

Environmental Impact Assessment: Part 3

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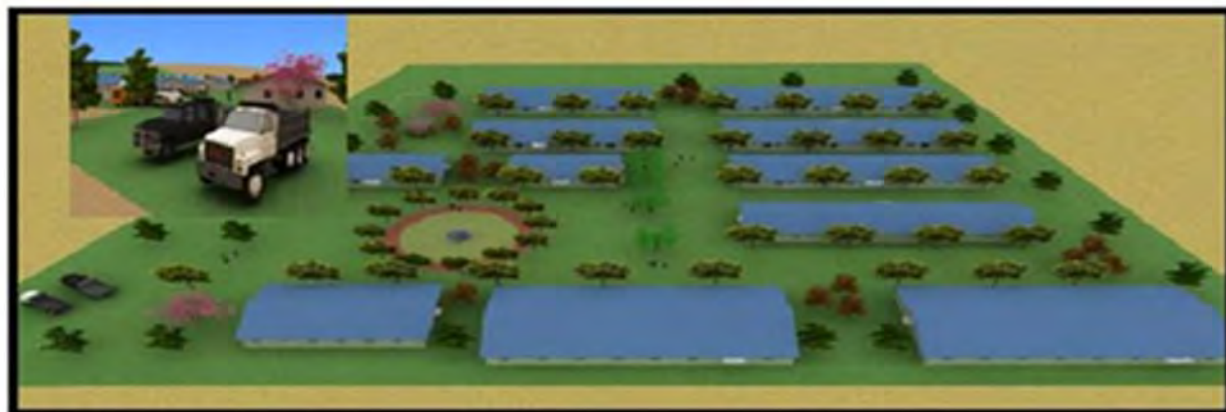
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STAR HYDROPOWER LIMITED

PATRIND HYDROPOWER PROJECT ENVIRONMENTAL IMPACT ASSESSMENT



ENVIRONMENTAL MANAGEMENT PLAN (EMP)

APRIL 2011



Pakistan Engineering Services (Pvt.) Ltd.

188-Y, Commercial Area, Phase-III, D.H.A. Lahore, Pakistan

Tel: 92-42-35726816, 35891921, 35893785 Fax: +92-42-35722003 E-Mail : info@pespk.com



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ABBREVIATIONS

EPAs	Environmental Provincial Agencies
EMU	Environmental Management Unit
SHPL	Star Hydropower Limited
LRD	Land Revenue Department
SC	Supervisory Consultant
AJK	Azad Jammu and Kashmir
OC	Operation Contractor
WAPDA	Water & Power Development Authority
SWHP	Surface Water Hydrology Project
APs	Affected Persons
GRC	Grievance Redress Committee
SEP	Site Environmental Plans
ERP	Emergency Response Procedures

STUDY TEAM

Mr. Sohail Anwar	Project Manager
Mr. Muhammad Nawaz Tariq	Chief Environmental Engineer
Mr. Mukhtar Ahmed Tahir	Principal Environmentalist
Mr. Naeem Akhtar	Senior Environmentalist
Mr. Tariq Mahmood	Forestry Specialist
Mr. Muhammad Younus	Fishery Specialist
Mr. Bashir Hussain Leghari	Senior Environmentalist
Mr. Fayyaz Ahmed	Computer Operator

EXECUTIVE SUMMARY

1. Introduction

This Environmental Management Plan has been prepared as part of the updated *Environmental Impact Assessment* (EIA June 2010) for Patrind Hydro Power Project. All environmental management measures previously proposed in the EMP of draft updated EIA Report are included in this EMP.

Environmental management plan 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. Key players in the implementation of the plan are SHPL, EPC Contractor, EMU, SC, EPA Khyber Pakhtunkhwa and EPA Azad Jammu & Kashmir. Frequency for the assessment of various parameters has also been included in the plan.

This EMP is an environmental operation manual for SHPL management and staff, contractors and regulatory authorities. It provides a commitment to environmental management by SHPL.

Required field work on aquatic life, flora and fauna had been conducted in 2006 and 2010. Water quality assessment has also been carried out. One main target of the Patrind Project is to keep water releases downstream of weir for biodiversity.

According to this EMP the Resettlement Plan has been prepared, which is committed to deal with mitigation, monitoring and management of relevant affects on the socio-economic environment. Focus lies on the compensation of 129 affected people residing in the 14 houses needed to be acquired for project implementation and the re-establishment and improvement of the livelihood of the local population during construction and operation period.

2. PROJECT DESCRIPTION

Pakistan Engineering Services (Pvt) Ltd. in association with Fitchner GmbH Consulting Engineers Germany conducted a Feasibility Study in 2006 and recommended a run-of-river project due to environmental issues relating to human settlements. The Report on Environmental Impact Assessment of Patrind Hydropower Project has been prepared as part of Feasibility study by Pakistan Engineering Services (Pvt.) Ltd. Lahore on behalf of STAR Hydropower Limited (the Company).

Patrind is a small village on the left bank of Kunhar river, 12 ½ km downstream from Garhi Habibullah bridge. The proposed weir site is accessed by Boi Road on

right side of Kunhar river. The left bank of Kunhar river 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.

Following most important project construction components are being described below;

- 26m high concrete gravity dam with crest length of 130m
- U/S and D/S coffer dam on Kunhar river at weir site
- Head pond at 765m conservation level
- Flip bucket type spillway
- Design discharge of 153 m³/sec
- Open type sand trap
- 7m dia headrace tunnel
- 16m dia Surge tank
- Vertical and horizontal pressure tunnels
- Steel lined penstock
- 150MW powerhouse having three vertical Francis turbines units
- Open channel tailrace

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.

Sediment flushing will take place during monsoon period (May – July). Total suspended sediment load during these months is 82 % of total annual load. After flushing of sediment only 5 – 10 % volume of sediment will be added into the existing sediment load (82 %) which will not affect the water quality.

3. STATUTORY REQUIREMENTS

Pakistan 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.

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

Following Environmental laws are applicable in Pakistan and AJK (Azad Jammu and Kashmir).

1. Pakistan Environmental Protection Act -1997
2. AJK Environmental Protection Act 2000
3. Land Acquisition Act 1894
4. Draft National Resettlement Policy 2002
5. Forest Act 1927/NWFP (KP) Forest Ordinance 2002
6. Sarhad (KP) National Conservation Strategy 1996/2004
7. Explosive Act

The EMP has been prepared along the guidelines established by the ADB/WB and adjoining institutions especially IFC guidelines on EHS 2007 and Performance Standards 2006.

The EIA was submitted in July 2008 to EPA-AJK for approval. The EPA-AJK approved the EIA report in August 2010. The measures identified and determined in the EMP have to be implemented by the contractor.

Negative and positive impacts on physical, biological and socio-economic condition during construction period as well as operational period have been identified and their mitigation measures have been suggested. Responsibilities have been fixed as to who will implement the suggested mitigation measures. Pre - construction impact is related to acquisition of land and houses which has been the main focus of the project. Due to construction of the project the flow of the Kunhar river from weir to the confluence with Jhelum river (13km stretch) will be obstructed for which releases of ecological flow has been calculated and provided. The main positive impact of the project is the generation of 150MW hydropower and socio-economic uplift of the area.

4. Implementation responsibilities

In order to handle the environmental and socio-economic matters during the proposed project, Star Hydropower Limited (SHPL) will establish an Environmental Management Unit (EMU) **in collaboration with their Owner's Engineer (PES/Fichtner)**. The EMU coordinates and consults with the administrators of local communities and dwellings in matters concerning the

impact arising from construction on environmental and socio-economic aspects. EPC Contractor abides by the Environmental Protective Standards, and gets permission if necessary from the Authority concerned in order to perform the Project successfully.

5. Management Measures

Management measures have been discussed in detail comprising impacts and mitigation measures regarding the following issues. This discussion pertains to pre-construction, construction and operation phases.

- Land and soil
- Water resources
- Air Quality
- Noise
- Spoil Material
- Waste Management
- Explosive storage and Handling
- Temporary structures and facilities
- Flora
- Terrestrial Fauna
- Fisheries
- Houses
- Commercial Assets
- Infrastructure
- Cultural and Archaeological Sites
- Vulnerable groups
- Health and Safety
- Traffic

Following parameters were studied for the operation phase of the project;

- Water resources
- Water Quality
- Noise

- Waste Management
- Flora
- Fisheries
- Health and Safety
- Economy

Environmental Management Plans

Following various EMP have been developed by EPC Contractor which are annexed at the end of the EMP.

- Plan for Disposal of Excavated Material
- Plan for Treatment and Disposal of Sanitary and Solid Wastes Management
- Plan for Traffic Control Management

6. MONITORING AND TRAINING

Under this heading monitoring plan is given and a comprehensive table has been developed where parameters, their location, frequency of monitoring and responsibilities are discussed. The parameters considered are more or less similar to the list given above.

A comprehensive description regarding the compliance monitoring, effects monitoring, grievance monitoring, external monitoring and communication and documentation is contained in the text. Proformas have been designed for the daily, weekly and quarterly monitoring for various parameters and are included in the text. Proformas have also been designed for the submission of the environmental complaints, environmental incident reports and training activities.

Grievance Redress Mechanism

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.

A Grievance Redress Committee (GRC) is constituted with the following members.

- District Revenue Officer, as the Chairman:

- Union Council Nazim, as Principal Member
- Three Affected Community Representatives, as Members
- SHPL

PUBLIC DISCLOSURE

During the field survey an extensive community consultation exercise was undertaken to incorporate the concerns and views of local communities in socioeconomic and environmental assessment survey. This consultation process entailed a thorough and simplified briefing of the technicalities and potential impacts of the project on the communities. For this purpose, apart from consultations with the local community, consultations with concerned public representatives and officials of the relevant line departments were also held.

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.

7. AUDITING

To demonstrate environmental compliance with the contract and EMP, records shall be kept regarding environmental management and monitoring during Project construction and operation phases. All records shall be kept at site premises and maintained in a legible state for the full period of construction. Environmental records will be made available to SHPL, EMU, EPAs (upon request).

8. COST OF ENVIRONMENTAL MANAGEMENT AND SOCIAL TRAINING

Following elements of cost have been estimated.

During construction of the project it is estimated that a total of approximately 20,300 USD per annum will be spent under the heads environmental management staff, annual monitoring and reporting and annual auditing. For environmental and social training and tree plantation an amount of approximately 12,300 USD is allocated for the entire construction period.

The total cost of the main mitigation measures to be borne by the EPC Contractor during construction is around 2 million USD.

During project operation it is envisaged that an amount of 27,300 USD will be spent on environmental management by SHPL annually.

1. INTRODUCTION

This *Environmental Management Plan* (EMP) updates the EMP contained in the updated draft EIA report June 2010 of Patrind Hydropower Project.

The EMP updates:

- Position titles, government authority names and responsibilities;
- Statutory requirements;
- Project design details; and
- Environmental management planning and procedures

All environmental management measures previously proposed in the EMP of draft updated EIA Report June 2010 are included in this EMP.

1.1 Aims of the Environmental Management Plan (EMP)

Environmental management plan 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. Key players in the implementation of the plan are SHPL, EPC Contractor, SC, EPA Khyber Pakhtunkhwa and EPA Azad Jammu & Kashmir.

Aim of EMP is to:

- Define environmental management principles and guidelines for the design, construction and operation of the Project;
- Establish the roles and responsibilities of all the parties involved in Project environmental management;
- Describe measures that shall be implemented to avoid or mitigate adverse environmental impacts; and
- Establish a framework of supervision, monitoring, auditing and reporting for Project environmental management.

This EMP is an environmental operation manual for SHPL management and staff, contractors and regulatory authorities. It provides a commitment to environmental management by SHPL.

1.2 Content of the Environmental Management Plan

1.	Introduction
2.	Project Description
3.	Statutory Requirements
4.	Implementation Responsibilities
5.	Management Measures
6.	Monitoring and Trainings
7.	Audits
8.	Environmental Social Uplift Programmes
9.	Environmental Management Cost Estimate
10.	References
11.	Appendices

2. PROJECT DESCRIPTION

2.1 Location of the Project

The Project is spread over two administrative territories, Azad Jammu & Kashmir (AJK) and Khyber Pakhtunkhwa province of Pakistan. The head pond of the Project falls in AJK and Khyber Pakhtunkhwa province as the centreline of the Kunhar river marks the boundary between AJK and Pakistan.

The proposed weir site is located near Patrind village, which is a small village on the left bank of Kunhar river in district Muzaffarabad of Azad Jammu & Kashmir (AJK), 12 ½ km downstream from Garhi Habibullah bridge. Since the boundary runs in the middle of the river, the weir falls in AJK and Khyber Pakhtunkhwa province, and is located about 13.4 Km upstream of the confluence of Kunhar with Jhelum river. It can be accessed by Boi Road on right side of Kunhar river. The left bank of Kunhar river 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 which is about 9.0

Km upstream of the confluence of Jhelum with Kunhar river. 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 across the Jhelum river to access the right bank for transportation of heavy machinery and equipment to the construction area of the powerhouse.

