

Contents

About the Project	1
About the Environment	5
The Environmental and Social Impacts	10

About the Project

Azad Pattan Power Private Limited (APPL) intends to construct the 700.7 megawatt (MW) Azad Pattan Hydropower Project (the Azad Pattan HPP) on the Jhelum River, about 90 kilometer (km) downstream of Muzaffarabad, in Muslimabad village, Pattan Sher Khan, Tehsil Mang, District Sudhnoti of the state of Azad Jammu and Kashmir (AJK). Near the proposed Project site the Jhelum River forms the boundary between the province of Punjab in Pakistan and the state of AJK.

This document introduces the Project and its environmental and social impacts in a non-technical language.

What is the Project?

The proposed Project is a hydroelectric power project to produce electricity from the flow of water in Jhelum River. The Project, once complete, will have two major components:

1. A concrete dam on Jhelum River with a maximum height of 90 m from the bed of the river.
2. The underground powerhouse to generate 700.7 MW of electric power.

How much water will be diverted?

The diversion of the water will depend on flow in the Jhelum River. Downstream of the Azad Pattan HPP the Karot HPP will be developed. The reservoir of the Karot HPP will extend till the Project. Flow that is to be released is of concern in the 300 m stretch of the river downstream of the dam before the river drains into the reservoir created by the Karot HPP. Given a short stretch of 300 m, there is no significant advantage in maintaining the river by releasing water during the storage period in the day at the expense of power generation. Release of environmental flow at the dam for this Project is therefore not recommended.

The water diverted to the tunnel, after passing through the power house will be released back to the Jhelum River.

Cumec

Cumec is the shorthand term of cubic meter per second. It is a unit of flow which equals 35.5 cubic foot per second (cfs).

Where will the electricity go?

Electricity produced at the powerhouse will be transferred to NTDC, the national company for transmission of electric power, for onward transmission and distribution to consumers.

Who is developing the Project?

Under a contract with the Government of Pakistan, the Project is being developed by the Azad Pattan Power Private Limited (APPL). APPL, a subsidiary of China Gezhouba Group Co., Ltd. (CGGC) and Laraib Group (LG), is responsible to implement the Project.

Exactly, where is the Project site?

Exhibit 1 shows the location of the Project. The dam and powerhouse will be located 7 km upstream from Azad Pattan Bridge, 90 km downstream of Muzaffarabad in Muslimabad village, Pattan Sher khan, Tehsil Mang, District Sudhnoti of the state of Azad Jammu and Kashmir (AJK). Administratively, the Project straddles Sudhnoti, Rawalakot and Bagh districts of AJK and Rawalpindi District of Punjab.

What is this document?

Any development project—a power plant, a factory, a road, or a canal—requires land and modifies whatever is there on the land. Although the development project itself may be beneficial to the overall economy or the people, the modification of the land and what is on it, can have negative impact for some people, particularly those living on or near the land, and the ecology.

The Environmental and Social Impact Assessment (ESIA) is a predictive study undertaken prior to the development of the project. It has essentially two aims:

1. Identify the potential environmental and social impact of the proposed projects;
2. Design measures to minimize any anticipated adverse impact of the proposed Project and enhance the benefits for the environment and the people.

This document is a non-technical summary of the ESIA report of the Project. The ESIA report was prepared by Hagler Bailly Pakistan (Pvt.) Limited, a leading consultancy firm of the country.

