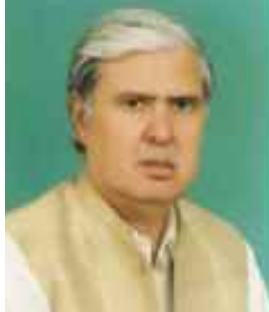


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Foreword



God has blessed Pakistan with a tremendous hydel potential of more than 40,000 MW. However, only 15% of the hydroelectric potential has been harnessed so far. The remaining untapped potential, if properly exploited, can effectively meet Pakistan's ever-increasing demand for electricity in a cost-effective way.

To exploit Pakistan's hydel resource productively, huge investments are necessary, which our economy cannot afford except at the expense of social sector spending. Considering the limitations and financial constraints of the public sector, the Government of Pakistan announced its "Policy for Power Generation Projects 2002" package for attracting overseas investment, and to facilitate tapping the domestic capital market to raise local financing for power projects. The main characteristics of this package are internationally competitive terms, an attractive framework for domestic investors, simplification of procedures, and steps to create and encourage a domestic corporate debt securities market.

In order to facilitate prospective investors, the Private Power & Infrastructure Board has prepared a report titled "Pakistan Hydel Power Potential", which provides comprehensive information on hydel projects in Pakistan. The report covers projects merely identified, projects with feasibility studies completed or in progress, projects under implementation by the public sector or the private sector, and projects in operation.

Today, Pakistan offers a secure, politically stable investment environment which is moving towards deregulation and an open market economy. The Government invites investors to invest in the hydel power sector and assures them its fullest possible support in implementation of their projects.

AFTAB AHMAD KHAN SHERPAO
Federal Minister for Water & Power

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The background of the page features a large, semi-circular image of a dam with water cascading over it, set against a backdrop of the Pakistani flag. The flag's green field and white star and crescent are visible in the upper right corner. The word 'PAKISTAN' is faintly visible in the background, and the title 'PAKISTAN Hydel Power Potential' is repeated vertically along the right edge.

INTRODUCTION

PAKISTAN
Hydel Power Potential

HYDEL POWER POTENTIAL

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Introduction

Pakistan is a water-rich country but, unfortunately, Pakistan's energy market investment in hydel-power generation has been caught up in confusion and paradoxes for more than a decade, and no significant progress has been achieved so far. On the other hand, the Government is trying to facilitate private investors to promote hydel power generation in the country. Hydropower is a primary domestic source of energy. Pakistan is endowed with a hydel potential of approximately 41722 MW, most of which lies in the North West Frontier Province, Northern Areas, Azad Jammu and Kashmir and Punjab.

Electric power is a stimulator for the socio-economic uplift of the country. However, only half of the country's population has access to electricity. After the creation of Pakistan, the country faced numerous problems including dearth of electrical power. Hydropower development in the Indo-Pak subcontinent started in 1925, with the construction of the Renala 1 MW hydropower station. After a decade, the 1.7 MW Malakand-I hydropower station was built, which was later upgraded to a 20 MW capacity. Subsequently, in 1953, the 20 MW Dargai hydropower station was commissioned. At the time of independence, Pakistan inherited a very small power base of only 60 MW capacity for its 31.5 million people. At the time of creation of WAPDA in 1958, the country's total hydel potential capacity was enhanced to 119 MW. By the Indus Water Treaty in 1960, it was decided that Pakistan is entitled to 142 MAF (Indus 93, Jhelum 23 and Chenab 26) of water utilization. Subsequently, 240 MW Warsak, 1000 MW Mangla and 3478 MW Tarbela Hydropower Projects were constructed.

For the success of economic activities, electricity is a basic ingredient. The total installed capacity of the hydropower stations in the country is about 6595 MW, out of which 3767 MW is in NWFP, 1698 MW in Punjab, 1036 MW in AJK and 93 MW in the Northern Areas. However, an abundant hydel potential is still untapped which needs to be harnessed.

This report has been prepared on the basis of data available in this office and information obtained from various organizations. The report provides information on the following:

- Projects in Operation
- Projects under implementation in the public sector
- Projects under implementation in the private sector
- Projects with Feasibility Study completed
- Projects with Pre-Feasibility Study completed / "Raw Sites"

In Pakistan, hydel resources are mainly in the north, however, in the south there are scarce hydel resources available. Comprehensive detail of total hydel potential in Pakistan is at Appendix-I. The hydel potential of Pakistan can be divided into six sectorial regions, namely:

- NWFP
- Punjab
- Azad Jammu & Kashmir

- Northern Areas
- Sindh
- Balochistan

The Government of NWFP has established a corporate body known as the Sarhad Hydel Development Organization (SHYDO) for carrying out hydro-power prospects, hydro-power development and to act as a utility company for isolated rural communities. With the assistance of WAPDA and GTZ, SHYDO prepared a Master Plan for the development of hydro-power potential in NWFP. Accordingly, the Regional Power Development Plan was completed with pertinent technical and financial data of different hydel sites in NWFP. About 150 potential sites, with a total capacity of 18698 MW were identified on the basis of high, medium and small head. Out of these, 17 projects are in operation, 6 sites are under implementation in the public sector and 1 site has been offered to the private sector. Mainly, these are run-of-river sites, with some as daily storage projects.

In Punjab, the Punjab Power Development Board was created in the Irrigation Department in 1995, for the promotion of hydel power generation on canal sites in Punjab. At different canals, about 324 potential sites of medium and low head, with a total estimated capacity of 5895 MW were identified. Recently, WAPDA has launched the 1450 MW Ghazi Barotha hydel project as a run-of-river project .

In order to exploit the plentiful hydel resources of AJK, the Government of AJK (GOAJK) established the AJK Hydro Electric Board (HEB) in 1989. The AJK HEB successfully completed the 1.6 MW Kathai, 2 MW Kundel Shahi, 2 MW Leepa, and 30.4 MW Jagran hydel power projects. Subsequently, with the intention of providing a one-window facility and to encourage the development of hydel potential in the private sector, the GOAJK created the AJK Private Power Cell (PPC) in 1995. A number of hydel projects with the total capacity of 829 MW are being processed/undertaken by the private sector.

Numerous promising potential hydel sites have been identified in the Northern Areas but, due to the absence of high power transmission lines, these sites have not been developed so far. On account of difficult mountainous terrain and the absence of high power transmission line system, the Northern Areas are not connected to the National Grid and no projects have been undertaken by private investors. The Northern Areas Public Works Department (NAPWD) was established, which is responsible for the generation and distribution of electrical power. NAPWD has constructed various mini hydel power stations in the region and has built 11 KV lines for the transmission of power to consumers. A 18 MW Naltar-III Hydropower Project is under implementation in public sector. Currently, approximately 40 % of the local population of Northern Area has been provided with electrical power.

The Irrigation & Power Department, Government of Sindh is responsible for conducting hydro-power activities in the Province, and for facilitating and liaison with the concerned agencies. Six potential sites of an estimated total capacity of 178 MW have been identified with medium

and low head at different canals. The hydropower projects identified in the Province are Nai Gaj Fall, Sukkur (Indus /Nara Canal), Rohri canal and Guddu Barrage Projects. These projects have an estimated 178 MW capacity. Feasibility studies of the Rohri and Guddu Barrage Projects have been completed, and it is expected that implementation work will be started in the near future. Presently, no hydel projects are in operation or under implementation, either in the public or private sectors.

The National Water Resources Development Programme for Balochistan included 8 irrigation projects, but none of them have the required head to generate electricity. Presently, no hydel projects are in operation or under implementation in the public sector, and no projects are being processed/undertaken by the private sector.

In order to facilitate investors to participate in the development and implementation of hydel projects data pertaining to the hydel projects in operation, under implementation in public/private sector, feasibility studies and pre-feasibility studies has been compiled and is presented in the report.

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PAKISTAN POWER SECTOR



PAKISTAN
Hydel Power Potential

HYDEL POWER POTENTIAL

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Pakistan Power Sector

The Pakistan power sector is mainly under direct or indirect control of either government departments or other officials organizations. Pakistan has two vertically integrated public sector utilities for power generation and distribution, namely, the Pakistan Water And Development Authority (WAPDA) and Karachi Electric Supply Corporation (KESC). WAPDA supplies electricity to the whole country except the Karachi, which is supplied electricity by KESC. The systems of WAPDA and KESC are interconnected through a 220 kV double circuit transmission line. Following are the main players of power sector in Pakistan.