2.2 Project Components

The project components and its detail have been summarised in following table.

Table 2.1: Project Components and its Details

Sr. #	Project Components	Details
1.	Weir	
	River	Kunhar river
	Type of Weir	Concrete Gravity Dam
	Height	26.00 m from existing natural river bed level
	Crest Elevation	769.00 m amsl
	Width	8.20 m
	Length	130.00 m
2.	U/S Coffor Dam on Kunhar River	
	Type	Earth Dam
	Height	16 m
3.	D/S Coffor Dam on Kunhar River	
	Type	Earth Dam
	Height	3 m
4.	Head Pond	
	NHWL (Conservation Level)	765.00 m amsl
	Reservoir Submergence Area	57.2 Hectares
	Reservoir Capacity	5.90 million m ³
	Reservoir length	7 Km approx.
5.	Spillway	
	Design Discharge	2,626.6 m ³ /sec
	Crest Level	757.00 m amsl
	Type	Flip Bucket Type
	No. of Radial Gates	4 Nos. each 13 X 10.33 m
6.	Intake	

Sr. #	Project Components	Details
7.	Design Discharge	153 m3/sec
	No. of Chambers	2
	Sand Trap	
	Type	Open Type
	Design Discharge	153 m3/sec
	No. of Chambers	2
8.	Size of Each Chamber	Width : 23 m Height : 26.7 m
	Headrace Tunnel	
	Shape	Modified Horse Shoe (Inner Circular Section)
	Type	Concrete Lined
9.	Size	Diameter : 7 m
	Surge Tank	
	Size	Diameter 16 m
	Max. Upsurge Level	788.70 m amsl
10.	Min. Downsurge Level	745.10 m amsl
	Vertical Pressure Tunnel and Horizontal Pressure Tunnel	
	Type	Concrete Lined
	Shape	Inner Circular Section
11.	Size	Diameter : 7 m
	Penstock	
	Type	Inner Circular Section, Steel Lined
	Size and Nos.	Diameter : 5.5 m, 1 No. Diameter : 3.2 m, 3 Nos.
12.	Powerhouse	
	Type	Surface Station
	Size	38.2m x 66.0m x 43.6 High
	Discharge	153 m3/sec
	Capacity	150 MW
	Turbine Units	3 Nos.
	Type	Vertical Francis

Sr. #	Project Components	Details
13.	Tailrace Type Length	Open Channel 75 m

2.3 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 following table.

Table 2.2: 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)

2.4 Worker camps, work areas and administration buildings

Two workforce camps for up to 1350 workers are likely to be established at weir and powerhouse sites. During Project construction, these camps will serve as the Project management staff camp. Two temporary workforce camps are likely to be established at wire and powerhouse sites. The weir site camp is proposed to house the coffer dam, weir, head pond, spillway and intake construction workforce, while the proposed powerhouse camp will house the power station

construction workforce. A temporary project site office will be established in Upper Chattar, Muzaffarabad.

2.5 Construction Program

The Project program consists of three phases:

- **Design / Pre-construction** – the detailed final design of Project structures, on-going environmental and social planning and preparatory activities for construction;
- **Construction** – major construction activities up to full Project commissioning; and
- **Operation** – Project operation starts with the commissioning of the first unit (overlapping with the Construction phase).

The “construction phase” refers to all pre-construction, construction and post-construction activities until final acceptance of plant by SHPL.

2.5.1 Design/Pre-Construction Schedule

The detailed final design and pre-construction phase will run for approximately seven months. Pre-construction activities will include the commencement of construction of the access road to diversion tunnel outlet, diversion tunnel portal excavation, weir access roads, weir access bridge and powerhouse access bridge/roads, preparation of the camp.

2.5.2 Construction Schedule

Project construction will occur over a 48 months. The scheduled major construction activity commencement dates are:

Pre-Construction:	Powerhouse access roads/bridge, camps, offices, workshops, access road to outlet, diversion tunnel portal excavation, weir access roads, weir access bridge.
Months 1-6:	Camp construction, Powerhouse bridge, powerhouse excavation, diversion tunnel, sandtrap excavation, access road to surge shaft, upper access tunnel excavation.
Months 7-12:	River diversion, coffer dam, weir foundation excavation, powerhouse bottom treatment, head race tunnel excavation, surge shaft excavation.
Months 13-18:	Powerhouse concrete work, draft tube installation, weir concrete work, flushing penstock, sandtrap concrete work.
Months 19-24:	Powerhouse superstructure, weir concrete work, sandtrap concrete work, completion of HRT excavation.
Months 25-30:	Completion of powerhouse concrete work, installation of EOT crane, assembly of unit no.1, radial gate work, HRT lining concrete, pressure shaft concrete work.

Months 31-36:	Assembly of unit no 2 & 3, installation of flushing gate, installation of trash rack, HRT grouting, surge shaft concrete.
Months 37-42:	Installation of unit 1, 2 and 3, dry test, river diversion, plugging of diversion tunnel, commissioning of gate, plugging of HRT
Months 43-48:	Commissioning and performance test

Major construction activities will be completed during months **7-30**

2.5.3 Operation Schedule

Three turbines vertical Francis would be installed and its generation capacity made available to the Power Purchaser will be 147 MW for a period of 30 years under a Power Purchase Agreement. The plant will be operated on run-of-river philosophy under despatch instructions from the power purchaser.

2.5.4 Environmentally Relevant Construction Milestone

- Start of land acquisition -----July 2010
- Completion of land Acquisition----- March 2011
- Houses Acquisition-----March 2011
- Start of Compensation Process----- December 2010
- Start of Construction Process-----April 2011
- Completion of project-----March 2015

2.6 Reservoir Sedimentation and Management

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.

Sediment flushing will take place during monsoon period (May – July). Total suspended sediment load during these months is 82 % of total annual load. After flushing of sediment only 5 – 10 % volume of sediment will be added into the existing sediment load (82 %) which will not affect the water quality.

3. STATUTORY REQUIREMENTS

3.1 Legislative Framework

This section describes the policy, legal and administrative framework as well as institutional set up relevant to environmental and social assessment. The Environmental and social guidelines from the national agencies as well as international donors and other organizations, have also been discussed. Government of Pakistan Environmental Laws are applicable throughout the country including KP. The same laws were adopted by the Government of AJK.

Following laws, related to environment are applicable in Pakistan and AJK (Azad Jammu and Kashmir).

1. Pakistan Environmental Protection Act -1997
2. Land Acquisition Act 1894
3. Draft National Resettlement Policy 2002
4. Forest Act 1927/NWFP (KP) Forest Ordinance 2002
5. Sarhad (KP) National Conservation Strategy 1996/2004
6. Explosive Act
7. AJK Environmental Protection Act 2000
8. AJK Local Government Act 1997

Pakistan Environmental Protection Act

The Pakistan Environmental Protection Act 1997 is the basis of the environmental legislation and provides the framework for the implementation of the National Conservation Strategy issued in 1991 by the Government of Pakistan in collaboration with IUCN. The Act was enacted for the protection, rehabilitation, conservation and improvement of the environment. Furthermore, for the prevention and control of pollution, and also for the promotion of sustainable development.

Under Section 5 of PEPA-1997 Pakistan Environmental Protection Agency (Pak.EPA) has been established with a Director General as its head. Section 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.

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

- 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

- 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.

- Projects promoting energy efficiency

Thus Patrind Hydroelectric Project is covered by Schedule A which requires preparation of a full EIA report, for submission to provincial EPA KHYBER PAKHTUNKHWAH Peshawar for their approval.

AJ&K Environmental Protection Act 2000

Azad Jammu and Kashmir Environmental Protection Act was promulgated on 11 October 2000 by Azad Government of Jammu and Kashmir. They have followed the Pakistan Environmental Protection Act 1997.

Land Acquisition Act 1894

The Act is a "law for the acquisition of land needed for public purposes, for companies and for determining the amount of compensation to be paid on account of such acquisition". The purpose of the Act can be divided to cover two purposes. Firstly to fulfil the needs of the Government and the Companies for land required by them for their projects and secondly, to determine and pay compensation those who have been deprived of their property. It can, however, be argued that the Act does not take fully into consideration the social, cultural and economic situation.

The Act comprises of 55 sections pertaining to: area notifications and surveys; acquisition; compensation and apportionment of awards, penalties, and exemptions but neither this nor any other law of the land covers resettlement and rehabilitation of persons in the manner as a mandatory process according to current perceptions and requirements of International financing agencies.

Draft National Resettlement Policy 2002

The problems in the application of the Land Acquisition Act 1894 were considered primarily in this Policy. The following issues were identified:

- Non-recognition of any adverse impacts on the affected persons for the purposes of compensation since in the LAA 1894 the affected persons could not claim compensation as a right.
- The payment of compensation was valued on the date of the notification rather than the value at the time of the acquisition.
- The coverage of the losses of livelihood was excluded.
- The potential business losses were also not covered in the compensation.
- The non-binding nature of the recommendations made to the collectors by the Land Valuation Committees.
- The tenants, farmers, herders, lease holders and labourers were not entitled to the compensation/resettlement benefits.

Forest Act 1927/NWFP (KP) Forest Ordinance 2002

The Forest Act 1927 and later amendments establish the right of the Government to designate areas reserved for forests, village forests and protected forest and may also acquire such areas for prohibiting or restricting the public use of the resources or other activities. The 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.

Sarhad (KP) National Conservation Strategy 1996/2004

The Pakistan Environmental Protection Act 1997 is the basis of the environmental legislation and provides the framework for the implementation of the National Conservation Strategy issued in 1991 by the Government of Pakistan in collaboration with IUCN. NWFP initiated the Sarhad National 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 Pakhtunkhwa through the conservation and sustainable development of province's natural resources.

Explosive Act 1884

This Act was passed for the regulation and control on the use and sale of explosive substances. The Government can prohibit either absolutely or partly the use, sale and manufacture of explosives and a licence is required for the use, storage, manufacture and sale of explosive substances.

AJK Local Government Act 1997

Law department of AJK issued the Act in 1997, which was later revised by the Government to include amendments.

"Matters relating to affected persons whose assets like houses, land, tree etc. will be acquired are dealt by the Department of Local Government (LG) of AJK and KP respectively. The Local Government department officials like Union Council representatives (Nazims) in association with Revenue Department Officials like Partwaris maintain the record of these assets and therefore have participated in the preparation of cadastral survey data and related information. **Mention of AJK LG Act1997 has therefore been referred."**

External Support Agencies

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." ADB Operational Manual F1 where Operational Procedures and Bank Policy issued March 2010 has also been consulted.

International Finance Corporation (IFC)

Guidelines provided by IFC on Environmental, Health and Safety (EHS), 2007 and IFC Performance Standards on social and environmental sustainability 2006 were adhered to.

3.2 Environmental Conditions of Approvals

In exercise of powers conferred under section 11 of the Azad Jammu & Kashmir Environmental Protection Act, 2000, the Director General AJK Environmental Protection Agency (AJK-EPA), after the review of Environmental Impact Assessment Report (EIA) of 147 MW Patrind Hydro Power Project accorded Environmental Approval subject to the fulfilment of following conditions by the proponent;

1. Proponent shall ensure compliance to National Environmental Quality Standards (NEQSs).
2. Mitigation measures suggested in the EIA Report & Environmental

Management Plan (EMP) shall be strictly adhered to ensure not to cast any negative impact on soil, ground water, ambient air quality, noise level, natural drainage, flooding, hill torrents and biological resources of the Project area. This should be indicated in the report as "Commitment". Institutional arrangements for implementation of Environmental Management Plan may be finalized before the start of construction, so that proposed mechanism of environmental protection should be operative well in time.

