4) The Government Agency shall communicate its approval or otherwise within a period of four months from the date the initial environmental examination or environmental impact assessment is filed complete in all respects in accordance with the prescribed procedure, failing which the initial environmental examination or, as the case may be, the environmental impact assessment shall be deemed to have been approved, to the extent to which it does not contravene the provisions of this Act and the rules and regulations.

(5) Subject to sub-section (4) the appropriate Government may in a particular case extend the aforementioned period of four months if the nature of the project so warrants.

(6) The provisions of sub-sections (1), (2), (3), (4) and (5) shall apply to such categories of projects and in such manner as may be prescribed.

(7) The Government Agency shall maintain separate registers for initial environmental examination and environmental impact assessment projects, which shall contain brief particulars of each project and a summary of decisions taken thereon, and which shall be open to inspection by the public at all reasonable hours and the disclosure of information in such registers shall be subject to the restrictions specified in sub-section (3).

13. Prohibition of import of hazardous waste.—No person shall import hazardous waste into Pakistan and its territorial waters, Exclusive economic Zone and historic waters.

14. Handling of hazardous substances.—Subject to the provisions of this Act, no person shall generate, collect, consign, transport, treat, dispose of, store, handle or import any hazardous substance except—

(a) under a licence issued by the Federal Agency and in such manner as may be prescribed; or

(b) in accordance with the provisions of any other law for the time being in force, or of any international treaty, convention, protocol, code, standard, agreement or other instrument to which Pakistan is a party.

15. Regulation of motor vehicles.—(1) Subject to the provisions of this Act, and the rules and regulations, no person shall operate a motor vehicle from which air pollutants or noise are being emitted in an amount, concentration or level which is in excess of the National Environmental Quality Standards, or where applicable the standards established under clause (g) of sub-section (1) of section 6.

(2) For ensuring compliance with the standards mentioned in sub-section (1), the Federal Agency may direct that any motor vehicle or class of vehicles shall install such pollution control devices or other equipment or use such fuels or undergo such maintenance or testing as may be prescribed.

(3) Where a direction has been issued by the Government Agency under subsection (2) in respect of any motor vehicles or class of motor vehicles, no person shall operate any such vehicle till such direction has been complied with.

16. Environmental protection order.—(1) Where the Federal Agency or a Provincial Agency is satisfied that the discharge or emission of any effluent, waste, air pollutant or noise, or the disposal of waste, or the handling of hazardous substances, or any other act or omission is likely to occur, or is occurring, or has occurred, in violation of the provisions of this Act, rules or regulations or of the conditions of a licence, and is likely to cause, or is causing or has caused an adverse environmental effect, the Federal Agency or, as the case may be, the Provincial Agency may, after giving the person responsible for such discharge, emission, disposal, handling, act or omission an opportunity of being heard, by order direct such person to take such measures that the Federal Agency or Provincial Agency may consider necessary within such period as may be specified in the order.

(2) In particular and without prejudice to the generality of the foregoing power, such measures may include—

(a) immediate stoppage, preventing, lessening or controlling the discharge, emission, disposal, handling, act or omission, or to minimize or remedy the adverse environmental effect;

(b) installation, replacement or alteration of any equipment or thing to eliminate, control or abate on a permanent or temporary basis, such discharge, emission, disposal, handling, act or omission;

(c) action to remove or otherwise dispose of the effluent, waste, air pollutant, noise, or hazardous substances; and

(d) action to restore the environment to the condition existing prior to such discharge, disposal, handling, act or omission, or as close to such condition as may be reasonable in the circumstances, to the satisfaction of the Federal Agency or, Provincial Agency.

(3) Where the person, to whom directions under sub-section (1) are given, does not comply therewith, the Federal Agency or Provincial Agency may, in addition to the proceedings initiated against him under this Act, the rules and regulations, itself take or cause to be taken such measures specified in the order as it may deem necessary and may recover the reasonable costs of taking such measures from such person as arrears of land revenue.

17. Penalties.—(1) Whoever contravenes or fails to comply with the provisions of sections 11, 12, 13 or section 16 or any order issued thereunder shall be punishable with fine which may extend to one million rupees, and in the case of a continuing contravention or failure, with an additional fine which may extend to one hundred thousand rupees for every day during which such contravention or failure continues:

Provided that if contravention of the provisions of section 11 also constitutes contravention of the provisions of section 15, such contravention shall be punishable under sub-section (2) only.

(2) Whoever contravenes or fails to comply with the provisions of section 14 or 15 or any rule or regulation or conditions of any licence, any order or direction, issued by the Council or the Federal Agency or Provincial Agency, shall be punishable with fine which may extend to one hundred thousand rupees, and in case of continuing contravention or failure with an additional fine which extend to one thousand rupees for every day during which such contravention continues.

(3) Where an accused has been convicted of an offence under sub-sections (1) and (2), the Environmental Court and Environmental Magistrate, as the case may be, shall, in passing sentence, take into account the extent and duration of the contravention or failure constituting the offence and the attendant circumstances.

(4) Where an accused has been convicted of an offence under sub-section (1) and the Environmental Court is satisfied that as a result of the commission of the offence

monetary benefits have accrued to the offender, the Environmental Court may order the offender to pay, in addition to the fines under sub-section (1), further additional fine commensurate with the amount of the monetary benefits.

(5) Where a person convicted under sub-sections (1) or sub-section (2) had been previously convicted for any contravention under this Act, the Environmental Court or, as the case may be, Environmental Magistrate may, in addition to the punishment awarded thereunder—

(a) endorse a copy of the order of conviction to the concerned trade or industrial association, if any, or the concerned Provincial Chamber of Commerce and Industry or the Federation of Pakistan Chambers of Commerce and Industry;

(b) sentence him to imprisonment for a term which may extend to two years;

(c) order the closure of the factory;

(d) order confiscation of the factory, machinery, and equipment, vehicle, material or substance, record or document or other object used or involved in contravention of the provisions of the Act:

Provided that for a period of three years from the date of commencement of this Act the sentence of imprisonment shall be passed only in respect of persons who have been previously convicted for more than once for any contravention of sections 11, 13, 14 or 16 involving hazardous waste;

(e) order such person to restore the environment at his own cost, to the conditions existing prior to such contravention or as close to such conditions as may be reasonable in the circumstances to the satisfaction of the Federal Agency or, as the case may be, Provincial Agency; and

(f) order that such sum be paid to any person as compensation for any loss, bodily injury, damage to his health or property suffered by such contravention.