1.1. The Ministry of Water & Power

The Ministry of Water & Power plays the lead role in implementation of all policy pertaining to water and power issues in the country. As per Schedule II, Rule 3(3) of the Rules of Business 1973, the following responsibilities are assigned to the Ministry of Water and Power:

- Matters relating to the development of water and power resources of the country
- Indus Waters Treaty, 1960 and Indus Basin Works
- Water and Power Development Authority (WAPDA)
- Matters relating to electric utilities
- Liaison with international engineering organizations in water and power sectors, such as International Commission on Large Dams, International Commission on Irrigation and Drainage, and International Commission on Large Power Systems .
- Federal agencies and institutions for promotion of special studies in water and power sectors
- Electricity
- Karachi Electric Supply Corporation and Pakistan Electric Agencies Limited
- Matters regarding Pakistan Engineering Council
- Institute of Engineers, Pakistan
- National Engineering (Services) Pakistan Limited (NESPAK)
- National Tube well Construction Corporation (NTCC)
- National Power Construction Corporation (NPCC)
- Indus River Systems Authority (IRSA)
- Private Power and Infrastructure Board (PPIB)

The Ministry of Water & Power also deals with the following areas of national activity:

- Electric Utilities
- Independent Power Projects
- Federal agencies and institutions for promotion of special studies in the water and power sectors

- Monitoring of technical standards and specifications of materials and tools and plants used in Water and Power engineering and technologies

1.2 WAPDA (Water And Power Development Authority)

WAPDA was established by statute in 1958 and entrusted with a massive agenda, including generation, transmission and distribution of electrical power together with irrigation, water supply, drainage and flood control etc. It owns about 54 % of the country's total electrical power generation capacity, and serves 88% of all electricity customers of Pakistan. The privatization of WAPDA is to be preceded by corporatization, including twelve (12) public limited companies. These twelve (12) corporate entities comprises of three (3) generation companies (GENCOs), one (1) National Transmission & Despatch Company (NTDC) and eight (8) Distribution Companies (DISCOs), as stated below:-

1.2.1 GENCOs

- 1 Southern Generation Power Company Limited (GENCO-1), head-quartered at Jamshoro, District Dadu near Hyderabad, Sindh
- 2 Central Power Generation Company Limited (GENCO-2), head-quartered at Guddu, District Jacobabad, Sindh
- 3 Northern Power Generation Company Limited (GENCO-3), head-quartered at WAPDA House, Lahore, Punjab

1.2.2 DISCOs

- 1 LESCO- Lahore Electric Supply Company
- 2 GEPCO - Gujranwala Electric Power Company
- 3 FESCO - Faisalabad Electric Supply Company
- 4 IESCO - Islamabad Electric Supply Company
- 5 MEPCO- Multan Electric Power Company
- 6 PESCO - Peshawar Electric Power Company
- 7 HESCO - Hyderabad Electric Supply Company
- 8 QESCO - Quetta Electric Supply Company

1.3 PPIB (Private Power & Infrastructure Board)

PPIB was established by the Government of Pakistan in 1994 as an extension of the Ministry of Water and Power, for encouraging participation of private entrepreneurs in the power generation. The mandate of PPIB is to:

- ✓ act as a one-window organization on behalf of Federal Government ministries, departments and agencies, in matters relating to the establishment of private power projects;
- ✓ grant consent on behalf of various official agencies in issues related to power, and to review and decide all matters relating to private power projects;

- ✓ negotiate and finalize implementation agreements and fuel supply agreements with prospective developers;
- ✓ obtain bank guarantees, performance bonds, letters of credits from private power companies, to receive and (when and if necessary) refund monies relating to the above instruments;
- ✓ take all other actions as may be required to develop private power in the country;
- ✓ provide the one-window facility to private sector investor;
- ✓ provide sovereign guarantee to IPPs on behalf of the GOP;
- ✓ formulate, review and update the policies relating to private sector investment in power generation;
- ✓ executes security documents on behalf of the GOP;
- ✓ liaise with the concerned official agencies for the executing of the projects;
- ✓ expedite progress of private sector power projects; and
- ✓ provide necessary information to private sector investors.

1.4 KESC (Karachi Electric Supply Corporation)

KESC was established in 1913 and was registered under the Indian Companies Act 1882. It is one of the oldest utilities in the South Asian region and caters for the electric power requirements of Karachi. KESC is a Joint stock public limited company, and its shares are quoted at the Karachi, Lahore and Islamabad stock exchanges. It is principally engaged in the generation, transmission and distribution of electricity to industrial and other consumers under the Electricity Act 1910, as amended to date and the NEPRA Act 1997, within its licensed areas.

1.5 NEPRA (National Electric Power Regulatory Authority)

NEPRA was established under the Regulation of Generation, Transmission and Distribution of Electric Power Act 1997. The main functions of NEPRA are to grant licenses for generation, transmission and distribution of electric power, prescribe and enforce performance standards for generation, transmission and distribution companies, and determine tariff, rate etc. for the supply of electric power services. Being a regulator, NEPRA is responsible for all matters related to the tariff of electric power in the country.

1.6 Energy Wing - Planning & Development Division

The Energy Wing was created in 1988 under the Ministry of Planning & Development to undertake technical, financial and economic appraisal of generation, transmission and distribution projects submitted by WAPDA, KESC etc. The Energy Wing also prepares short and long-term energy sector programmes, including forecast on supply and demand of utilities.

1.7 Power Sector Institutions and Departments in the Provinces and AJK

The Provinces/AJK also administer the investment for power projects and act as main drivers in this regard. Details of certain provincial institutions and departments engaged in the power sector are given as under.

1.7.1 Sarhad Hydel Development Organization (SHYDO)

In 1986, the Government of NWFP established SHYDO for carrying out hydropower prospects, hydropower development and to act as a utility company for the isolated rural

communities. The organization is under the administrative control of Irrigation & Power Department of Provincial Government and is governed by the Board of Directors. With the assistance of WAPDA and GTZ, SHYDO has prepared a Master Plan for the development of hydropower potential in NWFP. Accordingly, the Regional Power Development Plan was completed with pertinent technical and financial data of different hydel sites in NWFP. SHYDO has identified hydel potential of more than 6000 MW and has completed feasibility studies of several hydel projects ranging from 8 MW to 125 MW. Presently, SHYDO is implementing 81 MW Malkand-III Hydropower Project.

1.7.2 Punjab Power Development Board (PPDB)

PPDB was created in Punjab's Irrigation Department in 1995 for the promotion of hydel power generation through the development of hydel power stations on canal sites in Punjab. At different canals, about 324 potential sites of medium and low head were identified, with a total estimated capacity of 5895 MW.

1.7.3 Irrigation Power Department Sindh (IPDS)

IPDS is responsible for the hydel development and identification of different hydel sites on canals and barrages in the Sindh. It prepares, inter alia, policies, plans, schemes for development of hydel power generation in the Province.

1.7.4 AJK Hydro Electric Board (AJK HEB) and AJK Private Power Cell (AJK PPC)

In order to exploit the plentiful hydel resources of AJK, the Government of AJK established the AJK HEB in 1989. Public sector projects are implemented by AJK HEB, the AJK HEB successfully completed the 1.6 MW Kathai, 2 MW Kundel Shahi, 2 MW Leepa and 30.4 MW Jagran hydel power projects. Subsequently, with the intention of providing a one-window facility and to encourage the development of hydel potential in the private sector, the GOAJK created the AJK Private Power Cell in 1995. The first private sector project namely, 1 MW Jari Kas Hydropower Project has been recently brought into operation. Besides, two other projects 79 MW New Bong Escape Hydropower Project on upper Jhelum canal and 132 MW Rajdhani Hydropower Project on Poonch River are at various stages of implementation.

1.7.5 Northern Areas Public Works Department (NAPWD)

In order to provide electric power to the isolated network of the Northern Areas, the NAPWD was established, which is responsible for the generation and distribution of electricity. NAPWD has constructed various mini hydel power stations in the region, and has built 11 KV lines for the transmission of electric power to consumers. Currently, approximately 40 % of the local population of Northern Area has been provided electricity.

The addresses of the above institutions are at Appendix-II.