3. Star Hydro Power Limited will constitute Environmental/Post EIA Monitoring Committee having the representatives of all concerned stakeholders as mentioned in EIA. The reporting mechanism and TORs of the committee shall be finalized in consultation with AJK-EPA.
4. Monitoring shall cover the entire period of the Project construction and operation. Monitoring reports shall be submitted to AJK-EPA on quarterly basis.
5. The Proponent shall provide the copy of this approval and EIA report to the contractor for information and compliance.
6. Compensation shall be provided to inhabitants in case of loss of agriculture land, crops, property, usage right etc. in accordance with the rates that agreed upon. All conflicting issues regarding compensation should be settled amicably before or during project activities.
7. Proponent shall ensure the adequate arrangements for addressing public grievances and implementation of Resettlement Action Plan (RAP) through Public Grievances Redress and Settlement Committee (PGRSC) if any.
8. In the case, the blasting is inevitable, the controlled techniques, in accordance Pakistan Explosive Act, should be adopted in sliding and perspective sliding prone areas.
9. In case an independent Environment Specialist Companies are to be hired, as a arrangement, to undertake measurements of different parameters critically important in determining water & air quality and assessing noise emission level either during construction phase or in both construction and operation phases of the proposed project. The findings of quality analysis on regular basis should positively be shared with AJK EPA.
10. Proponent shall submit a "Community Development Plan (CDP]" for the benefit of effected communities of the Project area to AJK-EPA within two months of start of the Project construction phase. The proponent is obliged to implement CDP sooner than later.
11. The Proponent shall ensure that strict and efficient health and safety measures are in place for the protection of workers and passers-by backed by a comprehensive emergency response plan.
12. As far as possible, employment should be provided to local people for all unskilled jobs. Preference may also be given to local people for all semi-

- skilled and skilled jobs. Employment record for all positions shall be provided to AJK-EPA positively.
13. In the case the articles of Archaeological importance like artefacts, coins rock-arts and other archaeological relics are discovered, the work at the site should immediately be stopped and the concerned department or agency should be consulted for the appropriate action.
 14. Proponent shall ensure all public utilities, such as water supply pipes, power/phone lines be not disturbed by the execution of the project. If it is inevitable then alternative may be provided to the people of the area before hand in consultation with respective agencies under intimation to AJK EPA.
 15. Proponent shall take special safety measures while working settlements, towns, schools and hospitals etc. for safety of the general public and livestock.
 16. Proponent/contractor shall make sure the safety & security of wild animals and their habitats at the project site and in its environs with the prior consultation and adhering to the guidelines of forestry and Wildlife Departments strictly.
 17. During the excavation of tunnel, the spoil should be dumped at pre-identified location. Free roll down of excavated land shall be prohibited, to avert damage to green vegetation cover, water bodies, perennial & non-perennial drains, irrigation channels, communication routes and productive lands. Littering would be avoided strictly during transportation of materials.
 18. The mechanized plants and machinery and other equipments must be fitted with noise abatement devices and should have the conformity to NEQS standards. The sites to install the asphalt plant and other machinery would be selected in consultation with the Agency (AJK-EPA). Special consideration must be given to critical installations like school, hospitals, mosques, community hall, etc. while selecting temporary utility sites.
 19. The proponent shall be liable for the correctness and validity of the information furnished by the environmental consultant.
 20. Proponent shall be liable for compliance of regulations 13, 14, 17 & 18 of IEE/EIA Regulations 2000, which enunciate the conditions for approval, confirmation of compliance, entry, inspection and monitoring of the proposed project.
 21. Proponent would be responsible to facilitate EPA team for any visit for Inspection/monitoring etc.
 22. Any change in the approved project shall be communicated to AJK-EPA and shall be commenced after obtaining the approval.
 23. This approval shall stand null and void if the conditions, mentioned herein

before, are not fully complied with.

24. This approval does not absolve the proponent of the duty to obtain any other approval or clearance that may be required under any law in force or by any competent forum/court of law.
25. This Approval shall be valid for a period of three years from the date of issue under Section 16 of IEE/EIA Regulation, 2009.
26. This Approval can be withdrawn at any time with any prior notice if deemed necessary in the public interest.

Together with the submission of EIA for approval from EPA AJK, Company also submitted its EIA to EPA KP but approval is awaited.

3.3 Permits and Approvals

The EPC contractor will have to seek approval for blasting activities during construction stage of the project under the Pakistan Explosive Act.

4. IMPLEMENTATION RESPONSIBILITIES

4.1 Formation of Environmental Management Unit (EMU)

Star Hydropower Limited (SHPL) will establish an Environmental Management Unit (EMU) in collaboration with their Owner's Engineer (PES/Fichtner), in order to handle the environmental and socio-economic matters during the proposed project. The EMU will not be part of the proposed project organization, and will provide advisory services to the project and other departments. Initially, the EMU will have two environmental and socio-economic Inspectors of relevant qualification and experience headed by an Environmental Expert. The strength can be increased in the future as required.

SHPL, through the EMU, will coordinate with regulatory agencies like EPA AJK and KP and other stakeholders who may want to send their own teams to monitor the project activities. EMU will also inform all employees of the details of protection and necessary care and appropriate action in accordance with the Environmental Protection Plan approved by the Lender.

For the environmental management SHPL will depute one HS&E Manager who will coordinate with the consultant's environmental team comprising of two Environmental and Social Inspectors who will be responsible for environmental monitoring and reporting during the construction period. The consultants will be responsible for monitoring EPC contractor's compliance to the environmental issues.

4.2 EMU Role and Responsibilities

4.2.1 Works Relevant to the Authorities

The EMU coordinates and consults with the administrators of local communities and dwellings in matters concerning the impact arising from construction on environmental and socio-economic aspects. EPC Contractor abides by the Environmental Protective Standards, and gets permission if necessary from the Authority concerned in order to perform the Project successfully.

4.2.2 Keeping Documents

For environmental monitoring purposes, papers and photos of all areas at which construction activities take place and of all areas which are affected by these operations are documented and kept safely for a certain period of time. Documents and photos are kept by the EMU.

4.2.3 Action to Rectify

If any part of the Environmental Protection Plan is not preserved, EMU shall report immediately to the Contractor and the Project Manager. The EMU takes an appropriate action to rectify the disorderly conduct.

4.2.4 Instruction to Employees

The EMU staff will periodically interact with the employees for the awareness of environmental conservation and encourages them to abide by the environmental safety standards.

- Fuel Supply Storage
- Locations and methods for storing fuel at the Site will be settled between EPC Contractor and the Engineer.
- Location, facilities and pollution control will be consistent with management requirements in the Environmental Safety Standards.

4.3 Environmental Roles and Responsibilities

Table 4.1 shows the organisational structure whereas Table 4.2 shows roles and responsibilities of Environmental Team.

Table 4.1: SHPL ORGANISATIONAL CHART DURING CONSTRUCTION FOR ENVIRONMENTAL COMPLIANCE

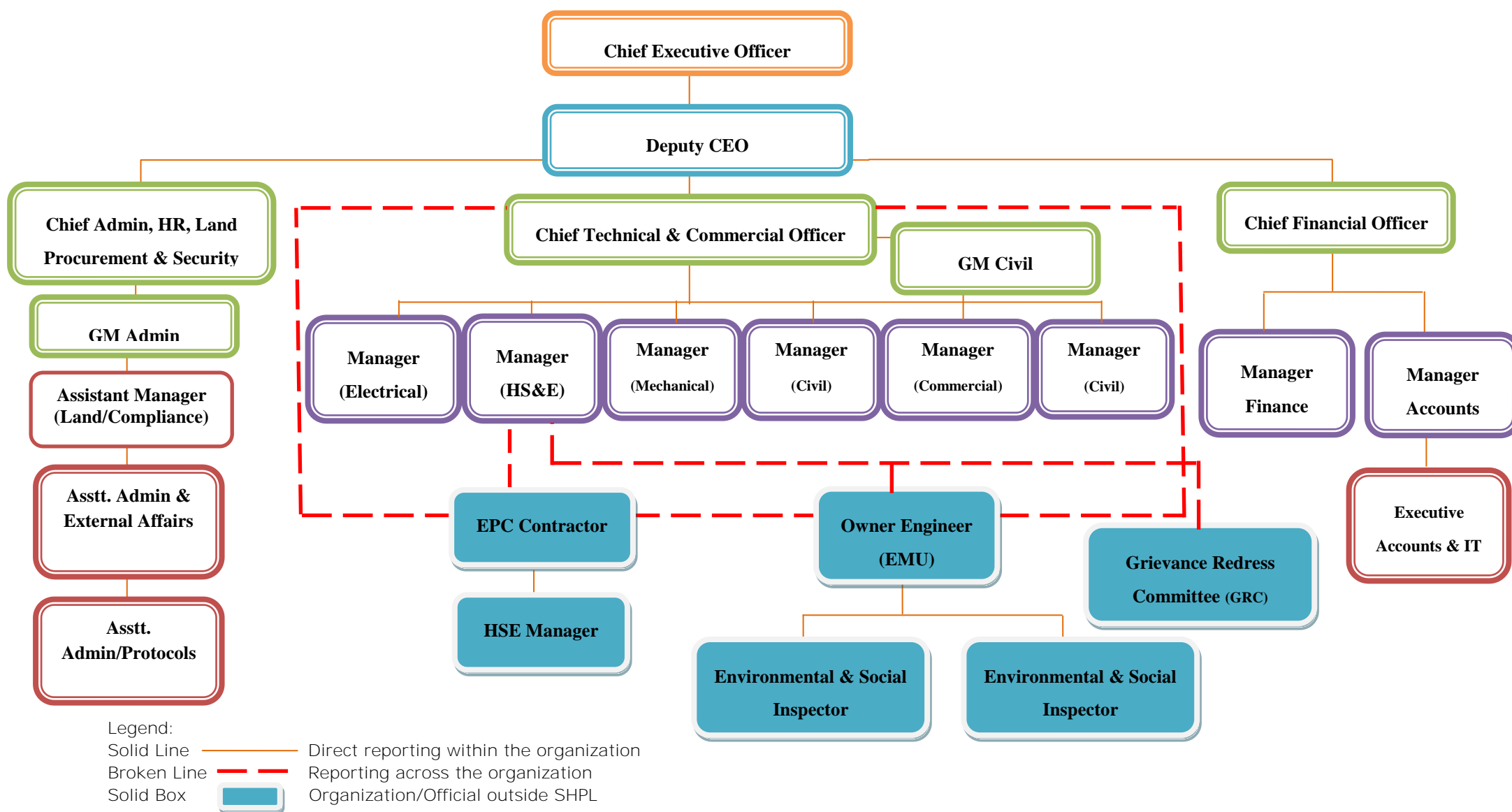


Table 4.2: Environmental Management and Monitoring Responsibilities

Organization	Designation	Responsibilities
Environmental and Management Unit	Environmental expert	<ul style="list-style-type: none"> - Advise SHPL, contractor and other construction Departments on matters relating to environment and social aspects of the project. - Advise and direct ESIs regarding the implementation of EIA and EMP. - Ensure compliance with all relevant environmental laws. - Coordinate with other stakeholders, including relevant EPAs.
Owner Engineer PES	Environmental and Social Inspectors (ESI)	<ul style="list-style-type: none"> - Ensure that the entire project is conducted in an environmental friendly and socially sound manner. - Ensure compliance with all relevant environmental laws. - Monitor full implementation of EIA and EMP requirement during construction of the project. - Report environmental and social compliances and ensure implementation of corrective measures, if any. - Coordinate with other stakeholders, including relevant EPAs, SC.
SHPL	Project Engineer	<ul style="list-style-type: none"> - Ensure that the construction is carried out within the agreed timeframe according to satisfactory EHS and technical standards.
Contractor	Site Manager	<ul style="list-style-type: none"> - Manage construction activities, construction crew, camp crew and other site personnel.
EPAs AJK& KP	DGs EPAs	<ul style="list-style-type: none"> - Overall monitoring of environmental issues and their management according to their rules and regulations.

5. MANAGEMENT MEASURES

Environmental management measures will be implemented over the three Project phases: (i) pre-construction; (ii) construction; and (iii) operation. The main measures that shall be implemented are described in this section.

5.1 Pre-Construction Management

Environmental management during Project pre-construction shall involve:

- preparation of SEPs and ERP;
- permit application;
- commencement of land and building acquisition and leasing;
- survey, pegging and fencing of Project sites;
- identification and protection of local village services;
- commencement of resettlement activities;
- finalisation of the Project employment strategy;
- preparation of environmental management course;
- commencement of staff training;

5.1.1 SEP and ERP Preparation

The EPC contractor shall prepare SEPs and ERP for at least those sites where construction will occur during the first six months of the construction program. SEPs shall then be progressively prepared for the remaining construction sites at least three months prior to the proposed commencement of site use.

5.1.2 Permit Application

The SHPL/EPC shall obtain any permits and approvals required for specific construction activities (such as blasting) prior to the commencement of these activities.

The EMU shall conduct pre-construction inspections as specified and to verify that the proposed activities adhere to the terms and conditions of these permits and approvals and the EMP.

5.1.3 Land and Building Acquisition and Leasing

SHPL/EPC shall commence land and building acquisition and leasing as per the RAP.

5.1.4 Survey, Pegging and Fencing of Project Sites

All Project construction and ancillary sites shall be surveyed and pegged by the EPC contractor in accordance with the approved final Project design and layout, prior to the commencement of vegetation clearance, earthworks and any other construction activities. Site boundaries shall be pegged at intervals of 25 m or less.

The pegging of Project sites will:

- enable construction activities to be confined to the minimum area required, thus reducing the area of disturbance and loss of productive resources;
- assist in identifying site specific environmental issues prior to construction, allowing appropriate mitigation measures to be developed.
- ensure construction workers clearly recognise the extent of sites; and
- allow landowners to recover or harvest resources from the affected area prior to construction.