(6) The Director-General of the Federal Agency or of a Provincial Agency or an officer generally or specially authorised by him in this behalf may, on the application of the accused compound an offence under this Act with the permission of the Environmental Tribunals or Environmental Magistrate in accordance with such procedure as may be prescribed.

(7) Where the Director-General of the Federal Agency or of a Provincial Agency is of the opinion that a person has contravened any provision of Act he may, subject to the rules, by notice in writing to that person require him to pay to the Federal Agency or, as the case may be, Provincial Agency an administrative penalty in the amount set out in the notice for each day the contravention continues; and a person who pays an administrative

penalty for a contravention shall not be charged under this Act with an offence in respect of such contravention.

(8) The provisions of sub-sections (6) and (7) shall not apply to a person who has been previously convicted of offence or who has compounded an offence under this Act who has paid an administrative penalty for a contravention of any provision of this Act.

18. Offences by bodies corporate.— Where any contravention of this Act has been committed by a body corporate, and it is proved that such offence has been committed with the consent or connivance of, or is attributed to any negligence on the part of, any director, partner, manager, secretary or other Officer of the body corporate, such director, partner, manager, secretary or other officer of the body corporate, shall be deemed guilty of such contravention along with the body corporate and shall be punished accordingly:

Provided that in the case of a company as defined under the Companies Ordinance, 1984 (XLVII of 1984), only the Chief Executive as defined in the said Ordinance shall be liable under this section.

Explanation.— For the purposes of this section, "body corporate" includes a firm, association of persons and a society registered under the Societies Registration Act, 1860 (XXI of 1860), or under the Co-operative Societies Act, 1925 (VII of 1925).

19. Offences by Government Agencies, local authorities or local councils.—Where any contravention of this Act has been committed by any Government Agency, local authority or local council, and it is proved that such contravention has been committed with the consent or connivance of, or is attributable to any negligence on the part of, the Head or any other officer of the Government Agency, local authority or local council, such Head or other officer shall also be deemed guilty of such contravention along with the Government Agency, local authority or local council and shall be liable to be proceeded against and punished accordingly.

20. Environmental Tribunals.—(1) The Federal Government may, by notification in the official gazette, establish as many Environmental Tribunals as it consider necessary and, where it establishes more than one Environmental Tribunals, it shall specify territorial limits within which, or the class of cases in respect of which, each one of them shall exercise jurisdiction under this Act.

(2) An Environmental Tribunal shall consist of a Chairperson who is, or has been, or is qualified for appointment as, a judge of the High Court to be appointed after consultation with the Chief Justice of the High Court and two members to be appointed by the Federal Government of which at least one shall be a technical member with suitable professional qualifications and experience; in the environmental field as may be prescribed.

(3) For every sitting of the Environmental Tribunal, the presence of the Chairperson and not less than one Member shall be necessary.

(4) A decision of an Environmental Tribunal shall be expressed in terms of the opinion of the majority of its members, including the Chairperson, or if the case has been decided by the Chairperson and only one of the members and there is a difference of opinion between them, the decision of the Environmental Tribunal shall be expressed in terms of the opinion of the Chairperson.

(5) An environmental Tribunal shall not, merely be reason of a change in its composition, or the absence of any member from any sitting, be bound to recall and rehear any witness who has given evidence, and may act on the evidence already recorded by, or produced, before it.

(6) An Environmental Tribunal may hold its sittings at such places within its territorial jurisdiction as the Chairperson may decide.

(7) No act or proceeding of an Environmental Tribunal shall be invalid by reason only of the existence of a vacancy in, or defect in the constitution, of, the Environmental Tribunal.

(8) The terms and conditions of service of the Chairperson and members of the Environmental Tribunal shall be such as may be prescribed.

21. Jurisdiction and powers of Environmental Tribunals.—(1) An Environmental Tribunal shall exercise such powers and perform such functions as are, or may be, conferred upon or assigned to it by or under this Act or the rules and regulations made thereunder.

(2) All contravention punishable under sub-section (1) of section 17 shall exclusively be triable by an Environmental Tribunal.

(3) An Environmental Tribunal shall not take cognizance of any offence triable under sub-section (2) except on a complaint in writing by—

(a) the Federal Agency or any Government Agency or local council; and

(b) any aggrieved person, who has given notice of not less than thirty days to the Federal Agency, or the Provincial Agency concerned, of the alleged contravention and of his intention to make a complaint to the Environment Tribunal.

(4) In exercise of its criminal jurisdiction, the Environmental Tribunals shall have the same powers as are vested in Court of Session under the Code of Criminal Procedure, 1898 (Act V of 1898).

(5) In exercise of the appellate jurisdiction under section 22 the Environmental Tribunals shall have the same powers and shall follow the same procedure as an appellate court in the Code of Civil Procedure, 1908 (Act V of 1908).

(6) In all matters with respect to which no procedure has been provided for in this Act, the Environmental Tribunal shall follow the procedure laid down in the Code of Civil Procedure, 1908 (Act V of 1908).

(7) An Environmental Tribunal may, on application filed by any officer duly authorised in this behalf by the Director-General of the Federal Agency or of Provincial Agency, issue bailable warrant for the arrest of any person against whom reasonable suspicion exist, of his having been involved in contravention punishable under sub-section (1) of Section 17:

Provided that such warrant shall be applied for, issued, and executed in accordance with the provisions of the Code of Criminal Procedure, 1898 (Act V of 1898):

Provided further that if the person arrested executes a bond with sufficient sureties in accordance with the endorsement on the warrant he shall be released from custody, failing which he shall be taken or sent without delay to the officer in-charge of the nearest police station.

(8) All proceedings before the Environmental Tribunal shall be deemed to be judicial proceedings within the meaning of section 193 and 228 of the Pakistan Penal Code (Act XLV of 1860), and the Environmental Tribunal shall be deemed to be a court for the purpose of section 480 and 482 of the Code of Criminal Procedure, 1898 (Act V of 1898).