HYDEL POWER POTENTIAL OF PAKISTAN



PAKISTAN
Hydel Power Potential

HYDEL POWER POTENTIAL

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Hydel Power Potential of Pakistan

In Pakistan, the hydel resources are mainly in the north; the resources in the south being scarce. The hydel potential of Pakistan can be divided into six sectorial regions namely:

- NWFP
- Punjab
- Azad Jammu & Kashmir
- Northern Areas
- Sindh
- Balochistan

Pakistan is endowed with a hydel potential of approximately 41722 MW, most of which lies in the North West Frontier Province, Northern Areas, Azad Jammu and Kashmir and Punjab. However, an abundant hydel potential is still untapped which needs to be harnessed.

The total installed capacity of the hydropower stations in the country is about 6595 MW, out of which 3767 MW is in NWFP, 1698 MW in Punjab, 1036 MW in AJK and 93 MW in the Northern Areas. Table-2-1 depicts a comparative summary of the hydel projects in various stages of implementation in various regions of Pakistan. Table-2-2 shows a list of existing hydropower plants ranging from 1 MW to 3478 MW, while Figure-2-1 shows the graphical representation of Province/ area wise hydel power generation in Pakistan.

On the basis of data available in PPIB and information obtained from various organizations, details of the projects of the following categories in the aforesaid regions of the country are given in the proceeding chapters.

- Projects in Operation
- Projects under implementation in the public sector
- Projects under implementation in the private sector
- Projects with Feasibility Study completed
- Projects with Pre-Feasibility Study completed / “Raw Sites”

Table-2-1

COMPARATIVE SUMMARY OF THE HYDEL PROJECTS IN VARIOUS STAGES OF IMPLEMENTATION IN VARIOUS REGIONS OF PAKISTAN

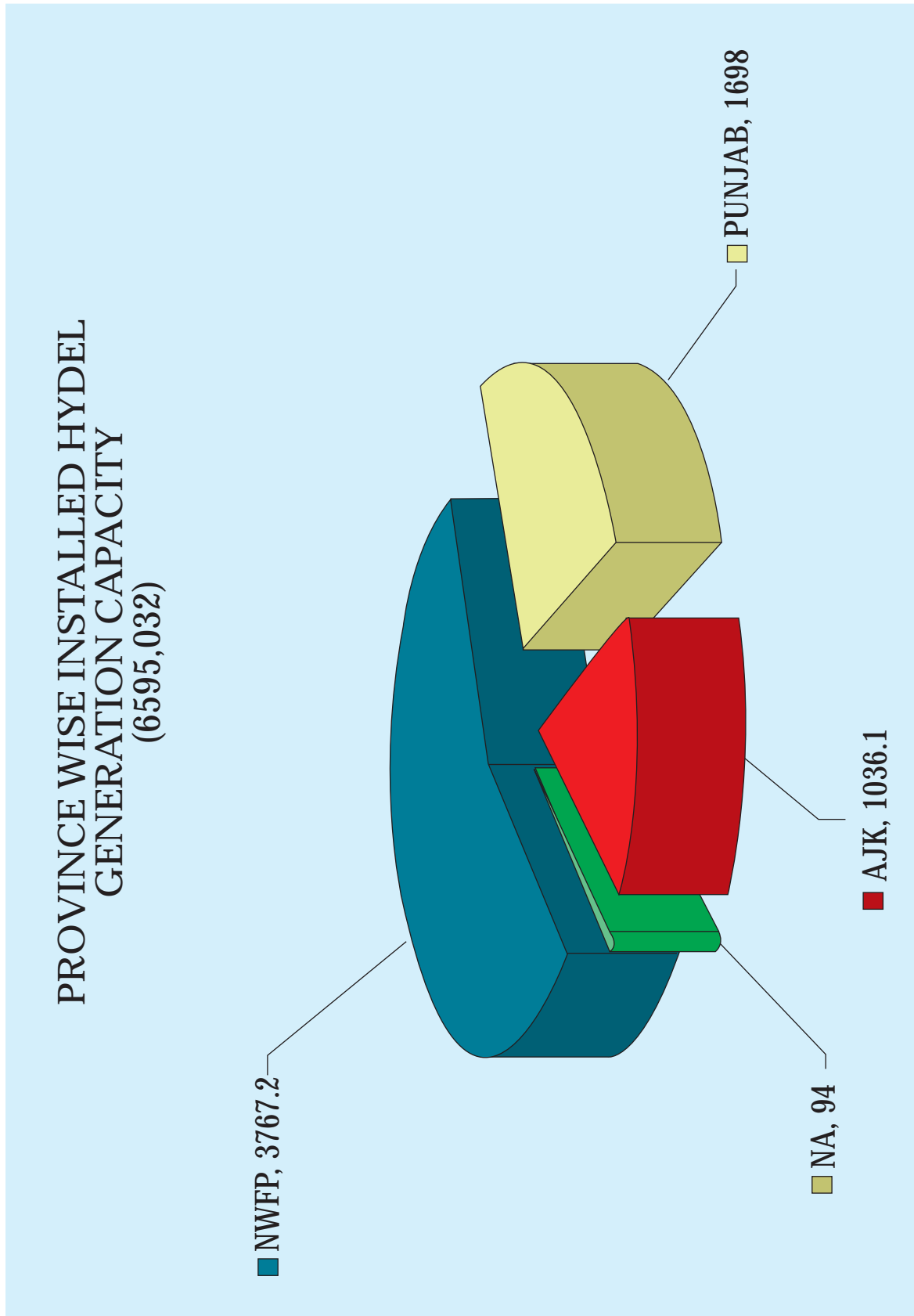
Name of Province	Projects in Operation (MW)	Public sector Projects (MW)	Private sector Projects (MW)	Projects with Feasibility Study (MW)		Projects with Pre-Feasibility Study/ Raw Sites (MW)	
				Above 50 MW	Below 50 MW	Above 50 MW	Below 50 MW
NWFP	3767.2	635	84	58	143	13584	426
Punjab	1698	96	Nil	3720	32.17	NIL	349.65
AJK	1036.1	973.8	828.7	420	48.2	1152	177
Northern Areas	93.732	18	Nil	505	71.5	10905	814
Sindh	Nil	Nil	Nil	Nil	49.5	80	48.55
Baluchistan	Nil	Nil	Nil	Nil	0.5	Nil	Nil
TOTAL	6595.032	1722.8	912.7	4703	344.87	25721	1815.2

Table-2-2

EXISTING HYDEL POWER STATIONS IN PAKISTAN

S.No	Name of Project	Installed Capacity (MW)
1	Tarbela	3478
2	Ghazi Barotha	1450
3	Mangla	1000
4	Warsak	240
5	Chashma	184
6	Malakand	19.6
7	Dargai	20
8	Rasul	22
9	Shadiwal	13.5
10	Chichoki Malian	13.2
11	Nandipur	13.8
12	Kurram Gari	4
13	Reshun	2.8
14	Renala	1.1
15	Chitral	1
16	Jagran-I	30.4
17	Kathai	1.6
18	Kundel Shahi	2
19	Leepa	1.6
20	Northern Area	94
21	Small / Micro Hydel Stations	3
	TOTAL	6595.032

Figure 2-1



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HYDEL POTENTIAL IN NWFP

HYDEL POWER POTENTIAL

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Hydel Potential in NWFP

3.1 Introduction

NWFP is the northern most of the provinces of Pakistan, it is bounded by Afghanistan in the west, Northern Areas in the north, the Azad State of Jammu & Kashmir in the northeast, Pakistan's Punjab province in the east and Balochistan in the South. NWFP has five (5) Divisions, thirteen (13) Districts and six (6) Tribal Agencies. It is separated from Punjab by the River Indus. The main rivers of NWFP are the Indus, Kunhar, Swat, Kabul, Kohat, Kurram, Tochi, Chitral, Panjkooora and Gabral .

The River Swat is one of the oldest rivers mentioned in the chronicles of the Indo-Pakistan sub-continent and is a very valuable asset of NWFP. It is a snow-fed stream, with a catchment area of 13,491 square kilometers. The Upper Swat Canal System was completed in 1918. It emanates from River Swat at Amandara Head Works and irrigates 121,400 hectares of land of the Peshawar valley. A 6 km long canal carries water from Amandara to the foot of Malakand hills where the 3.5 km long Benton Tunnel pierces the Malakand hills and passes water into the Dargai Nullah. Two cascade type power plants, Jabban and Dargai, each of 20 MW capacity, were set up in 1937 and 1953 respectively, and are located between the outlet portal of Benton Tunnel and the trifurcator at Dargai.