After pegging the boundary of each construction and ancillary site the EPC shall:

- identify and document all local services within pegged areas;
- identify trees/vegetation within each site to be retained and fence them off;
- peg the proposed location of all stockpile areas, spoil disposal areas, crushing and batching plant operations, waste storage and disposal areas and fuel/chemical storage areas with pegs at no greater than 10 m intervals; and
- count the number of trees to be felled at each Project site in order to complete permit applications to fell trees.

Once the EPC contractor has pegged a Project site, the EMU and EPC contractor shall jointly inspect the pegged site. The EMU shall confirm the number of trees to be felled and the proposed location of the above listed activities and areas within the Project site.

The EPC contractor shall fence the boundary of workforce camps with a security fence to restrict vehicle and pedestrian access to designated points.

5.1.5 Protection of Village Services

Village services (e.g. access tracks, water supply pipelines, electricity supply lines) that will or may be affected by construction sites or activities shall be identified by the EPC in each SEP. These services shall be protected, or temporarily or permanently relocated, to ensure that they continue to function in a similar manner.

5.1.6 Land and Building Acquisition and Leasing

Private land and buildings must be acquired at Project sites prior to construction. Land and property acquisition shall occur in accordance with the provisions of the *Land Acquisition Act, 1894*, and the detailed guidelines contained in RP. RP guidelines include:

- notice to inform concerned landowners of Project activities;
- identification of all affected land parcels and census of affected owners;
- verification and quantification of land and building losses;
- finalisation of the list of entitled persons for publication;

- publication of the acquisition notice specifying the evacuation period and compensation arrangements; and
- payment of displacement allowances and compensation within specified time periods.

SHPL, as the Project proponent, shall ensure that all relevant land acquisition procedures and guidelines are followed prior to the commencement of any related works. Copies of Project land acquisition procedures shall be given to the EMU and EPC contractor, who shall adhere to these procedures.

SHPL shall enter into lease agreements with private landholders for temporarily required land prior to the commencement of construction or related activities. Lease agreements shall specify the existing condition of the land, land protection measures to be implemented during the lease and land rehabilitation measures to be undertaken at the end of the lease.

SHPL shall provide a complete list of affected property owners to the EMU and EPC contractor.

5.1.7 Compensation

Approximately 242 persons will be directly affected due to construction of weir and powerhouse.

Compensation procedures are fully described in the RP and EIA report shall be adhered to by SHPL.

5.2 CONSTRUCTION MANAGEMENT

Physical Environment

5.2.1 Land and Soils

- The project will require a total land area of approximately 45.6 hectares out of which approximately 37.6 hectares will be for permanent structure and approximately 8 hectares will be leased. Please refer to the draft Resettlement Plan.
- Soil erosion triggered by excavations of power house foundations
- Construction will include activities such as, levelling and result in loosening up of soil making the surface prone to erosion from wind and water
- Pollution of soils due to spillage of fuels, chemicals and lubricants during construction

Management Measures

- Cash compensation of land will be paid to the land owners on mutually agreed rates.
- Major excavation for construction will take place when the topsoil will be removed and the ground will be graded to obtain a level surface. Earth excavation for laying the foundations of the project equipment will be

undertaken.

- Internationally accepted best practice engineering approaches to minimize erosion risks will be incorporated.
- Back filling, compaction, and levelling to original state be carried out to avoid mishaps to people, cattle, etc.
- Sewage treatment facilities should be established for the construction camps.
- Construction activities should be limited to designated areas.
- Soil and Land use for the construction will be minimized.

5.2.2 Water Resources

- 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.
- For the weir site it would be necessary to establish dry pit condition to carry out construction work across Kunhar river.

Management Measures

- This change in water quality will be temporary and over a short distance of the reach which is neither used for agricultural irrigation nor for drinking water supply. Contractor would take care that minimum quantities of soil enters the river water.
- It is planned that during the construction period Kunhar river reach between the upstream coffer dam and the downstream coffer dam will remain dry. This change in river regime over a short reach will be temporary and of short duration.

5.2.3 Air Quality

- Air pollution caused by exhaust emissions from vehicles, machinery and equipment.
- Particulate matter emission during construction activities include earthworks (dirt or debris pushing and grading), exposed surfaces, exposed storage piles, vehicle movement on unpaved land, combustion of liquid fuel in equipment and vehicles.

Management Measures

- The contractor should be made aware of Environmental Protection laws prescribing air pollution control measures.
- The contractor shall take all necessary measures to limit pollution from dust and any wind-blown materials during construction, including water sprinkling on regular basis.
- Development and implementation of air quality and meteorological monitoring programme to check whether emissions and ambient air pollutant concentrations comply with NEQS and ADB Guidelines.

- Materials piled in the field are veiled with dust-proof covers.
- The spoil material shall not be overloaded beyond trucks' carrying capacity.
- All cars are run under specified speed limit.

5.2.4 Noise

- Enhanced noise level due to increased traffic as well as working of construction machinery and equipment
- During the day noise annoyance and can interfere with sleep during the night
- Effects would be caused by drill-blasting for the tunnel, pressure shaft and caverns.

Management Measures

- Selection of equipment causing low noise.
- Noise generated by construction activities should be of short duration and in day time
- Reduced speed limit of vehicles in the construction area
- Avoiding the use of pneumatic drills and other noisy appliances during days of rest or after normal working hours.

5.2.5 Spoil Disposal

- Spoil material may cause obstruction in the movement of human beings and animals may effect on human and animals health.
- Dust generated by soil disposal.

Management Measures

- Spoil material 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, terracing of hill slopes and reclamation of low lying land for play ground, parks etc.
- EPC Contractor, to the extent practicable and economical, will use excavated rock material (muck) for other purposes, in order to reduce spoil material to be dumped permanently in dumping areas.
- EPC Contractor will use suitable fill areas and quarry sites for spoil disposal before turning to dumping the spoils in the river.
- Excess muck material may be temporarily stored and dumped into the dumping areas.

EPC Contractor's Plan for the Disposal of Excavated Material

Detailed plan for the disposal of excavated material is given in Appendix-2

5.2.6 Waste Management

- Generation of solid waste and sewage from the workers and construction camps.
- Pollution of surface and ground water.
- Spreading of disease due to improper disposal of solid waste.
- Soil and water contamination through oil spills and leakage.

Management Measures

- Provision of sewerage and sewage treatment systems for sanitary waste water and solid waste management system for construction camp.
- Provision to construct a gravity drainage system which discharges into septic tanks.
- Latrines would be located in areas isolated from surface and groundwater, EPC contractor shall thoroughly disinfect and fill all latrine pits, sumps and trenches when no longer required.
- EPC contractor shall select and operate a solid waste disposal sites by avoiding environmentally sensitive areas.
- All waste and scrap materials from construction activities shall be stored in a scrap yard, which shall be created on site. The scrap yard shall be completely fenced and shall be managed by waste consignment contractor. All waste to be stored in the scrap yard shall be quantified and recorded.
- Impervious sheathing will be used to avoid soil and water contamination during vehicle and equipments maintenance. Waste oil will be collected in drums and sold to recycling contractor. Oil storage containers shall be well labelled in English and Urdu.

EPC Contractor's Waste Management Plan

- Detailed waste management plan is given in Appendix-2

5.2.7 Explosive and Hazardous Materials Storage and Handling

- The mishandling and incorrect storage of explosive and combustible material may cause accidents and or explosions which can affect human and animals life. Explosive material is vulnerable to theft as well.

Management Measures

- Explosive material has to be handled safely, including transport to the site (camp, quarry), storing at certain places and utilisation for blasting.
- The EPC Contractor will establish storage places, which will be maintained under special safety conditions. Only skilled and licensed personal has to be involved in all handling procedures. For blasting all safety conditions as internationally required will be applied.
- At all times, EPC Contractor will maintain full liaison with and inform well in advance, and obtain such permission as is required from, all Government authorities, public and private bodies whatsoever concerned or affected, or likely to be concerned or affected by blasting operations.

- EPC Contractor will be responsible for providing an up-to-date whole process documentation for all explosives brought on to the Site at all times, and maintains these explosives records from the Notice to Proceed to the end of the Defects Liability Period.
- EPC Contractor will remove all unused explosives from the Site on completion of the Works when directed by the Engineer. .
- EPC Contractor will schedule all above-ground blasting activities to occur during daylight hours as a safety precaution and as a courtesy to local residents.
- The EPC will have in place an Emergency Response Plan for any unforeseen accidents and/or incidents.

5.2.8 Temporary Structures and Facilities

Temporary facilities, such as access roads, warehouses, labour camps, storage areas, and work yards will be located so as to preserve the natural environment such as trees and vegetation to maximum extent possible.

Management Measures

- EPC Contractor shall take due care to minimize land requirements for temporary structures and facilities; EPC Contractor's layout and construction drawings will be subject to approval by the Engineer; any deviation from areas specified in the design Drawings or EIA (Environmental Impact Assessment) is environmentally surveyed and cleared; and EPC Contractor will avoid environmentally sensitive areas specified in the EIA (Environmental Impact Assessment).
- Unless alternative arrangements are agreed to between EPC Contractor and the Engineer or Client, when no longer required all temporary facilities will be removed and the land is restored by EPC Contractor.
- Only assigned or approved quarries and borrow areas will be exploited and material deposit, spoil and dumping areas will be subject to approval by the Engineer or Client.
- All temporary structures, facilities and access road right-of-way will be constructed only in the areas designated by the Engineer or Client, based on the Drawings.
 - Required changes in location of permanent structures and approved by the Engineer or Client after environmental clearance.
- EPC Contractor will indemnify the Engineer or Client against any claim or proceedings resulting from the occupancy and use of areas not approved by the Engineer or Client
- Site or temporary roads will be planned and designed by EPC Contractor, and will be subject to approval by the Engineer or Client.
- EPC Contractor will take every precaution to minimize environmental impacts arising from construction and operation of site and temporary

roads.

- EPC Contractor's design will follow the outline of the Specifications and EIA (Environmental Impact Assessment).
- EPC Contractor will maintain the site roads throughout the construction period, and reinstates the roads upon the completion of the Works according to the Specifications.
- Maintenance includes vegetation and slope stabilization consistent with the Specifications provided.
- EPC Contractor's temporary facilities, such as warehouses, labour camps, storage areas, and work yards will be located so as to preserve the natural environment such as trees and vegetation to maximum extent possible.

Impact on Biological Environment

5.2.9 Flora

- Occupation of land for project implementation will result in loss of habitats for flora.
- Transportation of equipment/machinery for the project can cause damages of crop and vegetation.
- Flora may be affected by trespassing of construction crews.

Management Measures

- It will be contractor's obligation to avoid extra cutting or damage to biological resources. The contractor shall protect and preserve trees, hedges, shrubs, weeds etc. and shall replace as far as possible.
- Replantation of trees will be ensured during the annual tree plantation campaign by the Forest Department.
- Timber and topsoil shall only be removed in the areas of permanent structures, in the area of approved EPC Contractor's temporary facilities or as instructed by the Engineer or Client. EPC Contractor will make all efforts to minimize the removal of trees and flags in advance any trees to be taken with approval of the Engineer or Client
- Generally, all top soil in areas to be excavated or filled over shall be removed and stockpiled for later reuse, as directed by the Engineer or Client.
- Trees that are removed to make way for the construction of a facility or because they fall in the inundation zone shall be counted and harvested. These trees may be used as fuel wood or construction materials, or given to the landowner as determined by the Engineer or Client during the Construction period.
- EPC Contractor will make all efforts to protect trees. If unavoidable, EPC Contractor will make a count of the total number of trees removed and will include double the number of trees in the replanting efforts.

5.2.10 Terrestrial Fauna

- Occupation of land for project implementation will result in loss of habitats for fauna like reptiles and insects etc
- During construction activities birds might fly away to the nearby areas because of noise.
- Due to construction activity animals and mammals may suffer and migrate to some other unwanted places.
- During excavation of foundations reptiles may be killed
- The temporary increase in vehicular traffic coupled with high noise levels due to various construction activities may have some negative impacts on animals especially birds. Acoustically sensitive animals living in the vicinity of the site can be disturbed by noise.

Management Measures

- Animal, having migrated to nearby safe areas will have the opportunity to return to their habitats after project construction activity is over.
- Contractor will be responsible to protect and preserve all biological resources during construction activities.
- 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.
- EPC Contractor shall take all reasonable steps to ensure that the staff and labour force does not engage in hunting or trapping of wildlife, Purchasing of any wildlife product shall be banned and EPC Contractor shall ensure that any and all violators are dismissed

5.2.11 Fisheries

- Since the fisheries resources in the Kunhar river reach in the project area is insignificant so it is liable that contractor staff may use dynamite for the purpose of fishing.