(9) No court other than an Environmental Tribunal shall have or exercise any jurisdiction with respect to any matter to which the jurisdiction of an Environmental Tribunal extends under this Act, the rules and regulations made thereunder.

(10) Where the Environmental Tribunal is satisfied that a complaint made to it under sub-section (3) is false and vexatious to the knowledge of the complainant, it may, by an order, direct the complainant to pay to the person complained against such compensatory costs which may extend to one hundred thousand rupees.

22. Appeals to the Environmental Tribunal.—(1) Any person aggrieved by any order or direction of the Federal Agency or any Provincial Agency under any provision of this Act, and rules or regulations may prefer an appeal with the Environmental Tribunal within thirty days of the date of communication of the impugned order or direction to such person.

(2) An appeal to the Environmental Tribunal shall be in such form, contain such particulars and be accompanied by such fees as may be prescribed.

23. Appeals from orders of the Environmental Tribunal.—(1) Any person aggrieved by any final order or by any sentence of the Environmental Tribunal passed under this Act may, within thirty days of communication of such order or sentence, prefer an appeal to the High Court.

(2) An appeal under sub-section (1) shall be heard by a Bench of not less than two Judges.

24. Jurisdiction of Environmental Magistrates.—(1) Notwithstanding anything contained in the Code of Criminal Procedure, 1898 (Act V of 1898), or any other law for the time being in force, but subject to the provisions of this Act, all contravention punishable under sub-section (2) of section 17 shall exclusively be triable by a judicial Magistrate of the first class as Environmental Magistrate especially empowered in this behalf by the High Court.

(2) An Environmental Magistrate shall be competent to impose any punishment specified in sub-sections (2) and (4) of section 17.

(3) An Environmental Magistrate shall not take cognizance of an offence triable under sub-section (1) except on a complaint in writing by—

(a) the Federal Agency, Provincial Agency, or Government Agency or a local council; and

(b) any aggrieved person.

25. Appeals from orders of Environmental Magistrates.—Any person convicted of any contravention of this Act or the rules or regulations by an Environmental Magistrate may, within thirty days from the date of his conviction, appeal to the Court of Sessions whose decision thereon shall be final.

26. Power to delegate.—(1) The Federal Government may, by notification in the official Gazette, delegate any of its or of the Federal Agency's powers and functions under this Act and the rules and regulations to any Provincial Government, any Government Agency, local council or local authority.

(2) The Provincial Government may, by notification in the official Gazette, delegate any of its or of the Provincial Agency's powers or functions under this Act and the rules and regulations to any Government Agency of such Provincial Government or any local council or local authority in the Province.

27. Power to give directions.—In the performance of their functions under this Act—

(a) the Federal Agency and Provincial Agencies shall be bound by the directions given to them in writing by the Federal Government; and

(b) a Provincial Agency shall be bound by the directions given to it in writing by the Provincial Government.

28. Indemnity.—No suit, prosecution or other legal proceedings shall lie against the Federal or Provincial Governments, the Council, the Federal Agency or Provincial Agencies, the Director-Generals of the Federal Agency and the Provincial Agency, members, officers, employees, experts, advisers, committees or consultants of the Federal or Provincial Agencies or the Environmental Tribunal or Environmental Magistrates or any other person for anything which is in good faith done or intended to be done under this Act or the rules or regulations made thereunder.

29. Dues recoverable as arrears of land revenue.—Any dues recoverable by the Federal Agency or Provincial Agency under this Act, or the rules or regulations shall be recoverable as arrears of land revenue.

30. Act to override other laws.—The provisions of this Act shall have effect notwithstanding anything inconsistent therewith contained in any other law for the time being in force.

31. Power to make rules.—The Federal Government may, by notification in the official Gazette, make rules for carrying out the purposes of this Act including rules for implementing the provisions of the international environmental Agreements, specified in the Schedule to this Act.

32. Power to amend the Schedule.—The Federal Government may, by notification in the official Gazette, amend the Schedule so as to add any entry thereto or modify or omit any entry therein.

33. Power to make regulations.—(1) For carrying out the purposes of this Act, the Federal Agency may, by notification in the official Gazette and with the approval of the Federal Government, make regulations not inconsistent with the provisions of this Act or the rules made thereunder.

(2) In particular and without prejudice to the generality of the foregoing power, such regulations may provide for—

(a) submission of periodical reports, data or information by any Government agency, local authority or local council in respect of environmental matters;

(b) preparation of emergency contingency plans for coping with environmental hazards and pollution caused by accidents, natural disasters and calamities;

(c) appointment of officers, advisers, experts, consultants and employees;

(d) levy of fees, rates and charges in respect of services rendered, actions taken and schemes implemented;

(e) monitoring and measurement of discharges and emissions;

(f) categorization of projects to which, and the manner in which, section 12 applies;

(g) laying down of guidelines for preparation of initial environmental examination and environmental impact assessment and Development of procedures for their filing, review and approval;

(h) providing procedures for handling hazardous substances; and

(i) installation of devices in, use of fuels by, and maintenance and testing of motor vehicles for control of air and noise pollution.

34. Repeal, savings and succession.—(1) The Pakistan Environmental Protection Ordinance 1983 (XXXVII of 1983) is hereby repealed.

(2) Notwithstanding the repeal of the Pakistan Environmental Protection Ordinance, 1983 (XXXVII of 1983), any rules or regulations or appointments made, orders passed, notifications issued, powers delegated, contracts entered into, proceedings commenced, rights acquired liabilities incurred, penalties, rates, fees or charges levied, things done or action taken under any provisions of that Ordinance shall, so far as they are not inconsistent with the provisions of this Act be deemed to have been made, passed, issued, delegated, entered into, commenced, acquired, incurred, levied, done or taken under this Act.

(3) On the establishment of the Federal Agency and Provincial Agencies under this Act, all properties, assets and liabilities pertaining to the Federal Agency and Provincial Agencies established under that Ordinance shall vest in and be the properties, assets and liabilities, as the case may be, of the Federal Agency and Provincial Agency established under this Act.