In 1986, the Government of NWFP established a corporate body Sarhad Hydel Development Organization (SHYDO) for carrying out the hydropower prospects, hydropower development and to act as a utility company for the isolated rural communities. With the assistance of WAPDA and GTZ, SHYDO prepared a Master Plan for the development of hydropower potential in NWFP. Accordingly, the Regional Power Development Plan was completed with pertinent technical and financial data of different hydel sites in NWFP. About 150 potential sites with a total capacity of 18698 MW were identified with high, medium and small head. Out of these, 17 projects are in operation, 6 sites are under implementation in the public sector, one site has been offered to the private sector. Mainly, these are run-of-river sites, with some as daily storage projects. Table 3.1 indicates the details of the projects in operation with the total capacity of 3767 MW; while the Figure-3.1 shows the location of these projects. Tables-3.2 & 3.3 lists the details of the projects which are under implementation in public sector and private sector with the total capacity of 635 MW and 84 MW respectively; while Figure-3.2 depicts the location of these projects. Table-3.4 illustrate the details of raw site projects above 50 MW with the total capacity of 13584 MW, while Figure-3.3 shows the location of these projects. Table-3.5 indicates the details of raw site projects of below 50 MW with the total capacity of 426 MW , while Figure-3.4 shows the location of these projects. Table-3.6 indicates the list of the solicited sites of above and below 50 MW with the total capacity of 58 MW and 144 MW respectively, while Figure-3.5 shows the location of these projects.

TABLE-3.1
PROJECTS IN OPERATION IN NWFP

S. No	Name of Power Station	Location	Capacity (MW)	Status
1	Tarbela	Tarbela (Reservoir)	3478	C
2	Warsak	Warsak (Reservoir)	240	C
3	Dargai Power Station	Swat River	20	C
4	Kurram Garhi	Kurram Garhi (canal)	4	C
5	Malakand Power Station	Swat River	20	C
6	Reshun	Chitral	2.8	C
7	Shishi	Lower Chitral	0.30	C
8	Garam Chashma	Chitral	0.10	C
9	Kalam	Swat	0.2	LO
10	Ashuran	Swat	0.4	LO
11	Karora	Shangla	0.2	PLO
12	Damori	Shangla	0.1	LO
13	Thall	Dir	0.4	PLO
14	Kaghan	Mansehra	0.2	PLO
15	Duber	Kohistan	0.15	PLO
16	Keyal	Kohistan	0.2	PLO
17	Jalkot	Kohistan	0.15	PLO
		Total	3767.2	

C-Commissioned

LO-Leased out

PLO-Process of Leasing out

Figure 3.1
PROJECTS IN OPERATION IN NWFP

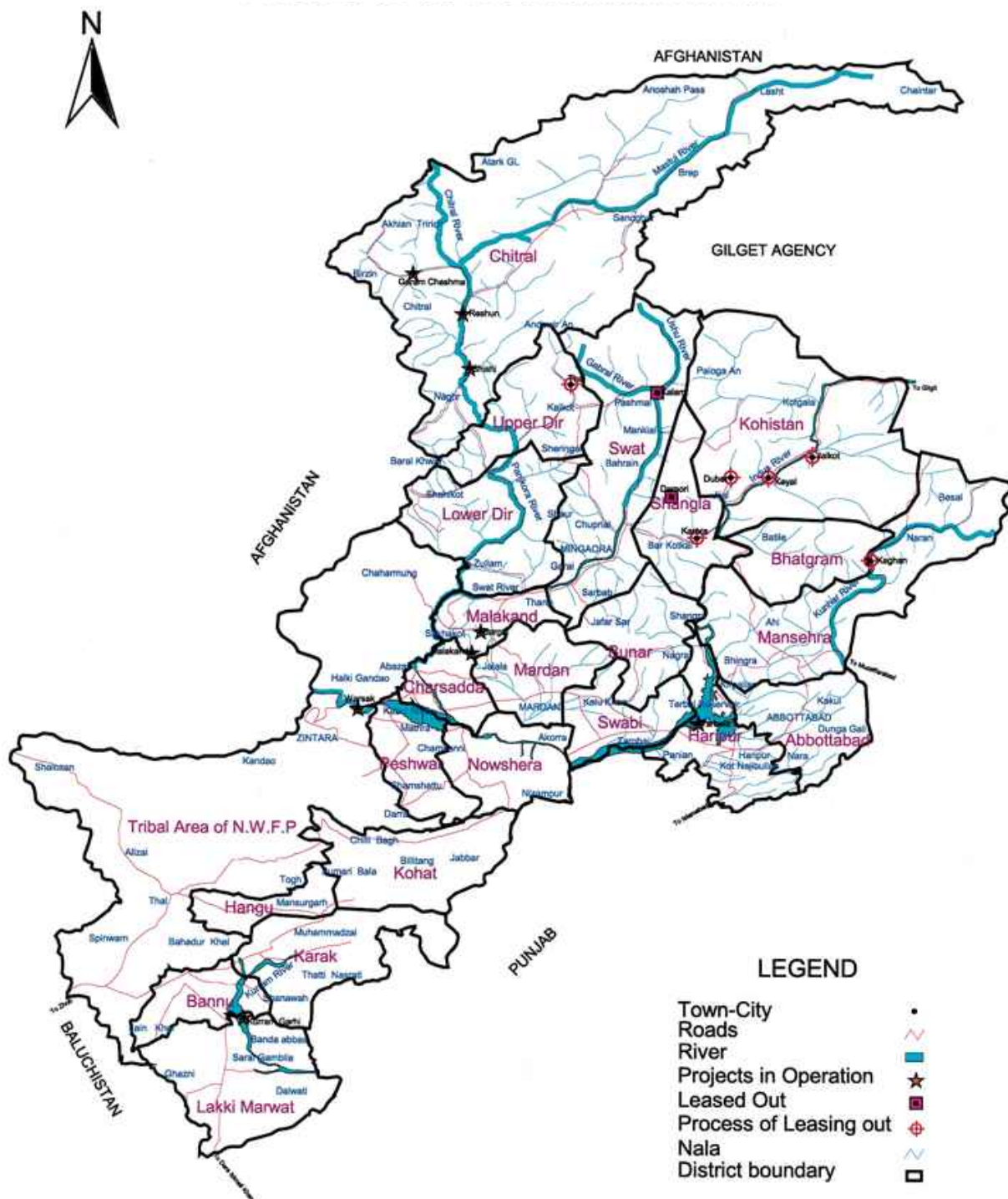


TABLE-3.2
PROJECTS IMPLEMENTATION BY PUBLIC SECTOR

S. No	Name of Project	River/Location	Capacity (MW)	Status
1	Malakand-III	Swat River Malakand Agency	81	A
2	Allai Khwar	Indus River Distt.Mansehra	121	B
3	Duber Khwar	Indus River Distt. Kohistan	130	B
4	Golen Gol	Golen/Mastuj Distt Chitral	106	B
5	Khan Khwar	Indus River Distt Kohistan	72	B
6	Kayal Khwar	Swat River near Bahrain	125	C
	Total		635	

- A. Project under construction by SHYDO, GONWFP.
 B. Project approved by ECNEC for implementation by WAPDA.
 C. It is yet to be decided as to whether the project will be implemented by WAPDA or SHYDO

TABLE-3.3
PROJECTS UNDER IMPLEMENTATION BY PRIVATE SECTOR

S. No	Name of Project	River/Location	Capacity (MW)	Status
1	Matiltan	Ushu River, District Swat	84	Tariff negotiations with WAPDA not yet finalized.
		Total	84	

Figure 3.2
PROJECTS IN IMPLEMENTATION BY PUBLIC/PRIVATE SECTOR IN NWFP



TABLE-3.4
RAW SITES INDENTIFIED IN NWFP (ABOVE 50 MW)

S. No	Project Name	Location	Capacity (MW)
1*	Dasu	Indus river	2712.00
2	Chor nullah system	Dist. Kohistan	1500.00
3	Patan	Indus river	1172.00
4	High Thakot	Indus river	1043.00
5**	Terbala 4th extension	Indus river	960.00
6***	Munda Dam	Swat river	740.00
7	Kunar river (2nd stage Suki Kinari)	Dist. Mansehra	652.00
8	Spat Gah (Middle)	Dassu	550.00
9	Kandiah (Kaigh Scheme)	Kohistan	548.00
10	Spat Gah (Lower)	Dassu	500.00
11	Kandiah (Karang Scheme)	Kohistan	454.00
12	Swat Scheme B1 (Kedam)	Kalam, Swat River	410.00
13****	Gahriat-Swir Lasht	Chitral	334.00
14	Korag-Parait	Chitral	223.00
15	Kunar river (ist stage naran)	Dist. Mansehra	219.00
16	Spat Gah(Upper)	Dassu	200.00
17	Madyan	Swat river	150.00
18	Swat Scheme C	Kalam, Swat River	147.00
19	Laspur-Muri Gram	Chitral	133.00
20	Patrind	Kunhar	133.00
21	Shogo-Sin	Chitral	127.00
22	Sharmi	Dist. Dir	115.00
23	Mirkani-Khazana	Panjikura Dir	110.00
24	Gabral-Kalam	Swat River	105.00
25	Swat Scheme A1 (Kalam)	Kalam, Swat River	101.00
26	Neckherdim-Paur	Chitral	80.00
27	Uchhatur-Andakht	Chitral	79.00
28****	Loo Nissar-Lawi	Chitral	65.00
29	Istaru-Buni	Chitral	52.00
30	Koto	Dist. Dir	52.00
31	Mujigram-Shogo	Chitral	51.00
	Total		13584.00

* Carrying out a detailed feasibility study has been approved in Public Sector.