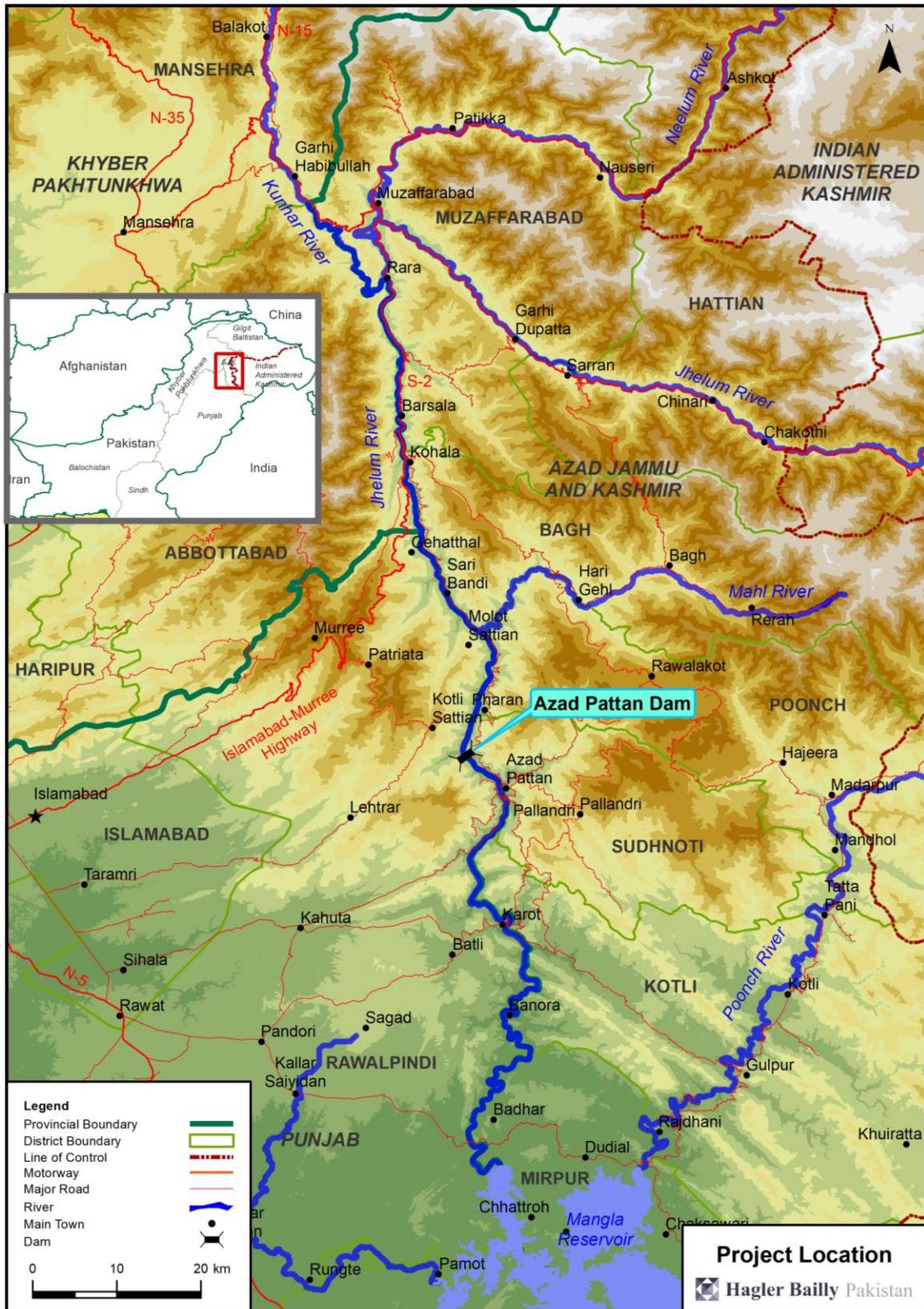
Who will approve the ESIA report?

Preparation of the ESIA report is a legal requirement in Pakistan and in AJK. The law requires that all proponents of development projects must assess the anticipated environmental impact of their projects and submit an environmental assessment report to the Environmental Protection Agencies of Punjab and Azad Jammu and Kashmir.

The EPAs will evaluate the ESIA against the environmental law and good environmental practices. They will determine whether the ESIA presents enough information to assure that the proposed project design complies with the environmental laws. They will review the potential air pollution, water pollution and noise from the proposed project and judge whether the health and well-being of the people will be protected. The EPAs will also determine whether the ecology—the vegetation, fish in the water, the wild animals on the land and the birds—are not going to be destroyed.

A key requirement of ESIA is stakeholder consultation. In it the ESIA team talks to people who are likely to be affected by the Project, provides them with information regarding the Project and seeks their opinion on it. The EPAs will also assess whether or not sufficient consultation has been undertaken.

Exhibit 1: Azad Pattan Hydropower Project Location



As part of the evaluation, the EPAs will also conduct public hearings. This event will be open to all in which any person can go and express his or her opinion on the proposed Project. In the end, if the EPAs are satisfied they will approve the Project. The construction of the Project will start only after the approval of the ESIA by the EPAs.

The International Finance Corporation (IFC). IFC, a member of the World Bank Group, is the largest global development institution focused exclusively on the private sector in developing countries. The IFC is financing a number of HPPs in the basin both upstream and downstream of the Project. APPL is following IFC guidelines as best practices to guide its own ESIA.