SCHEDULE

(See section 31)

1. International Plant Protection Convention, Rome, 1951.

2. Plant Protection Agreement for the South-East Asia and Pacific Region (as amended), Rome, 1956.
3. Agreement for the Establishment of a Commission for Controlling the Desert Locust in the Eastern Region of its Distribution Area in South-West Asia (as amended), Rome, 1963.
4. Convention on Wetlands of International Importance Especially as Waterfowl Habitat, Ramsar, 1971 and its amending Protocol, Paris, 1982.
5. Convention Concerning the Protection of World Cultural and Natural Heritage (World Heritage Convention), 1972.
6. Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), Washington, 1973.
7. Convention on the Conservation of Migratory Species of Wild Animals, Bonn, 1979.
8. Convention on the Law of the Sea, Montego Bay, 1982.
9. Vienna Convention for the Protection of the Ozone Layer, Vienna, 1985.
10. Montreal Protocol on Substances that Deplete the Ozone Layer, Montreal, 1987 and amendments thereto.
11. Agreement on the Network of Agriculture Centres in Asia and the Pacific, Bangkok, 1983.
12. Convention on the Control of Transboundary Movements of Hazardous Waste and Their Disposal, Basel, 1989.
13. Convention on Biological Diversity, Rio de Janeiro, 1992.
14. United Nations Framework Convention on Climate Change, Rio De Janeiro, 1992.

**NATIONAL ENVIRONMENTAL QUALITY STANDARDS (NEQS)
FOR MUNICIPAL AND INDUSTRIAL LIQUID EFFLUENTS
AND GASEOUS EMISSIONS.**

REGISTERED NO. M. 302
L. 7646

The Gazette of Pakistan

EXTRAORDINARY
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ISLAMABAD, THURSDAY AUGUST 10, 2000

Part II

Statutory Notifications (S.R.O.)

Government of Pakistan

MINISTRY OF ENVIRONMENT, LOCAL GOVERNMENT AND RURAL
DEVELOPMENT

NOTIFICATION

Islamabad, the 8th August, 2000

S.R.O. 549 (1)/2000-in exercise of the powers conferred under came (c) of sub-section (1) of section 6 of the Pakistan Environmental Protection Act, 1997 (XXXIV of 1997). The Pakistan Environmental Protection Agency, with the prior approval of the Pakistan Environmental Protection Council, is pleased to direct that the following further amendments shall be made in its Notification No S. R. O. 742 (1)/93. Dated the 24 th August, 1993, namely :-

In the aforesaid notification, in paragraph 2,....

(1289)

Price : Rs. 5.00

[4138 (2000)/Ex. Gaz.]

Page No. 1

(1) for Annex I. The following shall be substituted, namely.....

**NATIONAL ENVIRONMENTAL QUALITY STANDARDS FOR
MUNICIPAL AND LIQUID INDUSTRIAL EFFLUENTS (mg/l,
UNLESS OTHERWISE DEFINED)**

S. No.	Parameter	Revised Standards			
		Existing Standards	Into Inland Waters	Into Sewage Treatment(b)	Into Sea(b)
1	2	3	4	5	6
1.	Temperature or Temperature Increase	40°C	≤3°C	≤3°C	≤3°C
2.	pH value	6-10	6-9	6-9	6-9
3.	Biochemical Oxygen Demand (BOD) ₅ at 20°C(°)	80	80	260	80*
4.	Chemical Oxygen Demand (COD)(1)	150	150	400	400
5.	Total suspended solids (TSS)	150	200	400	200
6.	Total dissolved solids (TDS).	3500	3500	3500	3500
7.	Grease and oil	10	10	10	10
8.	phenolic compounds (as phenol)	0.1	0.1	0.3	0.3
9.	Chloride (as Cl ⁻)	1000	1000	1000	SC***
10.	Fluoride (as F ⁻)	20	10	10	10
11.	Cyanide (as CN ⁻) total	2	1.0	1.0	1.0
12.	An-ionic detergents (as MB As) ()	20	20	20	20.
13.	Sulphate (SO ₄ ²⁻)	600	600	1000	SC***
14.	Sulphide (S) ²⁻	1.0	1.0	1.0	1.0
15.	Ammonia (NH ₃)	40	40	40	40

Part III THE GAZETTE OF PAKISTAN, EXTRA. AUG. 10, 2000 1291

	1	2	3	4	5	6
16. Pesticides(3)			0.15	0.15	0.15	0.15
17. Cadmium(1)			0.1	0.1	0.1	0.1
18. Chromium trivalent and hexavalent(1)			1.0	1.0	1.0	1.0
19. Copper(1)			1.0	1.0	1.0	1.0
20. Lead(1)			0.5	0.5	0.5	0.5
21. Mercury(4)			0.01	0.01	0.01	0.01
22. Selenium(1)			0.5	0.5	0.5	0.5
23. Nickel(1)			1.0	1.0	1.0	1.0
24. Silver(4)			1.0	1.0	1.0	1.0
25. Total Toxic metals			2.0	2.0	2.0	2.0
26. Zinc			5.0	5.0	5.0	5.0
27. Arsenic(1)			1.0	1.0	1.0	1.0
28. Barium(1)			1.5	1.5	1.5	1.5
29. Iron			2.0	8.0	8.0	8.0
30. Manganese			1.5	1.5	1.5	1.5
31. Boron(1)			6.0	6.0	6.0	6.0
32. Chlorine			1.0	1.0	1.0	1.0

Explanations :

1. Assuming minimum dilution 1 : 10 on discharge, lower ratio would attract progressively stringent standards to be determined by the Federal Environmental Protection Agency. By 1 : 10 Dilution means, for example that for each one cubic meter of treated effluent, the recipient water body should have 10 cubic meter of water for dilution of this effluent.
2. Modified Benzene Alkyl Sulphate : assuming surfactant as biodegradable.
3. Pesticides include herbicides, fungicides, and insecticides.
4. Subject to total toxic metal discharge should not exceed level given at S. No. 25.
5. Applicable only when and where sewage treatment is operational and BOD₅ = 80 mg/l is achieved by the sewage treatment system.

6. Provided discharge is not at shore and not within 10 miles of mangrove or other important estuaries.
- * The effluent should not result in temperature increase of more than 30C at the edge of the zone where initial mixing and dilution take place in the receiving body. In case zone is not defined, use 100 meters from the point of discharge.
- ** The value for industry is 200 mg/l.
- *** Discharge concentration at or below sea concentration (SC).