** Project will be implemented in Public Sector.

*** Project is being processed in PPIB for implementation in the Private Sector.

**** WAPDA has submitted PC-II for carrying out detailed feasibility study for processing of approval.

Figure 3.3
PROJECTS ABOVE 50 MW (RAW SITES) IN NWFP



TABLE-3.5
RAW SITES INDENTIFIED IN NWFP (BELOW 50 MW)

S. No	Project Name	Location	Capacity (MW)
1	DongaiGah	Spat-Indus River	32.00
2	Tirich Gol, Alt 3A	Upper Chitral	29.70
3	Machi Branch	Mardan	28.00
4	Arkari Gol (Alt 2)	Lower Chitral	26.40
5	Tirich Gol, Alt 1 A	Upper Chitral	25.70
6	Arkari Gol (Alt 1)	Lower Chitral	24.00
7	Tirich Gol, Alt 2 A	Upper Chitral	22.60
8	Damtour	Dor/hazara	15.00
9	Bimbal	Mansehra	14.00
10	Serai, Karora	Indus Swat / Mansehra West	13.50
11	Y.I.A Golen	Lower Chitral	11.30
12	Chokel Khwar	Swat River near Bahrain	10.50
13	Barum Gol	Upper Chitral	10.00
14	Turkho River, Alt 2	Upper Chitral	9.90
15	Turkho River, Alt 1	Upper Chitral	9.40
16	Baral Darra	Swat Valley (Garni)	9.00
17	Mastuj River 2	Upper Chitral	8.90
18	Bhimbal	Dist. Mansehra	8.10
19	Jabori	Dist. Mansehra	8.00
20	Karora	Basham	8.00
21	Rish Gol, Alt 2	Upper Chitral	7.70
22	Karora New	Indus Swat / Mansehra West	7.50
23	Kedam Khwar	Kedam Khwar-Swat	7.00
24	Lutkho River	Lower Chitral	6.40
25	Rish Gol, Alt 1	Upper Chitral	6.20
26	Ushiri	Ushiri River Dir	6.00
27	Balkanai	Indus Swat / Mansehra West	5.30
28	Gande Gar	Dir Distt. (Ushri Khwar)	5.20
29	Ayun	Lower Chitral	5.06
30	Garbral River	Swat Valley (Kalam)	4.75
31	Khghan (Alt 1)	Kaghan Valley	4.10
32	Dadar	Siran/Hazara	4.00
33	Gandegah	Panjkoora River Dir	4.00
34	Laspur River	Upper Chitral	3.25
35	Bela	Dir Distt (Ghaldai sin)	2.95
36	Owir Gol	Upper Chitral	2.90
37	Naran	Kaghan Valley	2.80

38	Jashil Gah, G1	Indus Kohistan	2.77
39	Ritch Gol	Upper Chitral	2.75
40	Khelian Khwar	Indus Kohistan	2.60
41	Chaudwan	Chaudwan/DI Khan	2.50
42	Swat River	Swat Valley (Asrit)	2.40
43	Kaghozi Gol (Alt 2)	Lower Chitral	2.27
44	Bhimbal	Kaghan Valley	2.25
45	Kaghozi Gol (Alt 1)	Lower Chitral	1.98
46	Kao Gol, Alt 1	Upper Chitral	1.90
47	Bumburet	Lower Chitral	1.80
48	Biar	Dir Distt (Panjkora River)	1.72
49	Ushiri (Alt 1)	Dir Distt (Ushiri Khwar)	1.65
50	Murdan	Lower Chitral	1.60
51	Bangroan Khwar, Barigo Alt 2	Indus Kohistan	1.48
52	Jashil Gah, Badakk	Indus Kohistan	1.39
53	Thal	Dir Distt (Kumrat Sin)	1.35
54	Kaghan (Alt 2)	Kaghan Valley	1.28
55	Soyal Khwar (Alt 2)	Indus Kohistan	1.14
56	Patrak	Dir Distt (Ghaldai sin)	1.09
57	Chitral	Chitral	1.00
58	Chakosh Gol, Alt 1	Upper Chitral	0.93
59	Harban Gah, Harban	Indus Kohistan	0.90
60	Ushiri (Alt 2)	Dir Distt (Uushri Khwar)	0.90
61	Chokel Khwawar	Swat Valley (Ghundoputai)	0.89
62	Rehmat Shah Sind	Swat Valley (Garra)	0.86
63	Lower Thal	Dir Distt (Ghaldai sin)	0.80
64	Anakar gol	Swat Valley (Anaker)	0.76
65	Dongai Gah, Jalkot Nallah	Indus Kohistan	0.76
66	Kapar Banda Gah	Indus Kohistan	0.74
67	Seo Khwar	Indus Kohistan	0.71
68	Sheringal	Dir Distt. (Dok Darra Khwar)	0.71
69	Soyal Khwar (Alt 1)	Indus Kohistan	0.66
70	Kumrat	Dir Distt. (Kumrat Sin)	0.59
71	Birzin	Lower Chitral	0.50
72	Dir Alt No.1	Dir Distt. (Dir Khwar)	0.45
73	Dardabahm Gol, Alt 3	Upper Chitral	0.40
74	Baraul Bandai	Dir Distt. (Shingara Khwar)	0.24
75	Kolandai	Dir Distt. (Dir Khwar)	0.24
76	Sundraul	Dir Distt. (Landai Khwar)	0.21
77	Dir Alt. No.2	Dir Distt. (Dir Khwar)	0.12
78	Booni	Chitral	0.02
	Total		426.41