The ESIA has been developed keeping in consideration the legal requirements as well as guidelines of the IFC.

What will it take to construct this Project?

Construction of the Project will require about 633.35 hectares (1565.04193 acres) of land. The land will be utilized for construction of permanent facilities such as the dam, power house, and for temporary facilities required only during construction.

The Project will require aggregate and other construction material which will be obtained locally. The total construction period of the Project will be 5.75 years (69 months).

If consultation is mandatory, how many people were consulted?

Different types of consultation were undertaken for this project.

- u More than 200 families from the land acquired for the Project (those who will be displaced due to the Project) were consulted;
- u 15 communities along the Jhelum River were consulted;
- u About half a dozen government institutions were consulted.

Why this Project?

AJK and Pakistan are going through an acute power shortage. The gap between supply and demand has crossed 7,000 MW. The proposed Project will supply the much needed power to reduce the current gap without relying on import of fuels at the cost of foreign exchange to the country.

The alternatives to the proposed hydropower project include power generation from LNG/imported natural gas based plants, coal fired steam plants, and fuel oil based diesel engines. Cost of power generation for the proposed hydropower project is comparable to that for LNG and coal based options, and lower than that for wind energy and solar PV projects where power generation is intermittent and weather dependent.

The Azad Pattan Hydropower Project can be completed in under six years and is an attractive option amongst currently available alternatives for power generation.

About the Environment

A key component of any ESIA is the environmental and social baseline. This is a description of the environment of the area and includes the land, the people living on it—their social, environmental and cultural conditions—the vegetation and wildlife, and the water resources, the air quality, noise, and the traffic. A comprehensive description of the environmental conditions is presented in the ESIA report grouped in three chapters, the physical, social and the ecological baseline. A brief description of the environment follows.

The area over which the description is provided is called the Study Area. The Study for the Project is shown in **Exhibit 2**.

How is the air quality and water resources in the area?

Air quality in the Project area is within acceptable limits, except for particulate matter 2.5 (PM_{2.5}) concentrations that exceed National Environmental Quality Standards (NEQS)/Punjab Environmental Quality Standards (PEQS) at most locations tested but are within IFC-EHS limits at all locations.

Sound levels at all sampling sites exceed nighttime NEQS/PEQS and IFC-EHS limits.

Water resources in the area consist of surface water including rivers and nullahs and groundwater including springs and boreholes. A census was carried out to map the community water resources for villages near Project facilities, mountain springs and groundwater bores. Water quality samples from Jhelum River, tributaries and community springs are collected and analyzed. All parameters are within permissible levels of NEQS/PEQS for drinking water except for bacteriologically contamination of groundwater springs which are reported at levels not suitable for drinking and for aluminum and mercury, which is naturally occurring and can be contributed to the higher colloidal particles in the surface water.