Management Measures

- EPC Contractor is liable for any illegal use of project dynamite for the purposes of fishing. EPC Contractor will not release pollutants that would damage aquatic resources, into the river and its tributaries.

EPC Contractor will purchase local fish with the approval of the Engineer or Client to ensure harvest is legal and not detrimental to fish populations

Socio-Economic Environment

5.2.12 Houses

- A total of 13 houses will be taken over to construct the powerhouse on the right bank of Jhelum river, 6 houses due to the submergence in the headpond on AJK side, 8 houses due to the submergence in the headpond on KP side and 1 (one) house on the weir side due to the construction of the diversion tunnel. These houses are occupied by 242 persons who constitute the population which is subject to displacement.

Management Measures

- Cash Compensation will be paid to the owners of the houses. No resettlement issues were raised as the cash compensation was opted by the house owners instead of resettlement option.

5.2.13 Commercial Assets

- There is no impact on commercial assets except a small water mill which will be inundated by creation of head pond.

Management Measures

- Cash compensation will be paid.

5.2.14 Infrastructure

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

Management Measures

- Roads will rather be improved for the transportation of heavy equipment and machinery and also new access roads/bridge will be constructed in the project area.

5.2.15 Culture/Archaeological Sites

- 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.

Management Measures

Minimize disturbance monasteries sites through careful sitting and scheduling. Should any archaeological sites, places, monuments or areas which might be affected be identified during the performance of the construction works, these archaeological sites shall be left untouched and protected by fencing. Any type of archaeological site as well as sites of religious or cultural significance shall be forthwith brought to the attention of the Engineer or Client who will issue further instructions on protection and preservation measures.

Women

- 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 privacy. There are no other vulnerable groups, nor any indigenous people in the project area.

Management Measures

- The EPC contractor will ensure the privacy of the people of the project area by warding off the construction area.
- There will be approximately 1350 workers on powerhouse and weir site. Unskilled labour will be coming from the local area while the skilled may not be available locally so the skilled labour will be coming from other places. The EPC contractor will restrict the movement of labour to the camps.

5.2.16 Health and Safety

- Transportation and operation of heavy equipment/machinery and labour may cause accidents.
- Liability of spread of communicable disease brought by outside construction workers.

Management Measures

- Contractor's traffic management, health safety and emergency response plans.
- Awareness and training of workers.
- Data on waterborne diseases to be collected on regular basis
- Baseline data on malaria and other disease.
- Establishment of one special medical service facility with building, medical equipment,
- Supply of pharmaceutical products on malaria (over 4 years)

5.2.17 Traffic

- Obstruction in the movement of people and animals.
- Obstruction in water ways.
- Air pollution through vehicle exhaust and dust.
- Noise and vibration

Management Measures

- Placing traffic signs at appropriate places.
- Enforcement of speed limit.
- Water sprinkling of road sides.
- Complete or review the project hazard assessment and communicate the findings to co-workers.
- It shall be ensured that the vehicle is equipped with directional control signage.
- It shall be ensured that the vehicle is inspected prior to use.
- It shall be ensured that the signs, poles, and other traffic control devices are secure before proceeding to the work site.

- It shall be ensured appropriate personal protective equipment is available, in good condition and used (vest, hardhat, foot protection, etc.).
- Do not ride in the back of the vehicle.
- Approved lifting devices and proper lifting techniques shall be used.
- Always attempt to work facing traffic flow.

5.2.18 Site Environmental Plans and other Special Plans

The program for the finalization of the SEPs and other special plans is set out below.

SEP	DATE OF COMPLETION
Traffic Management Plan	Already submitted by EPCC, to be finalized before construction starts.
Health and Safety Plan	Already submitted by EPCC, to be finalized before construction starts.
Sewage and Waste Management Plan	Already submitted by EPCC, to be finalized before construction starts.
Emergency Response Plan	Already submitted by EPCC, to be finalized before construction starts.
Social Uplift Plan	Already submitted by EPCC and shared with EPA AJK as a condition of Environmental Approval.

5.3 OPERATION MANAGEMENT

The project impacts on physical, biological and socio-economic environment are described in following sections.

Physical Environment

5.3.1 Water Resources

- During operation phase river flow, in Kunhar River, will undergo cyclical changes particularly affecting the downstream flow of the weir.

Management Measures

- Minimum 2 cumec of water from the head pond will be released as ecological flow throughout the year. This flow is in addition to substantial flow which joins Kunhar river in the form of large and small streams downstream of the weir thus providing enough flow as a management measure for aquatic flora and fauna in the reach downstream of the weir.

5.3.2 Water Quality

- Sediment load in terms of watershed erosion/ silt runoff may affect the life of the head pond and downstream of weir if allowed at excessive filling rate.

Management Measures

- The weir design provides a control of sediment load by sluicing through the bottom outlets during high flows. Sand traps have also been provided to protect the turbine from the damage by sediments. The sand trap is designed to trap the particles greater than 0.2 mm.
- Quarterly water quality monitoring will be done in accordance with the NEQS.
- Sediment flushing with appropriate warning system and alarm procedures.

5.3.3 Noise

- Due to operation of powerhouse.

Management Measures

- The powerhouse design should provide a control of noise due to operation of powerhouse.
- The bank or wall blocking noise and vibration will be built around powerhouse, if possible.

5.3.4 Waste Management

- Generation of solid waste and sewage from the staff colony/residential areas.

Management Measures

- Provision of sewerage and sewage treatment systems for sanitary waste water and solid waste management system.
- Proper landfill site would be selected for daily disposal of solid waste.

Biological Environment

5.3.5 Flora

- The cutting of trees during the project implementation will affect the ecological balance of the area and enhance soil erosion and landslide potential.

Management Measures

- 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.
- 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.

5.3.6 Fisheries

- Creation of headpond will result in the development of fish culture habitat.
- Creation of weir will endanger aquatic life downstream.

Management Measures

- Propagation of seasonal fish species with the help of fishery Department in the headpond.
- Downstream releases of ecological flow.

Socio-Economic Environment

5.3.7 Health and Safety

- The staff may be exposed to unforeseen accidents such as fire eruption, electric shocks etc
- Risks due to improper handling of equipments.
- Deafness due to persistent exposure to the noise
- Safety risks due to non observance of WAPDA safety manual and other guidelines.

Management Measures

- The operation management is obliged to reduce any risks for powerhouse staff during operation from accidents. This includes development of a Safety Manual, medical service and fire fighting equipments.
- Provision of ear muffs, gloves etc for operation staff.
- Observance of WAPDA safety codes for powerhouse.
- Emergency response plan for any unforeseen accidents including appropriate warning system and alarm procedures for operation staff and community.

5.3.8 Economy

Project will affect positively on the economy of the area not only during construction but also during operation phase. The impacts will be in terms of;

- Employment opportunities which will help mitigate local opposition if may develop
- the project will also stimulate local economy
- the project will reduce population emigration and help find work for local unskilled workers
- Local market will be benefited due to increase in demand of consumer goods
- Increased income in the project area will encourage the formation and growth of local businesses resulting in new indirect employment opportunities.

6. MONITORING & TRAINING

6.1 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 program will be implemented.

6.2 Monitoring and Coordination

- 1) For the control and due implementation of EPC Contractor's policy as outlined in Environmental Protection Plan, the avoidance of unnecessary damages, repair of damages, and the implementation of all required protection and the implementation of all required protection and conservation measures, EPC Contractor will assign a competent environmental and monitoring officer who shall have sufficient authority to enforce the necessary measures as outlined in these Contract Documents. The environmental specialist shall be assigned through the Defects Liability Period to competently advise all employees of actions to be taken or to be omitted. EPC contractor will engage a suitable Government or private laboratory to test water quality biannually.
- 2) For environmental monitoring purposes, EPC Contractor shall provide photo documentation of all areas at which construction activities will take place and of all areas which will be affected by their operations.

Such photo documentation shall be taken prior to the commencement of the Works and shall be arranged so as to have a continuous presentation of the original terrain and its features. The standpoint of the photographer shall be recorded so as to enable the taking of later photos from the same permanent photographic standpoint. The Engineer or Client may direct that additional permanent photographic points be established for environmentally sensitive areas.
- 3) Upon completion of the Works, and also during the progress of the Works at selected critical areas, final photo documentation shall be undertaken so as to permit comparison of the terrain, and its features prior and after construction with particular emphasis on environmental features.
- 4) EPC Contractor shall coordinate and consult with the administrators of local communities and dwellings in matters concerning the impact of its operations on environmental and socio-economic aspects.
- 5) Any problems arising from its operations and which cannot be resolved by EPC Contractor shall be referred to the Employer through the Engineer.

EPC Contractor is responsible for any compensation due or reinstatement in respect of any damage caused by EPC Contractor to areas outside the sites.

- 6) EPC Contractor will provide monthly and annual Environmental Reports. The reports shall address compliance with other environmental clauses, monitoring requirements, and environmental problems and recommended solutions. The monthly reports shall be brief. They shall focus on problem areas and measures taken to correct problems. The annual reports shall also be brief but may append more extensive environmental data. These reports shall be provided to the Engineer or Client.
- 7) EPC Contractor is responsible for conducting monitoring. All data and records shall be given to the Engineer or Client at the end of the Contract. These records and data shall be well organized and legible.
- 8) EPC Contractor will report within 24 hours to the Engineer or Client the discovery of any project-related fish kill, toxic spill, or take of threatened or endangered species. Illegal harvest of fish, wildlife or forest resources shall be reported with the scheduled monthly reports.
- 9) All accidents have to be recorded. The Environmental Team has to monitor all accidents in order to avoid any further cases in future.

6.2.1 Monitoring parameters, location, frequency and responsibility

A comprehensive list of the factors to be monitored is reproduced below in the Table 6.1.

Table 6.1: Environmental Monitoring Plan for the Project

FEATURE / ISSUE	PARAMETER/S MONITORED	LOCATION	RESPONSIBILITY	FREQUENCY
PRE-CONSTRUCTION PHASE				
Survey of Required Land/Houses/commercial Assets/Flora Fauna	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Payments to Affectees, complaints 	Project sites	EMU, SHPL, LRD, EPA	Monthly till finalization
CONSTRUCTION PHASE				
Statutory Requirements	<ul style="list-style-type: none"> Compliance with approval conditions 	Project sites	EMU, EPA	Monthly
Landslides	<ul style="list-style-type: none"> Catchment stability 	Weir and powerhouse catchment	EMU, EPC	Once after monsoon
Vegetation Clearance	<ul style="list-style-type: none"> Progressive vegetation clearance within marked sites 	Project sites	EMU, EPC	Weekly
Erosion and Sediment	<ul style="list-style-type: none"> Extent of erosion and sedimentation Topsoil stripped and covered or seeded if stockpiled for longer than one month or during the monsoon 	Project sites	EMU, EPC	Weekly
Muck Disposal	<ul style="list-style-type: none"> Reuse of spoil/muck within Project areas where possible Correct disposal of surplus spoil/muck in designated areas 	Project sites	EMU, EPC	Weekly
		Disposal areas	EMU, EPC	Weekly
	<ul style="list-style-type: none"> 			

FEATURE / ISSUE	PARAMETER/S MONITORED	LOCATION	RESPONSIBILITY	FREQUENCY
Water Quality	<ul style="list-style-type: none"> 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 EPC	Weekly Biannually
Waste Management	<ul style="list-style-type: none"> Waste materials reused or recycled on-site where possible Non-recyclable wastes disposed of appropriately 	Project sites Project sites	EMU, EPC EMU, EPC	weekly Weekly
Hazards/Risk	<ul style="list-style-type: none"> Workers provided with appropriate safety equipment and regular safety training Storage of hazardous goods in bounded 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	<ul style="list-style-type: none"> 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 Monthly Weekly
Aquatic Ecology	<ul style="list-style-type: none"> Fish and Aquatic populations 	Kunhar River – upstream and downstream of weir	EMU, Fishery Department	Quarterly

FEATURE / ISSUE	PARAMETER/S MONITORED	LOCATION	RESPONSIBILITY	FREQUENCY
Flora	<ul style="list-style-type: none"> Direct observation of surrounding vegetation 	Within 1,000 m of Project sites	EMU, Forest Department, EPC, EPA	Monthly
Noise and Vibration	<ul style="list-style-type: none"> Maintenance of equipment in accordance with manufactures' specifications Controlled blasting 	Project sites Construction sites	EMU,EPC, EPA EMU,EPC, EPA	Weekly As per blasting schedule.
Air Quality	<ul style="list-style-type: none"> Exhaust emissions from machinery – visual inspection 	Project sites	EMU,EPA	Weekly
Traffic/Access	<ul style="list-style-type: none"> Enforcement of speed limits on Project roads Noise Traffic Signs 	Access and approach roads	EMU,EPC	Weekly
Complaints	<ul style="list-style-type: none"> All complaints replied to 	Project sites	EMU,SHPL	As per complaints received.
OPERATION PHASE				
Statutory Responsibilities	<ul style="list-style-type: none"> Compliance with approval conditions 	Project sites	SHPL, EPA	Biannually
Hydrology	<ul style="list-style-type: none"> River flow volume 	Downstream of weir and tailrace outlet	SHPL, O&M Contractor, EPA	Monthly
River Bed Degradation	<ul style="list-style-type: none"> River bed degradation 	Kunhar River bed from weir to confluence	SHPL, O&M Contractor, EPA	Quarterly