Figure 3.4
PROJECTS BELOW 50 MW (RAW SITES) IN NWFP

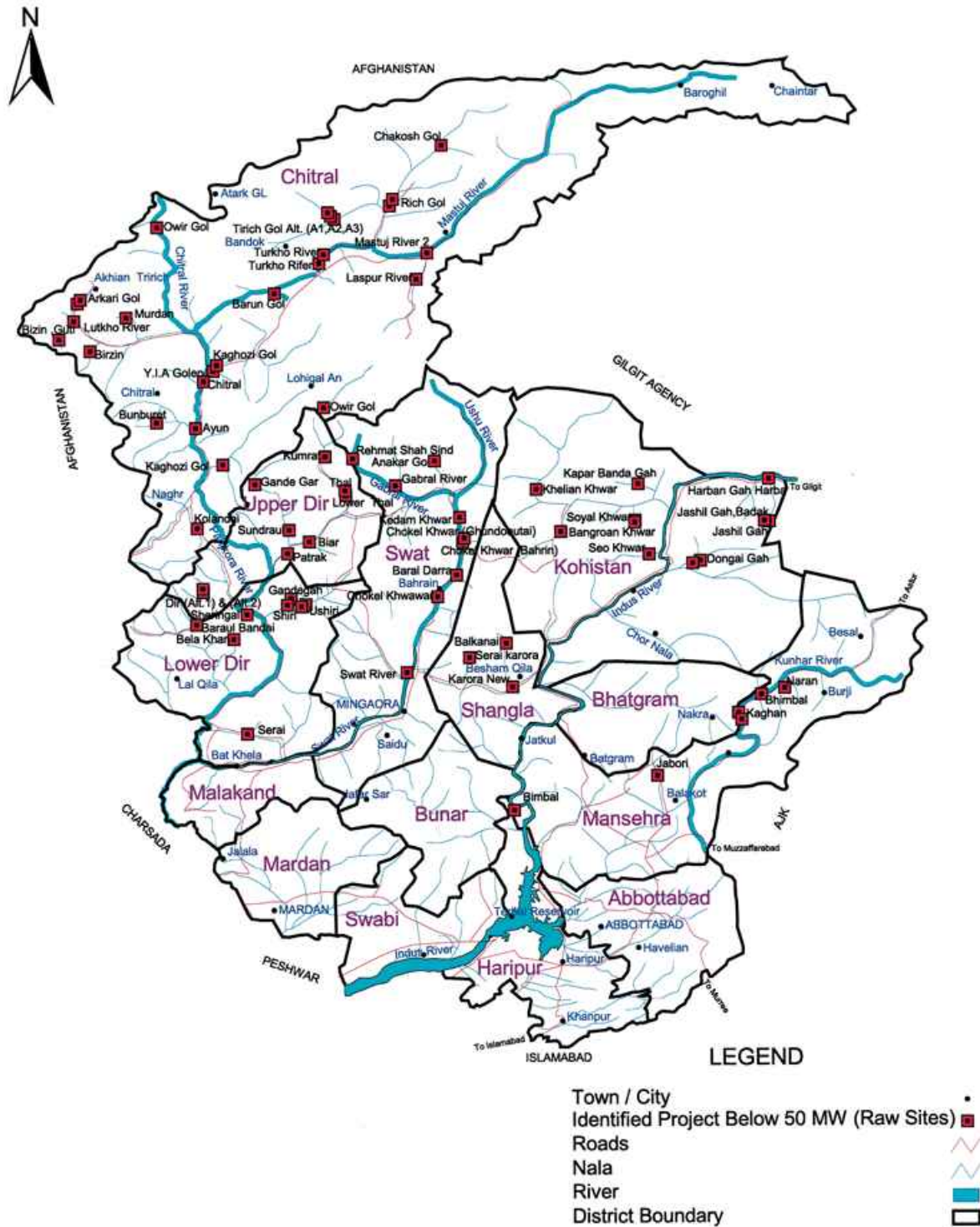


TABLE-3.6
SOLICITED SITES IDENTIFIED IN NWFP (ABOVE 50 MW)

S. No	Project Name	Location	Capacity (MW)
1	Kurram Tangi dam	Kurram North, Waziristan Agency	58
		Total	58

SOLICITED SITES IDENTIFIED IN NWFP (BELOW 50 MW)

S. No	Project Name	Location	Capacity (MW)
1	Daral Khwar	Kohistan	35
2	Summer Gah	Kohistan	28
3	Ranolia	Kohistan	12
4	Batal Khwar	Swat	8
5	Pehur	Swabi	18
6	Tank Zam	Tank Zam/ DI Khan	25.5
7	Gomal Zam	Gomal/Waziristan	17.4
	Total		143.90

Figure 3.5





HYDEL POTENTIAL IN PUNJAB

PAKISTAN
Hydel Power Potential

HYDEL POWER POTENTIAL

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Hydel Potential in Punjab

4.1 Introduction

Punjab is Pakistan's province of the five rivers namely, Sutluj, Ravi, Chenab, Jhelum and Indus. The first four join the mighty Indus at Mithan Kot which ultimately falls into the Arabian Sea. Punjab has the distinction of having the slope of gravity flow not only in Pakistan, but also in the world. Its irrigation system contributes 25 % of Pakistan's GDP and also engages 54 % of its labour force. After the Indus Water Treaty in 1960, large inter-basin link canals and storages were constructed.

In 1994, national consensus was developed to generate hydel power projects on canal sites in Punjab and, in pursuance thereof; the Punjab Power Development Board was created in the Irrigation Department in 1995 for the promotion of hydel power generation. Recently, WAPDA has launched the 1450 MW Ghazi Barotha hydel project as a run-of-river project. At different canals and barrages, about 324 potential sites with a total capacity of 5895 MW were identified with medium and small head. Out of these, 7 projects are in operation, one site is under implementation in the public sector. Tables-4.1 & 4.2 indicates the details of the projects in operation and under implementation in the public sector with the total capacity of 1698 MW and 96 MW respectively, while Figure-4.1 shows the location of these projects. Table-4.3 illustrates the details of raw sites projects below 50 MW with the total capacity of 350 MW. Table-4.4 indicates the list of solicited sites of above and below 50 MW with the total capacity of 3720 MW and 32.17 MW respectively, while Figure-4.2 shows the location of these projects.

TABLE-4.1
PROJECTS IN OPERATION

S. No	Project Name	Location	Capacity (MW)	Status
1	Ghazi Barotha	Ghazi Barotha, Disst. Attock	1450	C
2	Rasul	Rasul Distt. Mandi Bahuddin	22	C
3	Shadiwal	Shadiwal near Gujrat	14	C
4	Nandipur	Nandipur near Gujranwala	14	C
5	Chichoki Hydel	Upper Chenab Canal,	13	C
6	Renala	Renala-Khurd,-Distt. Okara	1	C
7	Chashma	Chashma	184	C
	Total		1698	

C-Commissioned

TABLE-4.2
PROJECTS UNDER IMPLEMENTATION BY PUBLIC SECTOR

S. No	Project Name	Location	Capacity (MW)	Status
1	Jinnah	Jinnah Barrage	96	B
	Total		96	

Figure 4.1
PROJECTS IN OPERATION IN PUNJAB & UNDER IMPLEMENTATION

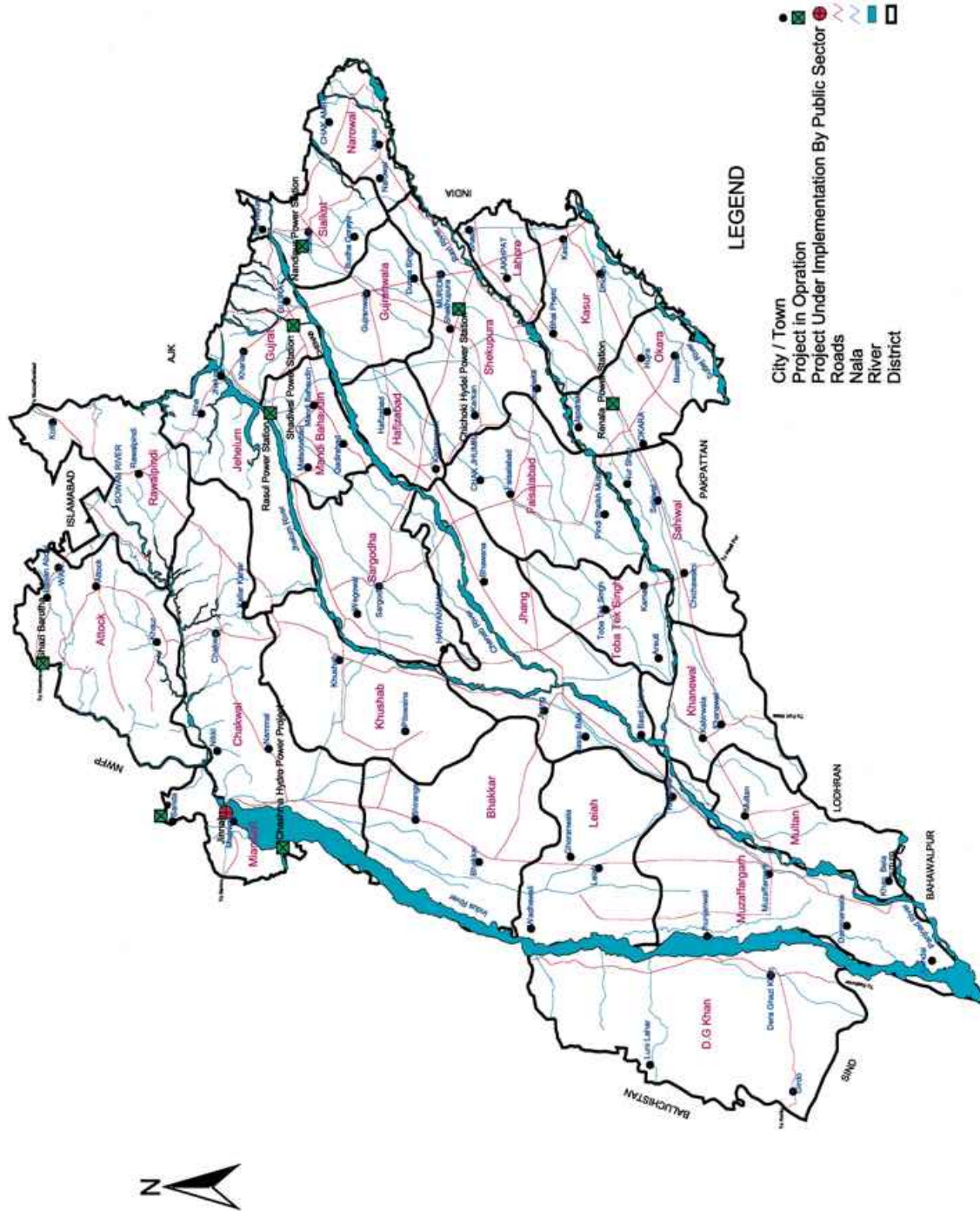


TABLE-4.3
RAW SITES IDENTIFIED IN PUNJAB (BELOW 50 MW)