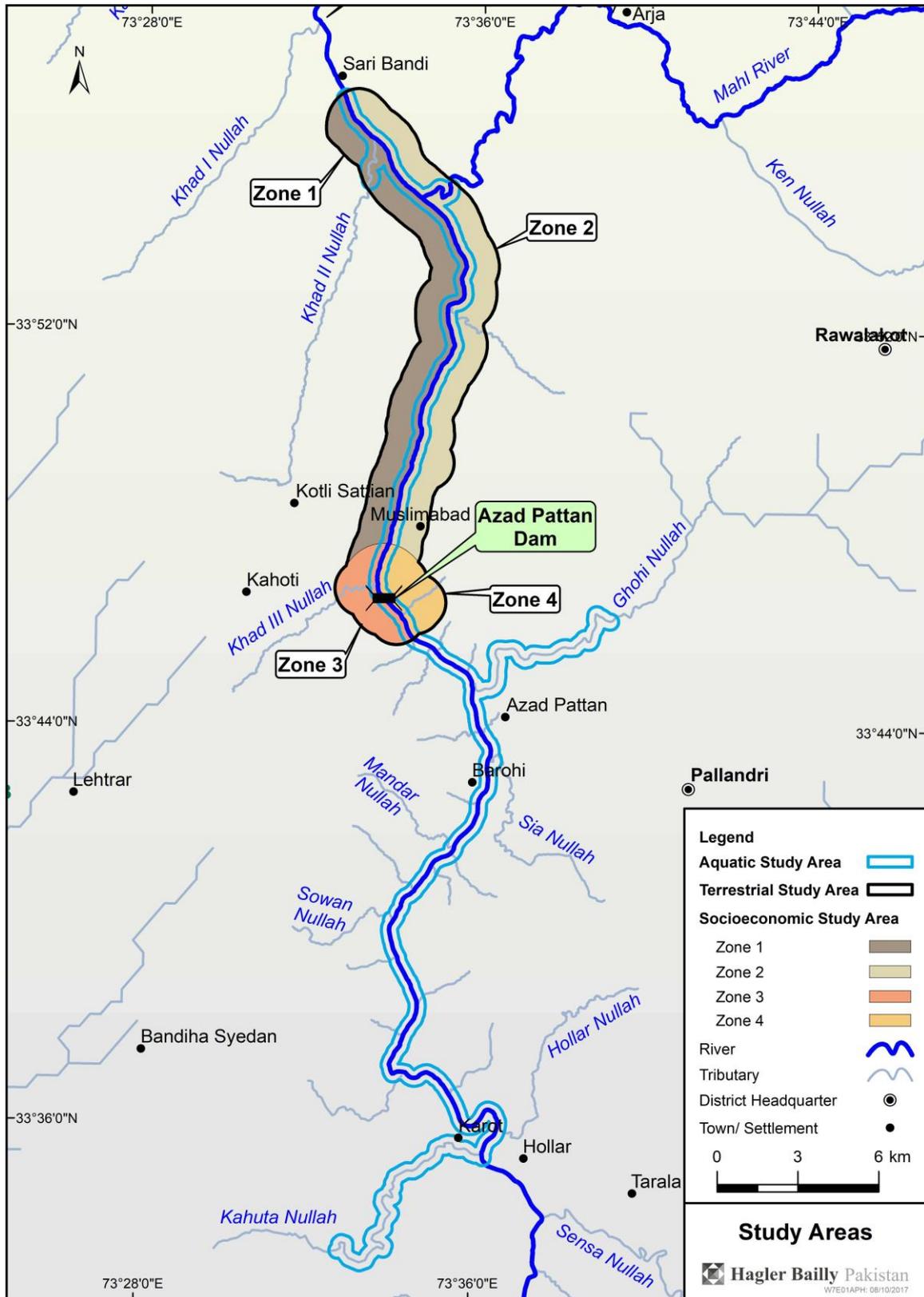
What wildlife is found in the area?

The main aspects of the aquatic biodiversity in the Study Area include the fish fauna, macro-invertebrates, periphyton biomass, and riparian vegetation. A total of 35 fish species are reported in the Jhelum River in the area of impact of the Project. Most of the fish fauna was observed either in the tributaries or at the confluences of the main river with the tributaries. Amongst the reported species, following two are of conservation importance:

- u Alwan Snow Trout, listed as Vulnerable.
- u Mahaseer, listed as Endangered.

There is also one fish species that is endemic to the Jhelum Basin. Highest number of species was observed at Kahuta Nullah and Mahl River, two tributaries of the Jhelum River. Species of commercial importance include Mahaseer, Alwan Snow Trout, Pakistani Labeo, and Indus Garua.

Exhibit 2: Study Areas



The land area is generally disturbed because of scattered settlements, grazing, and extraction of fuel wood from rangelands and forests, and the diversity of terrestrial wildlife species is generally low for this reason. A total of 6 mammal species were observed during the surveys carried out as part of the ESIA, namely Asiatic Jackal, Red Fox, Indian Crested Porcupine, Small Asian Mongoose, Rhesus Monkey, and Cape Hare, none of which are of conservation importance. Based on the survey a total of 36 species of birds and 11 species of reptiles and amphibians were observed during the surveys carried out. None of the species observed are of conservation importance based on IUCN Red List of Species.

What about the people?

Rural settlement surveys were undertaken in selected settlements with river dependence or within 1 km of Project facilities. Detailed interviews were conducted with key informants to gather information on settlement infrastructure and livelihoods. Key physical and socioeconomic features of the Study Area are illustrated by the photographs shown in **Exhibit 3**.