Note :....1. Dilution of liquid effluents to bring them to the NEQS limiting values is not permissible through fresh water mixing with the effluents before discharging into the environment.

2. The concentration of pollutants in water being used will be subtracted from the effluent for calculating the NEQS limits" and

(2) for Annex II. The following shall be substituted, namely : -

"NATIONAL ENVIRONMENTAL QUALITY STANDARDS FOR INDUSTRIAL GASEOUS EMISSION (mg/Nm³, UNLESS OTHERWISE DEFINED).

S. No.	Parameter	Source of emission	Existing Standards	Revised Standards
1	2	3	4	5
1.	Smoke	Smoke opacity not to exceed	40% or 2 Ring- elmann Scale	40% or 2 Ring- elmann Scale or equivalent Smoke number.
	Noise	85 dB (A)	Sound meter	at 7.5m from source
2.	Particulate matter ⁽¹⁾	(a) Boilers and furnaces : (i) Oil fired (ii) Coal fired (iii) Cement kilns	300 500 200	300 500 300
		(b) Grinding crushing clinker coolers and related processes, metallurgical processes, converters, blast furna- ces and cupolas,	500	500
3.	Hydrogen Chloride	Any	400	400
4.	Chlorine	Any	150	150
5.	Hydrogen fluoride	Any	150	150
6.	Hydrogen sulphide	Any	10	10

PART II THE GAZETTE OF PAKISTAN, EXTRA, AUG 10 2000

1	2	3	4	5
7.	Sulphur Oxides ⁽¹⁾ (²)	Sulfuricacid / Sulphonic acid plants Other Plants except power plants operating on oil and coal	400 400	5000 1700
8.	Carbon monoxide	Any	800	800
9.	lead	Any	50	50
10.	Mercury	Any	10	10
11.	Cadmium	Any	20	20
12.	Arsenic	Any	20	20
13.	Copper	Any	50	50
14.	Antimony	Any	20	20
15.	Zinc	Any	200	200
16.	Oxides of Nitro- gen ⁽¹⁾	Nitricacid manufacturing unit other plants except power plants operating on oil or coal :	400	3000
		Gas fired	400	400
		Oil fired	—	600
		Coal fired	—	1200

Explanations :

1. Based on the assumption that the size of the particulate is 10 micron or more.
2. Based on 1 per cent sulphur content in fuel oil. Higher content of sulphur will cause standards to be pro-rated.
3. In respect of emissions of sulphur dioxide and nitrogen oxides, the power plants operating on oil and coal as fuel shall in addition to National Environmental Quality Standards (NEQS) specified above. Comply with the following standards:-

A . Sulphur dioxide

Sulphur dioxide Background levels Micro-gram per cubic meter ug/m ³). Standards				
Background Air Quality (So, Basis)	Annual Average	Max. 24-hours Interval	Criterion I Max. So, Emission (Tons per Day per plant)	Criterion II Max allowable ground level increment to ambient (ug/m ³)

Unpolluted	< 50	< 200	500	50
Moderately Polluted*				
Low	50	200	500	50
High	100	400	100	10
Very Polluted**	> 100	> 400	100	10

* For intermediate values between 50 and 100 ug/m³ linear interpolations should be true.

** No projects with sulphur dioxide emissions will be recommended.*

B. Nitrogen Oxide

Ambient air concentrations of nitrogen oxides, expressed as NO_x, should not be exceed the following :-

Annual Arithmetic Mean 100ug/m³
(0.05 ppm)

Emission levels for stationary source discharges, before mixing with the atmosphere, should be maintained as follows :-

For fuel fired steam generators, as Nanogram (10⁻⁹ gram) per joule of heat input :

Liquid fossil fuel	:	:	130
Solid fossil fuel	:	:	300
Lignite fossil fuel	:	:	250

Note :- Dilution of gaseous emissions to bring them to the NEQS limiting value is not permissible through excess air mixing, blowing before emitting into the environment"

[File No. 14 (3)/98-TO-PEPC.]

HAFIZ ABDULLAH AWAN.
Deputy Secretary (admin.)

WORLD BANK AMBIENT NOISE LEVELS

THE WORLD BANK AMBIENT NOISE LEVELS

Ambient Noise:

Noise abatement measures should achieve either the levels given below or a maximum increase in background levels of 3 decibels (measures on the a scale A) [dB (A)]. Measurements are to be taken at noise receptors located outside the project property boundary.

	Maximum allowable log Equivalent (hourly measurement), in dB (A)	
	Day (07:00 – 22:00)	Night (22:00 – 07:00)
Residential		
Institutional		
Educational,	55	45
Industrial,		
Commercial.	70	70

Reference: Pollution Prevention and Abatement Handbook 1998
The World Bank Group in Collaboration with the UNEP and UNIDO
Washington, D.C. USA.

PUBLIC CONSULTATIONS

ANNEXURE 5

PUBLIC CONSULTATIONS

Sr. No.	Date	Name of Participants	Professions	Topics Discussed
Deedal Meera Village, Abbottabad				
1.	31-03-2010	Mr. Muhammad Kabir s/o M. Bashir	Student	▪ Project Benefits in the area ▪ Awareness of the people about the project ▪ Identification of Assets affected ▪ Redress mechanism ▪ Procedure for Land Acquisition ▪ Prevailing prices of land/ trees in the area ▪ Social values of the area ▪ Existing infrastructure in the area ▪ Utility services in the area
2.		Mr. Muhammad Sabir s/o Abdul rashid	Mason Worker	
3.		Hagi Gul Zaman s/o M. Faqeer	Farmer	
4.		Mr. Muhammad Bashir s/o M. Yasin	Mason Worker	
5.		M. Shafi s/o M. Maskeen	Tailor	
6.		M. Khan vaiz s/o M. Gul Zaman	Driver	
7.		M. Nazir s/o Waris Ali	Cook	
8.		M Akseer s/o Waris Ali	Shopkeeper	
9.		M. Suleman s/o Matwali	Farmer	
10.		M. Nazakat s/o Ameer Rehman	Shopkeeper	
11.		M. Pervez s/o M. Maskeen	Farmer	
12.		Rafiat Hussain s/o Amir Khan	Student	
13.		Shah Mohammad s/o Hyder	farmer	
14.		M. Tanveer s/o M. Bashir	Farmer	