S. No	Project Name	Location	DISTANCE RD (Feet)	Capacity (MW)
1	Indus/Chasma	Chasma Jhelum Link Canal	0+000	13.85
2	Indus/Chasma	Chasma Jhelum Link Canal	34+387	0.806
3	Indus/Chasma	Chasma Right Bank Canal	98+000	0.261
4	Indus/Chasma	Chasma Right Bank Canal	188+000	0.784
5	Indus/Jinnah	Thal Canal	0+000	0.091
6	Indus/Jinnah	Thal Canal	22+000	0.053
7	Indus/Jinnah	Thal Canal	0+000	0.143
8	Indus/Jinnah	Thal Canal	87+200	0.071
9	Indus/Jinnah	Thal Canal	0+000	0.246
10	Indus/Jinnah	Thal Canal	29+000	0.298
11	Indus/Jinnah	Thal Main Line Lower Canal	0+000	1.418
12	Indus/Jinnah	Thal Main Line Lower Canal	27+000	1.165
13	Indus/Jinnah	Thal Main Line Lower Canal	68+500	0.845
14	Indus/Jinnah	Thal Main Line Lower Canal	131+000	0.786
15	Indus/Jinnah	Thal Main Line Lower Canal	172+000	0.758
16	Indus/Jinnah	Thal Main Line Lower Canal	212+500	0.482
17	Indus/Jinnah	Thal Main Line Lower Canal	237+000	1.115
18	Indus/Jinnah	Thal Main Line Lower Canal	261+500	0.722
19	Indus/Jinnah	Thal Main Line Lower Canal	304+000	0.453
20	Indus/Jinnah	Thal Main Line Lower Canal	317+500	0.953
21	Indus/Jinnah	Thal Main Line Lower Canal	373+000	0.853
22	Indus/Jinnah	Thal Main Line Lower Canal	419+000	0.363
23	Indus/Jinnah	Thal Main Line Lower Canal	448+500	0.342
24	Indus/Jinnah	Thal Main Line Upper Canal	2+300	0.835
25	Indus/Taunsa	T.P Link Canal	60+000	4.235
26	Indus/Taunsa	T.P Link Canal	131+500	4.042
27	Indus/Taunsa	T.P Link Canal	182+000	6.157
28	Indus/Taunsa	T.P Link Canal	184+500	3.789
29	Chenab/Khanki	Lower Chenab Canal	0+000	0.0768
30	Chenab/Khanki	Lower Chenab Canal	36+670	0.0155
31	Chenab/Khanki	Lower Chenab Canal	54+4086	0.0308
32	Chenab/Khanki	Lower Chenab Canal	75+011	0.028
33	Chenab/Khanki	Lower Chenab Canal	0+000	4.9538
34	Chenab/Khanki	Lower Chenab Canal	40+200	1.6498

S. No	Project Name	Location	DISTANCE RD (Feet)	Capacity (MW)
35	Chenab/Khanki	Lower Chenab Canal	76+380	1.9399
36	Chenab/Khanki	Upper Gogera Branch	0	0.1737
37	Chenab/Khanki	Upper Gogera Branch	47+900	0.2076
38	Chenab/Khanki	Upper Gogera Branch	0+000	0.2828
39	Chenab/Khanki	Upper Gogera Branch	77+000	0.2855
40	Chenab/Khanki	Upper Gogera Branch	101+400	0.2982
41	Chenab/Khanki	Upper Gogera Branch	109+500	0.1104
42	Chenab/Khanki	Upper Gogera Branch	145+450	0.0436
43	Chenab/Khanki	Upper Gogera Branch	163+333	0.7275
44	Chenab/Khanki	Upper Gogera Branch	181+050	0.0212
45	Chenab/Khanki	Upper Gogera Branch	204+987	0.2732
46	Chenab/Khanki	Upper Gogera Branch	229+200	0.0966
47	Chenab/Khanki	Upper Gogera Branch	249+000	0.0875
48	Chenab/Khanki	Upper Gogera Branch	282+700	0.0458
49	Chenab/Khanki	Upper Gogera Branch	296+100	0.0476
50	Chenab/Khanki	Upper Gogera Branch	320+189	0.0558
51	Chenab/Khanki	Upper Gogera Branch	322+000	0.0429
52	Chenab/Khanki	Upper Gogera Branch	322+492	0.0687
53	Chenab/Khanki	Upper Gogera Branch	410+200	0.1173
54	Chenab/Khanki	Upper Gogera Branch	439+300	0.0347
55	Chenab/Khanki	Upper Gogera Branch	448+530	0.0665
56	Chenab/Khanki	Upper Gogera Branch	449+719	0.0276
57	Chenab/Khanki	Upper Gogera Branch	0+000	0.356
58	Chenab/Khanki	Upper Gogera Branch	27+000	0.59
59	Chenab/Khanki	Upper Gogera Branch	65+000	0.374
60	Chenab/Khanki	Upper Gogera Branch	103+927	0.238
61	Chenab/Khanki	Upper Gogera Branch	120+000	0.257
62	Chenab/Khanki	Upper Gogera Branch	171+000	0.189
63	Chenab/Khanki	Upper Gogera Branch	218+000	0.654
64	Chenab/Khanki	Upper Gogera Branch	265+000	0.125
65	Chenab/Khanki	Upper Gogera Branch	269+000	0.217
66	Chenab/Khanki	Upper Gogera Branch	294+300	0.045
67	Chenab/Khanki	Upper Gogera Branch	324+000	0.13
68	Chenab/Khanki	Upper Gogera Branch	0+000	1.327
69	Chenab/Khanki	Upper Gogera Branch	21+900	0.232
70	Chenab/Khanki	Upper Gogera Branch	54+879	0.128

S. No	Project Name	Location	DISTANCE RD (Feet)	Capacity (MW)
71	Chenab/Khanki	Upper Gogera Branch	101+400	0.269
72	Chenab/Khanki	Upper Gogera Branch	214+000	1.695
73	Chenab/Khanki	Upper Gogera Branch	219+000	0.888
74	Chenab/Khanki	Upper Gogera Branch	251+000	0.481
75	Chenab/Khanki	Lower Chenab Canal (Lower)	0+000	0.872
76	Chenab/Khanki	Lower Chenab Canal (Lower)	37+025	1.328
77	Chenab/Khanki	Lower Chenab Canal (Lower)	68+830	0.828
78	Chenab/Khanki	Lower Chenab Canal (Lower)	178+250	0.325
79	Chenab/Khanki	Lower Chenab Canal (Lower)	184+612	0.0249
80	Chenab/Khanki	Lower Chenab Canal (Lower)	216+852	0.689
81	Chenab/Khanki	Lower Chenab Canal (Lower)	260+000	0.401
82	Chenab/Khanki	Lower Chenab Canal (Lower)	277+500	0.285
83	Chenab/Khanki	Lower Chenab Canal (Lower)	140+050	0.209
84	Chenab/Khanki	Lower Chenab Canal (Lower)	161+287	0.816
85	Chenab/Khanki	Lower Chenab Canal (Lower)	182+950	0.524
86	Chenab/Khanki	Lower Chenab Canal (Lower)	0+000	0.262
87	Chenab/Khanki	Lower Chenab Canal (Lower)	25+020	0.174
88	Chenab/Khanki	Lower Chenab Canal (Lower)	38+585	0.429
89	Chenab/Khanki	Lower Chenab Canal (Lower)	49+898	0.116
90	Chenab/Khanki	Lower Chenab Canal (Lower)	61+288	0.067
91	Chenab/Khanki	Lower Chenab Canal (Lower)	86+105	0.166
92	Chenab/Khanki	Lower Chenab Canal (Lower)	137+073	0.316
93	Chenab/Khanki	Lower Chenab Canal (Lower)	170+500	0.242
94	Chenab/Khanki	Lower Chenab Canal (Lower)	192+936	0.114
95	Chenab/Khanki	Lower Chenab Canal (Lower)	229+520	0.057
96	Chenab/Khanki	Lower Chenab Canal (Lower)	246+080	0.07
97	Chenab/Marala	B.R.B.D Link Canal	0 +000	1.981
98	Chenab/Marala	B.R.B.D Link Canal	68+600	0.536
99	Chenab/Marala	B.R.B.D Link Canal	91+400	0.559
100	Chenab/Marala	B.R.B.D Link Canal	337+144	0.224
101	Chenab/Marala	B.R.B.D Link Canal	400+000	0.587
102	Chenab/Marala	B.R.B.D Link Canal	433+958	0.926
103	Chenab/Marala	B.R.B.D Link Canal	465+300	0.705
104	Chenab/Marala	B.R.B.D Link Canal	481+760	1.1208
105	Chenab/Marala	B.R.B.D Link Canal	509+712	3.1414
106	Chenab/Marala	B.R.B.D Link Canal	513+550	0.3894