Exhibit 3: Photographs of the Study Area



Scattered houses in affected settlement Pharan



Confluence of Mahl Nullah with Jhelum



Semi Pucca house at Islamnagar



Katcha house at Islamnagar



Sand mining in the study area



Fishing activity in the study area



Sealed road in the study area



Suspension bridge in the study area



Small shop in the study area



Small shop in the study area

The settlements situated on the left bank of Jhelum River in the Socioeconomic Study Area are well connected as there is a road running along the river for its entire length in the area. Communities residing in some parts of the right bank are less well connected, however suspension bridges and unsealed roads do connect them to major roads. A traffic survey was undertaken to evaluate the current traffic conditions on the routes that could be used for the transportation of equipment, material, and staff to the Project site during construction and operation.

All surveyed settlements reported having access to a public potable water supply system consisting of a central water storage system, where water collects from a mountain spring and is supplied to the community via a pipeline up to a central point in the community. Most surveyed settlements also reported having access to spring water at relatively short distances.

None of the settlements surveyed in the Socioeconomic Study Area are connected to a municipal sewage system. Human waste in some parts of the Study Area is disposed of in

septic tanks, however in most parts all wastewater eventually runs off into the Jhelum River. Most settlements surveyed reported access to pit latrines of some type.

Fuel wood is the main source of energy for domestic cooking and heating. Respondents reported that fuel wood is either collected from agricultural land, or dead, fallen trees in the forests are used. There is limited dependence on driftwood collected from the riverbanks as source of fuel wood.

Around 35% of the total employable population is reported as being employed while 33-40% are unemployed. The remaining are students, retired and others such as labor and small business operators.

The Socioeconomic Study Area and surroundings are generally peaceful, and there are no major law and order problems reported. Most of the Study Area has police presence in the form of police stations or check posts on major roads.

Sand mining is carried out in some settlements in the Study Area. The mineable sand resource is being extracted to meet small-scale construction demand, involving construction and maintenance of local residential and commercial buildings. The mining techniques are crude, involving use of labor for sand dredging. Community dependence on income from sand mining is less than 1%. However daily wages from sand mining is the main source of income for a number of persons engaged in this activity.

There is limited fishing activity in the Study Area. Some of the fish caught is consumed by the families engaged in fishing while the rest is sold locally on a small scale. The fishing season lasts around six months through the year, depending on the fish species caught. Most of the fishing is practiced without permits from government departments.

No Indigenous Peoples are residing in the Socioeconomic Study Area. A community of nomadic pastoralists called Gujjar Bakarwal that passes through the Socioeconomic Study Area have few characteristics of Indigenous Peoples however, Gujjar Bakarwal will not be affected by the Project. Moreover, there is no physical cultural heritage in the study area.

The Environmental and Social Impacts

What environmental issues were studied?

The ESIA team undertook an extensive assessment exercise to identify and evaluate various environmental issues. The issues that were evaluated included:

- u Aquatic ecology—loss of riverine ecosystem due to inundation by Mahl reservoir; degradation of the river ecosystem in the low flow segment; and decrease in population of the Endangered Mahaseer upstream of the Azad Pattan dam
- u Terrestrial ecology—terrestrial habitat loss and impacts of on biodiversity due to construction and operation activities
- u Ambient air quality—degradation of air quality due to emission of dust and other gases from construction activities
- u Water availability and quality—water resource depletion; changes to groundwater patterns; contamination of water resources; Alterations of natural passage of springs due to tunnel construction may disrupt the water availability at mountain springs for local community.
- u Noise and vibration—construction equipment noise and vibration from blasting
- u Soil, topography, land stability—impact on soil quality and soil erosion
- u Livelihood and well-being—employment; training and skill development; enhancement of subsistence and recreational fishing; sand and gravel mining; and land acquisition
- u Socio-cultural impacts—pressure on social infrastructure and services; conflicts due to provision of employment to outsiders; conflicting socio-cultural norms; and graveyard management
- u Aesthetics and tourism—degradation of aesthetic value of the area due to construction activities; and permanent change in visual character during plant operations
- u Traffic and road—impact on highway and community roads
- u Climate change—greenhouse gas emissions and climate risk
- u Cumulative impact assessment—cumulative impact of the all the hydropower project under construction or planned on the Jhelum basin

The study of these issues resulted in a series of mitigation measures that are now incorporated in the design and operation plan of the Project to ensure that the project impacts are within acceptable limits.

What are the key issues?

The purpose of the ESIA is to identify *all* potential environmental impacts and to propose a comprehensive set of measures to address the concerns associated with them.

Nevertheless the two issues are considered as sensitive requiring particular attention to avert any potential adverse impact.