ANNEXURE 5

Sr. No.	Date	Name of Participants	Professions	Topics Discussed
Boi Village, Abbottabad				
1.	31-03-2010	Mr. Fayyaz Ahmed s/o Ali Khan	Shopkeeper	▪ Project Benefits in the area ▪ Awareness of the people about the project ▪ Identification of Assets affected ▪ Redress mechanism ▪ Procedure for Land Acquisition ▪ Prevailing prices of land / trees in the area ▪ Social values of the area ▪ Existing infrastructure in the area ▪ Utility services in the area
2.		Mr. Barkat Nawaz s/o M. Akber	Medical Store	
3.		M. Shafeer s/o Aziz ur Rehman	Shopkeeper	
4.		Dayar Khan s/o Qutbuddin	Rtd. Lineman WAPDA	
5.		M, Irshad s/o Lal Khan	Hotel	
6.		Khan Awais s/o Gul Zai	Farmer	
7.		Juma Khan s/o Faqir Muhammad	Farmer	
8.		M Siraj s/o M Sadiq	Farmer	
9.		Jamil ur Rehman s/o Khalil ur Rehman	Driver	
Patrind Village, Muzaffarabad				
1.	1-04-2010	Mr. Gul Hassan s/o Nadir Ali	Farmer	▪ Project Benefits in the area ▪ Awareness of the people about the project ▪ Identification of Assets affected ▪ Redress mechanism ▪ Procedure for Land Acquisition ▪ Prevailing prices of land / trees in the area ▪ Social values of the area ▪ Existing infrastructure in the area ▪ Utility services in the area
2.		Mr. Abdul Aziz s/o Fateh Ali	Farmer	
3.		Mr. Abdul Rashid s/o Faqir Mohammad	Farmer	
4.		Mr. Ali Rehman s/o M. Zaman	Farmer	
5.		Mr. M Hassan s/o Qalander Khan	Farmer	
6.		Mr. Shabir s/o Ali Zaman	Farmer	
7.		Mr. Pir Khan s/o M. Khan	Farmer	
8.		Mr. Ali Khan s/o M. Khan	Farmer	
9.		M. Abdul Razaq s/o M. Khan	Farmer	
10.		Mr. M. Azeem s/o Khairullah	Farmer	
11.		M. Jan s/o Abdul Ghafoor	Farmer	

ANNEXURE 5

Sr. No.	Date	Name of Participants	Professions	Topics Discussed
12.		Mr.M.Yusuf s/o Zafar Ali	Farmer	
Tarcheela Village, Muzzaffarabad				
1.	01-04-2010	Noor Zaman s/o Sikander Khan	Ex.Member Union Council	▪ Project Benefits in the area ▪ Awareness of the people about the project ▪ Identification of Assets affected ▪ Redress mechanism ▪ Procedure for Land Acquisition ▪ Prevailing prices of land / trees in the area ▪ Social values of the area ▪ Existing infrastructure in the area ▪ Utility services in the area
2.		Mr. Muhammad Riaz s/o Gul Zaman	Farmer	
3.		Mr. M. Ghulab s/o Gul Zaman	Farmer	
4.		M. Yousuf s/o Sher Zaman	Farmer	
5.		M. Ayoub s/o Pir Khan	Farmer	
6.		Mr. Ashraf s/o Gohar Rehman	Farmer	
7.		Mr. M Javaid s/o M. Suleman	Farmer	
8.		Mr. M. Zaman s/o Ali Zaman	Farmer	
9.		Mr. Haroon s/o Gohar Zaman	Farmer	
10.		Mr. qadir Ahmed s/o Noor Amer	Farmer	
11.		Mr. Malik Awan s/o Gul Zaman	Farmer	
12.		Hameed s/o Gul Zaman	Farmer	
13.		Mr. Anwar s/o Ali Zaman	Farmer	
Alora Village, Muzzaffarabad				
1.	02-04-2010	Mr.M. Farooq	Govt. Employee	▪ Project Benefits in the area

ANNEXURE 5

Sr. No.	Date	Name of Participants	Professions	Topics Discussed
2.		Mr.Sadaqat Saleem s/o M. Saleem	Govt. Employee	▪ Awareness of the people about the project ▪ Identification of Assets affected ▪ Redress mechanism ▪ Procedure for Land Acquisition ▪ Prevailing prices of land / trees in the area ▪ Social values of the area ▪ Existing infrastructure in the area ▪ Utility services in the area
3.		Mr. M. Aslam s/o Samandur Khan	Govt. Employee	
4.		Mrs. Raisham Jan w/o M Maskin	House Wife	
5.		Mr. M. Pervez s/o M. Suleman	Govt. Employee	
6.		Mr. M. Ashraf s/o Ghulam Ali	Buisness	
7.		Mr. M. Akber s/o Mehar Ali	Buisness	
8.		Mr. Abdul Qayyum s/o Mehar Ali	Govt. Employee	
9.		Mr. M. Nawaz s/o Samunder Khan	Govt. Employee	
10.		Mr. Sarfaraz Khan s/o Essa Khan	Revenue clerk	
11.		Mr. M. Maskin s/o Saif Ali	Buisness	
12.		Mr. Tanveer Ahmad s/o Abdul Rashid	Buisness	
13.		Mr, Mahwali s/o Faqir Muhammad	Govt. Employee	