FEATURE / ISSUE	PARAMETER/S MONITORED	LOCATION	RESPONSIBILITY	FREQUENCY
Head Pond Stability	<ul style="list-style-type: none"> Banks stability 	Head Pond	SHPL, O&M Contractor	Biannually
Aquatic Ecology	<ul style="list-style-type: none"> Habitat availability and seasonal fish species and populations 	Upstream and downstream of weir	SHPL, Fishery Department, O&M Contractor	Quarterly
Water Quality	<ul style="list-style-type: none"> Temperature, dissolved oxygen, pH, conductivity, turbidity, total phosphorous, inorganic phosphorous, total nitrogen, ammonia nitrogen, nitrogen oxides, biochemical oxygen demand and faecal coliforms 	Head Pond and downstream of river	SHPL, O&M Contractor	Biannually
Hazards	<ul style="list-style-type: none"> Monitor landslides Structural soundness 	Catchment of project site and project structures	SHPL, EPA	Annually Biannually
Noise	<ul style="list-style-type: none"> Noise levels 	Powerhouse site	SHPL, EPA, O&M Contractor	Quarterly
Solid Waste Disposal	<ul style="list-style-type: none"> Visit disposal sites 	Project staff colonies	SHPL, EPA, O&M Contractor	Quarterly
Waste Water Discharge	<ul style="list-style-type: none"> Waste water Quality in accordance with NEQS 	Project staff colonies	SHPL, EPA, O&M Contractor	Quarterly
Workers Health and Safety	<ul style="list-style-type: none"> WAPDA safety codes for powerhouse 	Powerhouse site	SHPL, , O&M Contractor	Quarterly

6.2.2 Compliance Monitoring

The compliance monitoring of project activities is principally a tool to ensure that the environmental and social control measures identified in the EIA and EMP are strictly adhered to during the project activities. Various aspects of EIA compliance monitoring will be to:

- Systematically observe the activities undertaken by the contractors (and subcontractors) or any other person associated with the project. Verify that the activities are undertaken in compliance with the EIA, EMP
- Maintain a record of all incidents of environmental and social significance, related actions and corrective measures.
- Maintain contact with the communities, solicit their views and concerns, and discuss them during the fortnightly meetings.
- Prepare periodic reports of the environmental and social performance of project.
- The Management Measures will be used as a management and monitoring tool for compliance monitoring. Inspection will be done using checklists prepared by the respective contractors during the construction phase.
- Compliance monitoring will be the responsibility of all organizations involved in the field activities, i.e. SHPL, EPC Contractor, PES/Fichtner and any other contractors. It will be carried out by the ESI.

6.2.3 Effects Monitoring

The EIA predicts the impacts of the proposed project on the basis of information available at the time of conducting the assessment and the natural processes that link various environmental and social parameters. Based on this prediction, mitigation measures are introduced such that the predicted residual effects do not exceed acceptable levels. However, there is always an element of uncertainty in such predictions due to an insufficient grasp of the processes, limitations in prediction techniques, or inadequate data on the environment/social aspects. Consequently, it is possible that even if the mitigation measures are implemented fully, the negative impacts of the project will exceed acceptable limits. In order to address the above concerns, effects monitoring will be undertaken during the project activities, with the overall objective of proper management of environmental and social risks and uncertainties. Broadly, effects monitoring has the following objectives:

- To verify that the impacts of the proposed project are within acceptable limits, thus establishing credibility (public assurance)
- To immediately warn the project proponents (and the regulatory agencies, if required) of unanticipated adverse impact or sudden changes in impact

trends so that corrective actions can be undertaken, which may include modifications in the proposed activities, or the inclusion of modified or additional mitigation measures.

- To provide information to plan and control the timing, location, and level of certain project activities so that the effects are minimized.
- To facilitate research and development by documenting the effects of the proposed project that can be used to validate impact-prediction techniques and provide a basis for more accurate predictions of future projects.

The effects monitoring will comprise the following:

- Sanitation facilities
- Soil contamination
- Water quality
- Water consumption
- Air quality
- Noise
- Socioeconomic aspects
- Fishery (count and health) in pond

6.2.4 Grievance Monitoring

In addition, contact will be maintained with the communities, their views and concerns solicited. The outcome of these consultations will be discussed during the meetings.

6.2.5 External Monitoring

In addition to the above, the ADB requires SHPL to "retain qualified and experienced external experts or qualified NGOs to verify monitoring information".

The objectives of this external monitoring will be to ensure that:

- The EMP is being adequately implemented,
- Mitigation measures are being implemented,
- Negotiated cash compensation is being effected,
- The RP is being implemented,
- The compliance and effects monitoring are being conducted,
- Environmental and social training is being conducted, and complete documentation is being maintained.

The external monitoring consultants may periodically visit the project sites. Examine the compliance monitoring activities, review the documentation maintained at the site, interview key site staff, make spot checks, take

photographs where necessary, interview the PAPs, and meet with the communities. After each external monitoring visit, the consultant will prepare a monitoring report and submit to SHPL. The report will include the observations made during the visits, highlight non-compliances observed, if any, salient information obtained from PAPs/communities, and make recommendations.

6.2.6 Communication and Documentation

An effective mechanism for recording, storing and communicating environmental and social information during the project is an essential requirement of an EMP. The key features of such a mechanism are: Recording and maintaining all information generated during the monitoring in a predetermined format.

Following formats are used during monitoring:

6.2.6.1 Data Recording and Maintenance

All forms will be numbered and a tracking system will be developed for each. Whenever a form is released for use in the field, its number will be recorded. The field staff will be required to account for each form after completion. In this manner, it will be ensured that all forms are returned to the office.

6.2.6.2 Meetings

The following environmental meetings will take place during the project:

- Project initiation meetings (once for each of the contractors)
- Fortnightly meetings

The purpose of the project initiation meetings will be to discuss the EMP, and ensure full understanding and commitment from concerned parties for its implementation. A periodic meeting will be held at site during the construction phase. The purpose of the meetings will be to discuss the conduct of the operation, non-compliances noted by the **ESI or Contractors' ESM**, and any environmental / social issues identified in the field. The remedial measures will also be discussed and agreed during these meetings. The meeting will be recorded in the form of an environmental and social report (ESR) prepared by the ESI/ESM.

6.2.6.3 Grievance Redress Mechanism

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. In addition, grievances may also arise in relation to environmental issues, raised by local people or organisations. 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.

The local community shall be informed about project grievance handling procedures through village discussions. This will occur in all villages within 200

m of construction sites.

All complaints and resolutions will be properly documented by the concerned Grievance Redress Committee (GRC) and be available for review for monitoring purposes. As part of the post-evaluation and monitoring, the grievances will be available for review for Supervisory Consultant and decision regarding grievances shall be consistent with approved policies and entitlements.

Two GRC, one each for weir side and powerhouse, required in order to resolve disputes amicably through consultants. The GRCs are very important as it is expected that most cases, if not all would be resolved by the GRCs. The committee will hear complaints and facilities solutions and the process, as a whole will promote dispute settlement through mediation to reduce litigation.

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.

Grievance Redress Committee (GRC)

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

It shall deliver its decision within two to four weeks of registration of the case.

Function of the Grievance Redress Committee

The GRC will meet whenever grievances have been forwarded to them. The decision of the GRC will not be binding and APs can take recourse to the civil court if he/she so desires.

The functions of GRC are as under:

1. Record the grievances of APs, categorize and prioritize them and provide

solution to their grievances arising out of land and property acquisition and eligibility for compensation and to raise environmental issues including proof or substantiation of potential damage or concerns;

2. The GRC may undertake site visit and ask for relevant information in order to perform its functions;
3. Fix a time frame for resolving the grievance subject to a maximum of 14 days;
4. Inform aggrieved parties directly about the status/development of their case;
5. Inform in writing of their decision to the aggrieved party.

Grievances Redress Procedures

This grievance redress procedure along with specific time frame and mechanism for resolutions of complaints will be adopted. This procedure states that any AP who has a complaint or is not satisfied with the compensation provided can complain in writing to the GRC. The GRC will deal with the grievance within seven working days of receipt of any complaint.

The AP's and local stakeholders will be briefed on the function and responsibilities of the grievance redress committees and the grievance redress procedures.

6.2.6.4 Reports

The EMU will prepare periodic reports based on the information collected. These will include reports for:

- Project initiation meeting with contractor,
- Fortnight meetings,
- Non-compliances,
- Effects monitoring

These reports will be shared with the contractor's Project manager construction. The reports will also be made available for review, to the external monitoring teams, and to any other stakeholders who visit the site.

At the end of the construction phase, a final report will also be prepared.

The pro forma for daily and weekly environmental monitoring together with training record and incident report as attached to this document as Appendix-1

6.3 Environmental and Social Training

Training will cover all staff levels, ranging from the management and supervisory to the skilled and unskilled personnel. Following Table 6.2 is depicting the Training Plan.

Table 6.2: Training Plan

Schedule	Content	Participants	Responsibility
Prior to the start of the construction activities	Waste disposal General environmental and socioeconomic awareness; Environmental and social sensitivity of the project area; Mitigation measures; Community issues Awareness about social and cultural values of the area. Key findings of the EIA; EMP; Social and cultural values of the area.	Construction crew All site personnel SHPL management staff	EMU
Before and during the field operations.	Road safety; Defensive driving; Waste disposal; Cultural values and social sensitivity.	Drivers	Contractor, EMU
Before the start of the restoration activities	Restoration requirements; Waste disposal	Restoration Teams	Contractors, EMU

6.4 PUBLIC DISCLOSURE

During the field survey an extensive community consultation exercise was undertaken to incorporate the concerns and views of local communities in socioeconomic and environmental assessment survey. This consultation process entailed a thorough and simplified briefing of the technicalities and potential impacts of the project on the communities. For this purpose, apart from consultations with the local community, consultations with concerned public representatives and officials of the relevant line departments were also held.

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.

Outcome of Consultations

During scoping sessions/community consultations/question-answer meetings, the overall response from the project area population was positive. Everyone welcomed the project as being beneficial to the region.

- **Land Acquisition**

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

- **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. Noise nuisance of 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.

- **Employment**

The participants of the public consultation meetings 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 local on permanent basis.

- **Project Benefits**

The local community expressed the opinion that the project should be designed in a manner that all people, including the poor, should benefit from the project through such initiatives as electricity availability, and the establishment of school and health clinics.

The power that will be generated by the project will be despatched to NTDC, therefore local distribution by SHPL is not possible. A environmental and social uplift program (Section 8) will be implemented by the project that includes: (i) the provision of educational materials to local schools; and (ii) the establishment of two medical rooms in the local area; to be implemented by the EPC contractor.

Cooperation with the Community

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.

- **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 with a small minority expressing some apprehensions about compensation payment. They demanded timely compensation for land and houses.

A drinking water storage tank is located on the right bank of Kunhar river near the proposed route of the diversion channel. Spring water is stored in the tank to meet the drinking water requirements of the adjacent settlements like Taitree and Sarati. Local people have expressed a concern that this might be affected during construction.

The water storage tank is a concrete structure that is properly covered, therefore there does not seem to be any chance of direct contamination. Contamination of the spring water feeding the tank will be avoided by ensuring any nearby construction activities do not impact on this water source.

About 6 kanal of agriculture land are under cultivation on the right bank of Kunhar river near weir site. The owner of land also demanded that no damage may occur to the land during construction activities or else compensation for crops should be paid for the duration of construction activities. Community consultation process was started at an early stage in the project cycle.

6.5 COST OF ENVIRONMENTAL AND SOCIAL MONITORING

Following elements of cost have been estimated in Table 6.3.

Table 6.3: Cost of Environmental and Social Monitoring

Sr. No.	Title	Duration		Cost (Pak Rs.)	Cost (USD)
1	Environmental and Social Training	Requirement basis	=	500,000	5,882
2	Tree Plantation	Lump sum	=	500,000	5,882
3	Contingencies	5%	=	50,000	588
	Total:		=	1,050,000	12,353

7. AUDITING

7.1 Records

To demonstrate environmental compliance with the contract and EMP, records shall be kept regarding environmental management and monitoring during Project construction and operation.