The cumulative impact of hydropower projects in Jhelum Basin: Cumulative impacts are those that result from the incremental impact of a project or developments when assessed in combination with other existing or planned projects. The study area selected for the this assessment includes the Jhelum River from Wular Lake in the Indian Administered Kashmir (IAK) downstream to the top of the Mangla reservoir. It also includes segment of the Neelum River downstream of the Neelum-Jhelum Hydroelectric Project (NJHP), and segment of the Kunhar River downstream of the dam of Patrind HPP. Three hydropower projects in IAK, three under-construction projects in Pakistan and four planned projects in Pakistan were considered.

This cumulative assessment is based on the assessment of EFlows. Hagler Bailly Pakistan has experience in carrying out Eflow Assessments with assistance from Southern Waters, for the Jhelum River upstream and downstream of the proposed Project to determine the release of water from the dam required to meet the needs of aquatic life downstream, while generating power to meet the demand in country.

Regardless of whether or not Azad Pattan HPP is constructed, the areas upstream as well as downstream of the Azad Pattan dam will be affected by Neelum-Jhelum, Patrind, Kohala, Azad Pattan and Karot hydropower projects. Once Kohala and Neelum-Jhelum HPPs are constructed and operational, the barriers created by these dams will cut-off fish migration from downstream to upstream of the dams which will affect populations of migratory fish at the location of Mahl dam. Fish populations will

Environmental Flow (EFlow)

Environmental flows describe quantity, timing, and quality water flows required to sustain freshwater and estuarine ecosystems and the human livelihoods and wellbeing that depend on these ecosystems

also be affected significantly by lower flows from Kohala and Neelum-Jhelum HPP dams. In addition to impacts of the dams that will precede the Azad Pattan HPP, there is extensive illegal fishing and unregulated sand and gravel mining prevalent through the entire length of the river and there are clear indications that these activities are increasing with time.

APPL will provide resources for hiring of protection staff to prevent illegal fishing in the river. The Company will also support the government in preparation and implementation of guidelines for management of sand mining such that the community needs for sand from the river are met without harming the river habitats. These measure will compensate and balance the additional impact of the dam. Fish populations will decline in the main Jhelum River due to inundation caused by creation of reservoirs of the Mahl, Azad Pattan and Karot HPPs. In the tributaries connected to the main Jhelum River fish population in general will increase due to increased protection. A Biodiversity Management Plan prepared for the Project will be implemented to ensure that protection of aquatic biodiversity is achieved and results are monitored on a regular basis.

Special attention was given to protection of the migratory species including the Alwan Snow Trout, Mahaseer, Indus Garua, Pakistani Labeo, and Suckerhead and the endemic Nalbant's Loach. The habitat of the Jhelum

modified due to regulation of the river flow. However, the tributaries that connect to this stretch of the main Jhelum River consist of relatively intact habitat that will not be affected by the Project. The loss of fish species of conservation importance in the main Jhelum River can be offset by implementing protection in the tributaries that provide a refuge and breeding habitat for these and other fish species. In addition to these, basin-wide measures, mainly establishment and operation of an Institute for Research in River Ecology and a Watershed Management Program have also been included to support conservation of biodiversity in the long term.

Land Acquisition: Construction of the Project will require about 633.35 hectares (1,565.01 8 acres) of land. This land will be acquired by the government from its present owners and leased out to the Project proponents on AJK side while on Punjab side all the land will be permanently acquired for the project. Acquisition of the land will affect over 100 families. Part of the land is cropped. There around 1,000 fruit trees and more than 13,000 non-fruit trees on the private land. The land acquisition will also affect roads, bridges, schools, and mosques.

A resettlement action plan (RAP) has been prepared as a tool to acquire the land and resettle the families living on it in a socially responsible manner. The main objective of the RAP is to identify social impacts of the project and to plan measures to mitigate adverse social impacts resulting from loss of assets due to construction of the several project facilities as reservoir, powerhouse, construction camp and offices, access roads etc. The RAP is based on the findings of the census survey, field visits, meetings and consultations with various project-affected persons in the Project area. Compensation for all land, houses, and other assets will be made by the relevant government authorities keeping in view market prices and other considerations in accordance with applicable laws.

How it will be ensured that all mitigation measures are implemented?

An Environmental Management Plan has been prepared which details the measures that are required to implement the mitigation measures. Responsibilities have been defined for implementation and for monitoring the implementation. Specialized tools such as Site-Specific Environmental Management Plan will be developed to ensure that no all measures are implemented at the project level.