RECORDS OF MEETINGS WITH LINE DEPARTMENTS

RECORDS OF MEETINGS WITH LINE DEPARTMENTS

Date	Place	Organisation/ Person Consulted Position	Reason for visit Topics discussed
03-06-06	Muzaffarabad	Wildlife and Fisheries Division Shiekh Altaf Fisheries Development Officer	General situation of wildlife in the project area, minimal ecological flow, Fisheries in the project area
03-06-06	Muzaffarabad	Wildlife and Fisheries Department Syed Rashid Hussain Assistant Director Fisheries	General situation of wildlife in the project area, minimal ecological flow, Fisheries in the project area
04-06-06	Muzaffarabad	Protected Areas Management Project, Machiara National Park Naeem Iftikhar Dar Project Manager	Protected areas, Wildlife in Project Area, Wildlife protection measures
03-03-10	Abbottabad	NGO- SUNGI M. Arshad Community Facilitator Mrs. Tahira Awan Community Fcilitator	Community awareness about development projects Possible role of SUNGI in Patrind HPP
05-06-06	Abbottabad	Hazara Wildlife Division M. Hussain Khan District Forest Officer M. Abdullah Range Forest Officer	Wildlife in Project Area Wildlife protection measures Forest types / trees
05-06-06	Abbottabad	Hazara Forest Division Rustam Khan District Forest Officer	Forest types / trees Location of forests / pastures Sustainable use of forests by community
06-06-06	Muzaffarabad	Local Govt. and Rural Development Department Babar Minhas Assistant Director Environment	Environmental issues, Guidelines etc.
06-06-06	Muzaffarabad	P&D Building Secretariate Bashir Qureshi Director General Dr. Syed Asif Shah Secretary P&D and Environment	Legal Framework of AJK Guidelines of AJK
02-03-10	Muzaffarabad	Revenue Department Nisar Shah & Gulbaz Revenue Clerk	Role of District Revenue Officer in land acquisition and payment of compensation Redress procedures

SOCIO-ECONOMIC SURVEY PROFORMAS

PATRIND HYDROPOWER PROJECT

1. **Site Name**

Elevation		Co-ordinates
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2. **Location**
3. **River Name**
4. **Population Upstream of Weir Site within 2 Km**

 Village Names

 Populations
5. **Population Downstream of Weir Site within 2 Km**

 Village Names

 Populations
6. **Groundwater/Surface Water Quality**

 Depth

 Quality (Saline etc.)
7. **Climate**

 Met Data from Nearest Met Station
8. **Water Use Downstream of Weir**
9. **Biological Environment**

 Flora
 - Natural Vegetation
 - Forest Type/ Acreage
 - Endangered Species
 Agriculture
 - Crops
 - Vegetables
 - Fruits

Fauna

- Rare and Endangered Species
- Species which Require Management
- Species of Economic Significance
- Species of Special Interest to Local Population or Tourists
- Aquatic Fauna of Commercial/ Recreational Value and Migratory Fish Species Alongwith Their Spawning Ground.
- Migratory Route of Terrestrial, Aquatic as well as avi - Fauna

Livestock

Fisheries

10. Economy

Employment Classes

Occupations

Income

11. Civic Amenities

Housing (Class, Pucca, Kutcha Houses)

Water Supply and Sanitation

Health (Hospitals, Clinics, Dispensaries)

Education (Schools).

12. Culture

Archaeological Sites

Mosques, Shrines

Education of Women

13. Assets Submergence by Weir Reservoir

Submergence of Total Land Area (Acres)

Private Land

State Owned Land

Agricultural Area (Cost/Acre):

- Irrigated
- Rainfed
- Wasteland

Residential Area (Cost/Acre)

Name of Villages

No. of Villages

No. of Houses (Cost/House)

Population (No. of People Displaced and Needing Resettlement)

No. of Trees

14. Archaeological Sites

Shrines

Mosques

15. Infrastructure

Existing (Nearest Major Road)

Required (For project construction, **including equipment transportation**)

16. Using PRA, Interviews of Locals

**SOCIO-ECONOMIC SURVEY PROFORMAS
(URDU VERSION)**

پٹرینڈ بجلی گھر پراجیکٹ
سوالنامہ برائے معاشرتی و معاشی کوائف

1. علاقہ بند/بجلی گھر _____
2. گاؤں کا نام _____
3. جواب دینے والا _____
4. پیشہ _____
5. ذرائع آبپاشی _____
6. پینے کے پانی کے ذرائع _____
7. ذاتی جائیداد _____
8. مدنی سہولیات _____
9. کب سے مقیم ہیں _____
10. گھر سے کتنے فاصلے پر ہے _____
11. گھر کی تفصیلات _____
12. کیا آپ کو پٹرینڈ پراجیکٹ کے بارے میں علم ہے _____

ہاں ☐ نہیں ☐

13. اس پراجیکٹ کے کیا فوائد ہیں
- نوکریاں
- بجلی پیدا کرنا
- علاقے میں ترقی ہونا
- فیکٹریاں وغیرہ لگنا
- یا کوئی اور

14. اس پراجیکٹ کے کیا نقصانات ہیں

- کوئی نہیں

- زمین زیر آب آ جائے گی

- زراعت تباہ ہو جائیں گے

15. اگر آپ کو اپنی جگہ چھوڑنی پڑے تو آپ کیا کریں گے

16. اگر آپ کی زمین خرید لی جائے تو آپ کیا کوئی نیا پیشہ اختیار کریں گے

17. آپ زمین کے عوض کیا چاہتے ہیں

18. اگر پراجیکٹ میں نوکری مل جائے تو کیا آپ کام کریں گے

19. کوئی تجویز دینا چاہیں

20.

آپ کی زمین کتنی ہے	پراجیکٹ شروع ہونے سے پہلے	پراجیکٹ ختم ہونے کے بعد میں
-	زرعی	
-	ٹیوب ویل	
-	دریائی	
-	بارانی	

21. آپ کا کیا خیال ہے آپ کو فائدہ ہے یا نقصان؟

فائدہ ہے تو کتنے کا _____ نقصان ہے تو کتنے کا _____

وجہ بتائیں _____

22. پراجیکٹ مکمل ہونے کے بعد زمین کی قیمت

روپوں میں

مختلف قسم کی زمین کی قیمت

رہائشی

تجارتی

نہری

دریائی

بارانی

23. مال مویشی

بھینسیں

بکری/بھیڑ

مرغیاں

اور کوئی

24. فصلوں کا ہیر پھیر

فصل

فی الحال

(ایکڑوں میں)

بعد میں

(ایکڑوں میں)