7.1.1 Construction Phase

EPC Contractor shall keep records demonstrating environmental compliance during Project construction. The following records shall be maintained:

- all necessary permits and approvals;
- proof of employee environmental and safety training;

- all environmental monitoring results;
- a record of all maintenance of environmental controls;
- all written instructions and reports provided by the EMU, including Weekly, Monthly and quarterly Reports and Audit Reports;
- a register of non-conformances and corrective actions; and
- all correspondence on environmental management matters, including any complaints received.

All records shall be kept at site premises and maintained in a legible state for the full period of construction. Environmental records will be made available to SHPL, EMU, EPAs (upon request).

7.1.2 Operation Phase

SHPL shall keep records demonstrating environmental compliance during the operation of the Project. The following records shall be kept:

- all necessary approvals and permits, including permission for activities on private land;
- proof of employee environmental and safety training;
- results of all environmental monitoring;
- maintenance undertaken;
- all written instructions and reports provided by the EMU, including Weekly Reports, Monthly Reports and Audit Reports;
- a register of non-conformances and corrective actions; and
- Correspondence.

A database of environmental monitoring results will be established. If monitoring results indicate non-conformance, the Contractor shall inform SHPL immediately and appropriate remedial action shall be taken.

Records shall be kept at site premises and maintained in a legible state. Records will be made available to EPAs (upon request).

7.2 Site Audits

Site audits will be undertaken to independently verify the compliance of Project activities and controls against Government standards and the conditions set out in Project management plans.

7.2.1 Construction Phase Internal Compliance Audit

During the project construction, a full compliance audit of the SHPL operations and all construction and ancillary sites shall be conducted by an Auditor appointed by SHPL once every six months. Environmental compliance will be audited against the conditions of the EPC contract and the EMP.

The audit will involve a review of all sites in use or used since the previous

audit, any construction and related activities in progress and the site records. An Audit Report describing the results of each audit shall be prepared and submitted to the SHPL. The Audit Report shall specify any non-conformances and recommend corrective action/s with dates for completion.

7.2.2 Operation Phase

Internal compliance audit

SHPL shall undertake a compliance audit of all Project sites every six months over the initial three years of Project operation, then annually over the life of the power generation period. Sites and operation activities shall be audited against contract conditions and the EMP. The O&M Contractor shall accompany and assist SHPL during the audit. An Audit Report describing the results of each audit shall be prepared and submitted to SHPL/Contractor. The Audit Report shall specify any non-conformances and recommend corrective action/s with dates for completion.

Corrective Action

Environmental non-conformances usually require the implementation of corrective actions specified in non-conformance reports.

7.2.2.1 Construction Phase

EPC Contractor shall implement the corrective action/s recommended by the EMU in the time specified. EPC Contractor shall then notify the EMU of the completion of the corrective action/s.

The EMU shall verify the satisfactory implementation of corrective actions during the following Weekly Inspection and sign off on the non-conformance/s if satisfactorily rectified, or make a further request if unsatisfactory.

7.2.2.2 Operation Phase

During Project operation, the O&M Contractor shall implement the corrective action/s recommended by SHPL, in the time specified. The O&M Contractor shall then notify SHPL of the completion of the corrective action/s so that SHPL can verify satisfactory implementation.

SHPL shall verify the satisfactory implementation of corrective actions and sign off on the non-conformance/s if satisfactorily rectified, or make a further request if unsatisfactory.

7.3 Incident Management Procedures

Management of SHPL and the Contractor shall prepare Incident Management Procedures for their respective Project phases.

During employee environmental training, SHPL / Contractor shall emphasis on the importance of documenting all environmental incidents.

Management of Star Hydropower Limited / Operation Contractor shall immediately report all incidents to the EMU / SHPL. These incidents may include:

- Theft or misplacement of explosives;
- Construction activities undertaken outside approved sites;
- Damage to private or Government structures or land;
- Hazardous material spills; and
- Forest or grass fires.

Management of Star Hydropower Limited / Operation Contractor shall investigate and act on all incidents by:

- identifying the cause of the incident;
- identifying and implementing necessary corrective action(s);
- identifying personnel responsible for carrying out corrective action(s);
- implementing or modifying controls necessary to avoid repetition; and
- recording any changes required in written procedures

7.4 Emergency Response Procedures

SHPL and the EPC Contractor shall jointly develop and implement Emergency Response Procedures for Project construction prior to the commencement of construction. SHPL and the O&M Contractor shall jointly develop and implement Emergency Response Procedures for Project operation prior to the commencement of operation.

The construction and operation procedures will be shared with the ADB and IFC prior to the commencement of each of these phases. The Procedures shall contain the following steps

7.4.1 Define the Problem

The immediate problem is established to facilitate a review of available options for short-term action.

7.4.2 Manage the Situation

- The safety of any persons, either workers or others involved in Project construction or operation, is to be ensured as a first priority.
- Environmental damage is to be quickly minimised. All emergency action should take place as soon as possible after the event.

7.4.3 After the Event

- The EMU / SHPL shall be contacted immediately once all persons are safe and any possible immediate actions to control damage and manage the situation have been taken.
- A rectification plan will be developed by the EMU / SHPL detailing how any remaining environmental effects will be remedied.

7.4.4 EPC Contractor's Emergency Response Procedures during Construction

EPC Contractor will be committed to identifying and removing or controlling emergency situation as follow, but not limited to:

- Emergency Evacuation
- Medical Emergency (e.g. Work Related injuries, sickness)
- Fire and Explosion
- Health – Outbreak of Disease
- Toxic Emission from Adjacent Facilities
- Environmental Emergencies
- Security Breaches and Sabotage, Civil Disorder, War
- Motor Vehicle Accident
- Natural Calamities

The Emergency Response Procedure during Construction is a worker-oriented and supervisor-oriented process. Workers will be in the best position to identify the hazards in the workplace because they are the ones who perform the work, and the supervisor will be in a position of responding to emergency in a site before or just after it happens. Workers act as a second set of eyes for supervisors. The Response procedures of both will be shown as below:

- Worker Responsibilities
 - Report any perceived emergency situation, possible risk or hazard verbally to the site supervisor.
 - Provide recommendations to the supervisor on how to eliminate or control those potential harms.
 - **If the supervisor does not respond to worker's concern he shall then inform the management.**
- Supervisor Responsibilities
 - Discuss the hazard and controls with the worker, and complete the report to HSE team.
 - **Respond to the worker's concern by the next shift.**
 - Ensure that the reporting details the action or non-action which will be taken.
 - Provide a copy of the completed reporting on emergency, risk and hazard to HSE team and middle management.

As the counter measures will be applied to the emergency situation directly by workers and supervisors without any hesitation, the concurrent reporting to HSE staff and manager will be done at the site. According to the level of situation, direct notice to related parties such Police station or Government office will be

made for further action including evacuation, support and cooperation, etc.

Slow response, lack of resources, or absence of trained personnel can lead to chaos in an emergency. To minimize losses, especially fatalities and injuries, personnel should know their responsibilities, know the procedures to follow, and be able to communicate in an emergency. All related staff will follow these steps in developing the plan for emergency response procedures.

- List possible areas where emergencies such as fire, explosion, structural collapse, or chemical spills might occur.
- For each type of hazard, identify the possible results – fatalities, injuries, structural or environmental damage.
- Determine the required response, such as rescue, fire fighting, or evacuation. The response plan shall include step-by-step procedures and control measures for each type of emergency.
- Determine what resources, including rescue equipment and medical supplies, should be on hand to deal with specific emergencies.
- Determine the training required for effective response to emergencies.

8. ENVIRONMENTAL AND SOCIAL UPLIFT PROGRAMS

For the uplift and betterment of the local community, SHPL and the EPC Contractor have proposed five comprehensive environmental development programs. The programs are:

- Improvement of access to isolated villages
 - ✓ Bridge across Jhelum river
 - ✓ Connects Taitree to Patrind & Tarcheela
- Improvement of Existing Road Pavement
 - ✓ Paving the road if not paved from the Supreme Court
- Construction of New Road
 - ✓ New road from the children park to Switchyard
 - ✓ Road pavement connects Access Bridge for Powerhouse to Alda village
 - ✓ Road pavement connects Taitree → Weir → Tarcheela → Existing Access Road
- Improvement of the sites used for various construction activities
- Development Scheme for Medical Treatment, School Support & Social Uplift

8.1 Improvement of Access to Isolated Villages

Bridge across Jhelum river

The powerhouse site is located on the right bank of Jhelum river which will be accessed through a permanent bridge across Jhelum river, the bridge will

connect Lower Chatter Muzaffarabad to Alda village on the right bank of Jhelum river. Till now the locals face problems to cross the river as there is only a pedestrian bridge downstream of the Alda village, no vehicular traffic access is available for the locals.

By constructing the bridge across the river the locals will be highly benefited in terms of access and other benefits.

Connects Taitree to Patrind & Tarcheela

Patrind village is located on the left bank of Kunhar river while Taitree is on the right side of Kunhar river. The locals have to travel a lot because the only access is through Boi road leading from Garhi Habibullah Bridge and it takes lot of time and effort to communicate between two villages and the city of Muzaffarabad or Abbottabad.

During the construction period of Patrind Hydropower Project the downstream cofferdam can be used as temporary access bridge and after the completion of the construction there will be a permanent bridge on the weir deck which will be used by the locals to cross the Kunhar river between both the sides.

8.2 Improvement of Existing Road Pavement

Paving the road if not paved from the Supreme Court

A road leads from Supreme Court to the Chatter children park. As a part of the social uplift the road from Supreme Court to Children Park will be improved.

8.3 Construction of New Road

New road from the children park to Switchyard

After the children park to the location of the switchyard a new road will be constructed. The road will also be used by the locals. This will also improve the communication between the local residents in case of any emergency.

Road pavement connects Access Bridge for Powerhouse to Alda village

A new road will be constructed starting from a point joining the road leading towards the switchyard area which will connect to the bridge and again from the bridge on the right side of the Jhelum river a road will be constructed for the locals which will lead towards Alda village.

Road pavement connects Taitree → Weir → Tarcheela → Existing Access Road

A katcha track leads from the main Muzaffarabad- Garhi Habibullah road to Tarcheela village. During the construction and operation periods of the project the Katcha road will be converted to a permanent road helping the local residents in every manner. From Tarcheela village a road will be constructed towards the weir location and from the weir bridge deck on the right side of Kunhar river a road will be constructed to connect it with existing Boi Road.

8.4 Improvement of Construction Sites

Improvement of various sites used for different activities during the construction or operation period of the project will be a part of the social uplift of the local community.

8.5 Development Scheme for Medical Treatment, School Support & Social Uplift

- 1) 2 Medical rooms at upper & lower areas
- 2) Medical institution for health of local residents
- 3) Engage in aid project for improving of educational environment
 - Supplying information literacy & computer
 - Improving for educational environmental & facilities
 - Supplying educational materials
- 4) Local residents primarily hired assuring at least 1 person in a house
- 5) Contribution to local economy by recreation activities & tourist attractions using reservoir and parks created by weir construction

9. ENVIRONMENTAL MANAGEMENT COST

9.1 Annual Environmental Management Cost of SHPL during Construction

SR. No.	Description	Amount (PKR)	Amount (USD)
1.	Star Hydro environmental management staff	1,020,000	12,000.00
2.	Annual monitoring and reporting	300,000	3,529.41
3.	Annual auditing	400,000	4,705.88
	Total	1,720,000	20,235.29

9.2 Annual Environmental Management Cost of SHPL during Operation

SR. No.	Description	Amount (PKR)	Amount (USD)
1	Major mitigation measures	400,000	4,706.00
2	Star Hydro environmental management staff	1,020,000	12,000.00
3	Annual management activities	100,000	1,176.00
4	Annual monitoring and reporting	300,000	3,530.00
5	Annual auditing	400,000	4,706.00
6	Annual training	100,000	1,176.00
	Total	2,320,000	27,294.00

9.3 Cost of Main Mitigation Measures to be borne by EPC Contractor

SR. No.	Item	Total Cost (\$ million)
1.	Sanitary facilities in labor camps	0.537
2.	Solid waste management	0.119
3.	Management of muck disposal sites	0.215
4.	Stabilization of quarry sites	0.063
5.	Landscaping and restoration of construction sites	0.063
6.	Greenbelt development	0.101
7.	Public health delivery system	0.317
8.	Construction of settling tanks	0.025

9.	Environmental laboratory	0.051
10.	Environmental monitoring program	0.152
11.	Environmental scientific studies	0.089
12.	Contingencies	0.190
13.	Escalation	0.078
	Total	2.000