مکئی

گندم

کوئی اور

معلومات برائے پٹرینڈ ہائیڈرو پاور پراجیکٹ

محل وقوع کا تعین

جگہ کا نام

1	سطح سمندر سے اونچائی
2	مقام کا تعین
3	دریا کا نام
4	بند کے اوپر 2 کلومیٹر تک لوگوں کی تعداد
-	گاؤں کے نام
-	گاؤں کی آبادی
5	بند کے نیچے 2 کلومیٹر تک لوگوں کی تعداد
-	گاؤں کے نام
-	گاؤں کی آبادی
6	زیر زمین سطح زمین پر پانی کی کیفیت
-	سطح زمین سے پانی کی گہرائی
-	خصوصیات (نمکین وغیرہ)
7	موسمی حالات
-	قریبی دفتر موسمیات کی معلومات
8	بند سے نیچے پانی کا استعمال
9	حیاتیاتی ماحول
-	نباتات
-	قدرتی نباتات
-	درختوں کی اقسام / پھیلاؤ (ایکڑوں میں)
-	خطرے سے دوچار انواع (اقسام)

9.1	زراعت
-	فصلات
-	سبزیات
-	پھل
9.2	حیوانات
-	کم یاب اور خطرے سے دوچار انواع (اقسام)
-	انواع جنکے لئے بندوبست درکار ہے
-	انواع جنکی معاشی اہمیت ہو
-	انواع جن میں مقامی لوگوں اور سیاحوں کی دلچسپی ہو
9.3	معاشی اور تفریحی اہمیت کے آبی جانور اور نقل مکانی کرنے والی مچھلیوں کی اقسام مع انکے تخم ریزی کی جگہیں
9.4	ارضی و آبی جانوروں اور پرندوں کے نقل مکانی کے راستے
10	پالتو جانور
11	مچھلیاں
12	معاشیات
-	ملازمین کی درجہ بندی
-	پیشے
-	آمدن
13	مدنی (شہری) سہولتیں
-	تعمیرات (پکے۔ کچے)
-	پانی اور صحت و صفائی کا انتظام
14	تعلیم (سکول)
15	ثقافت
-	آثار قدیمہ

-	مساجد
-	دربار
-	قبرستان
-	تعلیم نسوان
16	بند کی وجہ سے غرقاب اٹائے
-	کل رقبہ جو زیر آب آئے گا (ایکڑوں میں)
-	ذاتی زمین
-	سرکاری زمین
17	زرعی اراضی (قیمت کا تخمینہ فی ایکٹر)
-	نہری
-	بارانی
-	بنجر زمین
18	رہائشی رقبہ (قیمت کا تخمینہ)
-	گاؤں کے نام
-	کل گھر (قیمت)
19	کل افراد (جو کہ بے گھر ہونگے یا جنکو تفسیہ کی ضرورت ہوگی)
20	کل درخت (قیمت کا تخمینہ)
21	بنیادی ڈھانچے
-	قریبی سڑک جو کہ پروجیکٹ کے سامان کی نقل و حمل کر سکے
22	لوگوں کے ساتھ گفت و شنید
-	پروجیکٹ کے بارے میں انکے تحفظات

**2006 & 2010
PHOTOGRAPHS OF PROJECT AREA,
FIELD VISITS
AND
SCOPING SESSIONS**



Downstream Flow of Kunhar River Showing Deeper Bed and high Banks - 2010



An Other Downstream view of Kunhar River showing Deeper bed and high Banks - 2010



Downstream Flow of Kunhar River near Boi Village Showing Deeper Bed and high Banks of the River - 2010



Downstream View of Kunhar River Showing Deeper bed and high banks - 2010



A Stream Joins Kunhar River about 2km Downstream of Weir Site - 2010



Piryali Nullah Enters Kunhar River about 1.5 km Downstream of Weir Site - 2010



**Boi da Katha Nullah Joins Kunhar River about
4km Downstream of
Weir Site - 2010**



**Another view of Site for Construction Camp in
Village Tarcheela at Weir Site - 2010**



**A katcha Track where Maintenance Road is to be
Constructed - 2010**



**House to be Affected due to Diversion Tunnel at
Weir Site -2010**



Local Consultation at Weir Site - 2010



**A Meeting with Locals of the Boi Village
Downstream of Weir Site - 2010**



Sociologist is Collecting Social Data in a Meeting with Locals of Village Patrind - 2010



Environmental Team is in Consultation with the Owners of Storage Camp at Weir Site in Patrind Village - 2010



A Process of Consultation in Tarcheela Village - 2010



Local Consultation in Deedal Meera Village - 2010



A Meeting with Locals in Alora Village at Powerhouse Site - 2010



Scoping Session in Deedal Meera Village - 2010



View of Powerhouse Site - 2010



View of Weir Site on Kunhar River - 2010



Site for Temporary Storage and Construction Camps near Powerhouse Site on Right Hand Side of Jhelum River - 2010



Site for Construction Camp in Village Tarcheela at Weir Site - 2010



A katcha Track where Maintenance Road is to be Constructed - 2010



Location of Storage Camp at Wier Site in Patrind Village showing Standing wheat Crop - 2010



Environmental Team in discussion with Geologists at Weir site - 2006



View of Kunhar River at Weir site near Patrind village - 2006



View of Kunhar River at Weir site near Patrind village - 2006



View of Weir site along Boi road and Patrind village showing natural vegetation - 2006



Powerhouse site along Jhelum River - 2006



Tunnel Outlet - 2006



**Consultation with locals in
Thori village - 2006**



Downstream view of Jhelum River - 2006



Gauge at powerhouse site - 2006



Gauge location at powerhouse site - 2006



**Gauge location at powerhouse
site - 2006**



Gauge location at powerhouse site - 2006



Gauge location at powerhouse site - 2006



Drilling in process at Powerhouse site - 2006



View of Jhelum River at Lower Chattar - 2006



Natural vegetation at Weir site - 2006



Participants of scoping session in Tarchela village - 2006



Land use in Reservoir area - 2006



Land use in Reservoir area - 2006



Grazing land in reservoir - 2006



Consultation with local people in Dedal Meera village - 2006



House on right bank of Kunhar River at Weir site - 2006



Cultivated land on right bank of Kunhar River at Weir site - 2006



Cable way on Kunhar River at weir site - 2006



Gauge Installed at Weir site - 2006



Gauge Installed at Weir site - 2006



Gauge Installed at Weir site - 2006



Drilling process at Weir site - 2006



Natural vegetation at weir site - 2006



Local consultation in Patrind village - 2006