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APPENDICES

APPENDIX-1

Daily Environmental Monitoring Proforma

Date:		Project site:		
Weather Conditions:	Rain	<input type="checkbox"/>	Dry	<input type="checkbox"/>
Item	Yes	No	N/A	Comments
Vegetation Clearance				
Disturbed areas kept to a minimum				
Vegetation cleared progressively				
Erosion and Sediment				
Stockpiles adequately protected from erosion				
Batter slopes stable				
Adequacy of sediment basins and drains				
Spoil Disposal				
Spoil reused on site where possible				
Surplus spoil disposed in designated area and correctly placed				
Waste Management				
Adequate number of waste disposal containers available and emptied				
Waste materials reused or recycled on-site where possible				
Blasting				
Blasting methods controlled				
Air Quality				
Monitor air quality in confined work places				
Water sprayed at appropriate sites to minimize dust generation				
Additional Comments:				
Reported By:				

Weekly Environmental Monitoring Proforma

Date:		Project site:		
Weather Conditions:	Rain	<input type="checkbox"/>	Dry	<input type="checkbox"/>
Item	Yes	No	N/A	Comments
Statutory Responsibilities				
Compliance with approval conditions				
Water Quality				
Wastewater treated prior to being discharged				
Waste Management				
Non-recyclable wastes disposed of appropriately				
Hazards / Risk				
Employees provided with safety equipment				
Hazardous goods stored in bounded area or in secure sheds				
Explosives stored in guarded bunkers				
Hazardous goods used according to manufactures' specifications				
Additional Comments:				
Reported By:				

Environmental Complaints Record

Date	Time:	
<p>The complaint was received from _____</p>		
<p>Address _____</p> <p>_____</p>		
<p>The complaint was</p>	<input type="checkbox"/>	<p>Verbal</p>
	<input type="checkbox"/>	<p>Written</p>
<p>Who took the complaint? _____</p>		
<p>The complaint relates to</p>	<input type="checkbox"/>	<p>Dust</p>
	<input type="checkbox"/>	<p>Noise/Blasting</p>
	<input type="checkbox"/>	<p>Water</p>
	<input type="checkbox"/>	<p>Other</p>
<p>Details of Complaint:</p> 		
<p>Action Taken:</p> 		
<p>Comments:</p> 		
<p>EMU</p>		

Environmental Incident Report

Date:		Time:	
Type of Incident			
Hazardous material spillage	<input type="checkbox"/>	Incorrect spoil disposal	<input type="checkbox"/>
Contaminated water discharge	<input type="checkbox"/>	Blasting overpressure vibration	<input type="checkbox"/>
Stolen explosives	<input type="checkbox"/>	Excess noise emission	<input type="checkbox"/>
Fire	<input type="checkbox"/>	Other	<input type="checkbox"/>
Description and Cause of Incident:			
Reported By:		Date:	
Action Taken:			
Approved By:		Date:	
Proposed Corrective Action:			
Reviewed By:		Date:	
Followed Up By:		Date:	

Copy to: EMU

☐

SHPL

☐

Induction Training Record

Employee:		Inductor:	
Date Commenced:		Induction Date:	
	Topic Discussed	Understood Yes	Comments
1.	Project Overview		
2.	Position and Authorities		
	- Reporting hierarchy		
3.	Job Description		
4.	Working Conditions		
5.	Environmental Awareness		
6.	Environmental Management Action Plan		
	- contract conditions		
	- emergency preparedness and response		
	- incident reporting		
	- community consultation and complaint handling procedures		
	- site environmental procedures		
7.	Safety Requirements		
	Signed		
		Employee	Inductor

APPENDIX-2

EPC CONTRACTOR'S WASTE MANAGEMENT PLAN

1. General

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

The strategy used to develop an integrated waste management system is to identify the level or levels at which the highest values of individual and collective materials can be recovered. For this reason, the process starts with reduction using less and reusing more, thereby saving material production, resource cost, and energy. The process culminates at ultimate disposal, the final resting place for the waste as shown in Figure below.

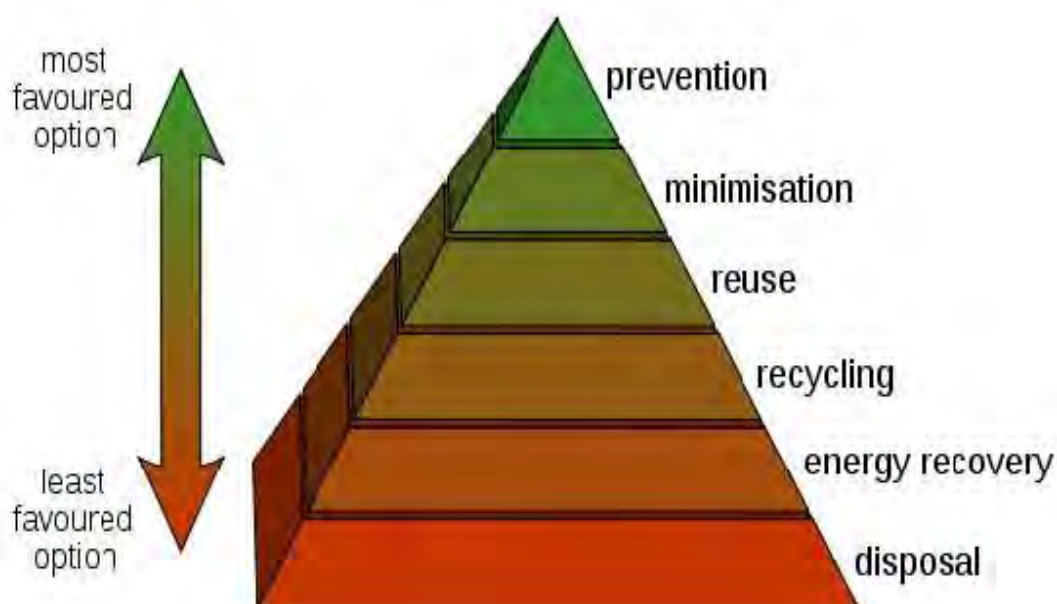


Figure: Waste Management Pyramid

EPC Contractor's approach shall focus on reduction of the waste by using less and reusing more, thereby saving material production. EPC Contractor shall prepare a Waste Management Plan which should deal the controlled usage of and treatment of all toxic materials and wastes, sanitary waste and solid waste used or produced on-site and in relation to the Works. The Plan shall also outline a management structure for carrying out the plan's specifics.

2. Sanitary Waste

EPC Contractor shall construct a gravity drainage system which discharges into septic tanks as described in the Specification. Where latrines are used, they shall be located in areas isolated from surface and groundwater. Special attention shall be given to protect water supplies. No toxic materials such as petrochemicals will be allowed in the latrines. EPC Contractor shall thoroughly disinfect and fill all latrine pits, sumps and trenches when no longer required.

3. Solid Waste

In conjunction with the Engineer or Client, EPC Contractor shall select and operate a solid waste disposal site. The site shall avoid environmentally sensitive areas or areas which could potentially pollute water supplies.

4. Protection

EPC Contractor shall take all necessary precautions to secure the efficient protection of all streams and waterways against pollution of all kinds arising from execution of the Works including from associates' camps and facilities and the presence or activities of staff and labour forces.

EPC Contractor shall also flag all existing springs and/or water supplies in the Project area prior to the commencement of any construction activities. These flagged areas shall be protected from avoidable sedimentation, Pollution, etc.

5. Construction Waste

All waste and scrap materials from construction activities shall be stored in a scrap yard, which shall be created on site. The scrap yard shall be completely fenced and shall be managed by waste consignment contractor. All waste to be stored in the scrap yard shall be quantified and recorded.

TRAFFIC MANAGEMENT PLAN

Traffic Control Temporary Signage

Working on road construction projects, safety precautions should be in place to protect workers and the general public. In order to install temporary traffic control devices, workers should follow this safe work practice.

1. Complete or review the project hazard assessment and communicate the findings to co-workers.
2. It shall be ensured that the vehicle is equipped with directional control signage.
3. It shall be ensured that the vehicle is inspected prior to use.
4. It shall be ensured that the signs, poles, and other traffic control devices are secure before proceeding to the work site.
5. It shall be ensured appropriate personal protective equipment is available, in good condition and used (vest, hardhat, foot protection, etc.).
6. Do not ride in the back of the vehicle.
7. Approved lifting devices and proper lifting techniques shall be used.
8. Be aware of pinch points.
9. Always attempt to work facing traffic flow.

Mobile Equipment

Field workers shall always be aware of mobile equipment operating in the area. Use the following guidelines to reduce the risk of personal injury.

Do

1. Wear a florescent traffic vest at all times.
2. Ensure that the operator sees you.

Do Not

1. Walk beside, in front, or behind mobile equipment that is operating.
 2. Position yourself between the swing radius of articulating machinery and other stationary objects.
 3. Assume an operator can always see you.
 4. Use the bucket as work platform or as a means of personnel transport.
-
-

Moving Vehicle Equipment

This practice is intended to ensure the safe movement and use of vehicles, machines and equipment in accordance with construction requirements.

1. The Site Superintendent shall ensure that all workers, contractors and sub-contractors will be informed of this procedure before moving or using vehicles, machines and equipment.
2. All workers, contractors, and sub-contractors will use this procedure when moving or using vehicles, machines and equipment.
3. When using vehicles, machines or equipment near energized overhead electrical conductors, no part shall be brought close to the energized equipment
4. Operators of vehicles, machines and equipment shall be assisted by signallers. If **the operator's view of the intended path of travel is obstructed and/or a person** could be endangered by the vehicle, machine or equipment and its load.
5. A competent worker shall be designated as a signaller. Both the operator and signaller shall jointly establish the procedures by which the signaller assists the operator and both will follow those procedures. A loud signalling device, such as a **whistle should be used to indicate either "STOP" or "GO"**.
6. The signaller should be walking with the vehicle, machine, or equipment in a manner that gives the signaller an unobstructed view of the intended path of travel and in full view of the operator.

Excavate Right of Way

Job Steps

1. Obtain necessary excavation permit from the jurisdictional authority.
 2. Ensure Traffic Plan is in place.
 3. Examine the nature of the traffic at the work site to fully understand the consequences of the proposed interruption.
 4. Review time restrictions for closing or diverting traffic.
 5. Taking into consideration weather conditions and hours of work, place appropriate signs, cones, flashers, and barricades.
 6. Review the set-up to ensure a safe movement of vehicular traffic and pedestrians.
 7. Assign flag persons to their duties.
 8. Bring in equipment and manpower as necessary.
-

PLAN FOR DISPOSAL OF EXCAVATED MATERIAL

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 economize 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 proposed land area for disposal of excavated material has been estimated at 21 acres for weir side and 25 acres for powerhouse side. 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.

The plan for disposal of excavated materials has been developed as follows.

Basic Concept

- i. Proper location of disposal area in order to gather excavated materials occurred during construction
- ii. Establishing operation plan and its implementation considering environment and possible civil complaints

Facility Plan

- i. Installation of dust prevention covers to Minimize dust generation during soil delivery
- ii. Temporary drainage installation to Prevent land sweep during rainfall
- iii. Installation of Vehicle washing facility to Prevent contamination of roads while vehicles in operation
- iv. Sprinkler operation to Mitigate dust scattering caused during vehicle operations

Excavated material & embankment

In some of the structures of the project, filling is more than excavation and where the excavation quantity is more the proper disposal sites are identified for the disposal of surplus material. Maximum use of the excavated material would be made for the construction of various civil works i.e. bulk fill, coarse aggregate, stone riprap, construction of roads and embankments and for the terracing of wastelands and farmlands.

i. Quantities of Excavation Work and Fill Material

Sr. #	Project Component	Excavation (m ³)			Fill (m ³)	
		Over burden	Rock Open Slope Cut	Rock Underground	Over burden	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	
7.	Coffer Dam at Jhelum River				16,000	
8.	Diversion Channel		100,100			
Sub Total (5+6)		51,065	226,484	157,884	34,216	

Weir side surplus requiring disposal is thus $205,464 + 453,915 + 16,958 - 72,050 = 604,287$ m³ and powerhouse side surplus requiring disposal is thus $51,065 + 226,484 + 157,884 - 34,216 = 401,217$ m³.

Waste Inventory, Segregation, Disposal and Strategies

The management of waste provides a baseline for identification of opportunities to improve practices and maintain waste record. All waste streams shall therefore, be quantified using appropriate forms prior to transportation and effective disposal. This process shall ensure the prevention of future liabilities.

Gaseous and liquid wastes generated by EPC Contractor shall be disposed off on site. The bulk of the solid waste cannot be conveniently disposed off on site, and therefore have to be contained and then transported for disposal on-land through the waste disposal Contractor, if needed.

- All solid wastes shall be segregated and be stored in approved containers for disposal by the waste management contractor.

- All waste shall be quantified by EPC Contractor.
- Record shall be kept to provide auditable trace as to its management and disposal
- All environmental incidents shall be promptly reported.
- All hydrocarbon or chemical spilled shall be cleaned up in a timely and efficient manner.