S. No	Project Name	Location	DISTANCE RD (Feet)	Capacity (MW)
107	Chenab/Marala	B.R.B.D Link Canal	271+000	0.344
108	Chenab/Marala	B.R.B.D Link Canal	304+000	0.33
109	Chenab/Marala	B.R.B.D Link Canal	375+000	0.213
110	Chenab/Marala	B.R.B.D Link Canal	445+000	0.0912
111	Chenab/Marala	B.R.B.D Link Canal	218+500	0.187
112	Chenab/Marala	B.R.B.D Link Canal	240+250	0.92
113	Chenab/Marala	B.R.B.D Link Canal	265+128	0.065
114	Chenab/Marala	B.R.B.D Link Canal	281+000	0.064
115	Chenab/Marala	B.R.B.D Link Canal	304+000	0.022
116	Chenab/Marala	Chenab / Upper Chenab Canal	0+000	4.789
117	Chenab/Marala	Chenab / Upper Chenab Canal (Lower)	0+000	10.52
118	Chenab/Marala	Chenab / Upper Chenab Canal (Lower)	128+000	4.679
119	Chenab/Marala	Chenab / Upper Chenab Canal (Lower)	164+400	3.455
120	Chenab/Marala	Chenab / Upper Chenab Canal (Lower)	221+000	5.975
121	Chenab/Marala	Chenab / Upper Chenab Canal (Lower)	225+508	2.761
122	Chenab/Marala	Chenab / Upper Chenab Canal (Lower)	266+000	1.153
123	Chenab/Marala	Chenab / Upper Chenab Canal (Lower)	283+100	4.671
124	Chenab/Panjnad	Abbasian Canal	0+000	4.671
125	Chenab/Panjnad	Panjnad Canal	0+000	6.309
126	Chenab/Panjnad	Panjnad Canal	150+000	1.952
127	Chenab/Panjnad	Panjnad Canal	203+966	0.517
128	Chenab/Panjnad	Panjnad Canal	229+000	1.307
129	Chenab/Panjnad	Panjnad Canal	0+000	0.353
130	Chenab/Panjnad	Panjnad Canal	62+486	0.223
131	Chenab/Qadirabad	Lower Chenab Canal Feeder	0+000	2.143
132	Chenab/Qadirabad	Qadirabad Balloki Link Canal	0+000	2.1432
133	Chenab/Qadirabad	Qadirabad Balloki Link Canal	81+274	2.116
134	Chenab/Qadirabad	Qadirabad Balloki Link Canal	182+102	0.639
135	Chenab/Qadirabad	Qadirabad Balloki Link Canal	271+665	3.602
136	Chenab/Qadirabad	Qadirabad Balloki Link Canal	304+985	4.107

S. No	Project Name	Location	DISTANCE RD (Feet)	Capacity (MW)
137	Chenab/Qadirabad	Qadirabad Balloki Link Canal	379+265	1.111
138	Chenab/Trimmu	Trimmu-Sidhuni Link Canal	0+019	2.222
139	Jhelum/Mangla	Gujrat Branch Canal	0+600	0.666
140	Jhelum/Mangla	Gujrat Branch Canal	1+350	0.677
141	Jhelum/Mangla	Gujrat Branch Canal	2+000	0.407
142	Jhelum/Mangla	Gujrat Branch Canal	21+000	0.309
143	Jhelum/Mangla	Gujrat Branch Canal	35+065	0.205
144	Jhelum/Mangla	Gujrat Branch Canal	63+000	0.152
145	Jhelum/Mangla	Gujrat Branch Canal	75+000	0.152
146	Jhelum/Mangla	Gujrat Branch Canal	113+000	0.87
147	Jhelum/Mangla	Gujrat Branch Canal	142+500	0.017
148	Jhelum/Mangla	Upper Jhelum Canal	27+500	2.125
149	Jhelum/Mangla	Upper Jhelum Canal	34+750	2.5
150	Jhelum/Mangla	Upper Jhelum Canal	36+860	2.43
151	Jhelum/Mangla	Upper Jhelum Canal	63+000	1.845
152	Jhelum/Mangla	Upper Jhelum Canal	78+695	0.662
153	Jhelum/Mangla	Upper Jhelum Canal	89+149	1.086
154	Jhelum/Mangla	Upper Jhelum Canal	107+000	1.509
155	Jhelum/Mangla	Upper Jhelum Canal	225+080	1.443
156	Jhelum/Mangla	Upper Jhelum Canal	348+000	1.117
157	Jhelum/Rasul	Lower Jhelum Canal	223+350	0.234
158	Jhelum/Rasul	Lower Jhelum Canal	276+850	0.714
159	Jhelum/Rasul	Lower Jhelum Canal	317+800	0.014
160	Jhelum/Rasul	Lower Jhelum Canal	0+000	0.209
161	Jhelum/Rasul	Lower Jhelum Canal	53+300	0.148
162	Jhelum/Rasul	Lower Jhelum Canal	83+900	0.17
163	Jhelum/Rasul	Lower Jhelum Canal Feeder	0+000	1.23
164	Jhelum/Rasul	Lower Jhelum Canal Feeder	8+626	1.0727
165	Jhelum/Rasul	Rasul Qadirabad Link	0+000	2.602
166	Jhelum/Rasul	Rasul Qadirabad Link	145+255	2.117
167	Ravi/ Balloki	B.S.Link I	0+000	1.114
168	Ravi/ Balloki	B.S.Link I	73+201	1.086
169	Ravi/ Balloki	B.S. Main Link	0+000	3.178
170	Ravi/ Balloki	B.S. Link I	1+410	0.059
171	Ravi/ Balloki	Lower Bari Doab Canal	0+000	1.095
172	Ravi/ Balloki	Lower Bari Doab Canal	27+173	0.758

S. No	Project Name	Location	DISTANCE RD (Feet)	Capacity (MW)
173	Ravi/ Balloki	Lower Bari Doab Canal	62+713	0.604
174	Ravi/ Balloki	Lower Bari Doab Canal	108+954	1.118
175	Ravi/ Balloki	Lower Bari Doab Canal	196+954	1.374
176	Ravi/ Balloki	Lower Bari Doab Canal	227+454	2.781
177	Ravi/ Balloki	Lower Bari Doab Canal	258+654	3.149
178	Ravi/ Balloki	Lower Bari Doab Canal	285+454	2.634
179	Ravi/ Balloki	Lower Bari Doab Canal	329+058	3.514
180	Ravi/ Balloki	Lower Bari Doab Canal	340+850	0.311
181	Ravi/ Balloki	Lower Bari Doab Canal	391+454	0.978
182	Ravi/ Balloki	Lower Bari Doab Canal	430+500	0.241
183	Ravi/ Balloki	Lower Bari Doab Canal	450+500	1.185
184	Ravi/ Balloki	Lower Bari Doab Canal	461+550	2.082
185	Ravi/ Balloki	Lower Bari Doab Canal	493+890	0.318
186	Ravi/ Balloki	Lower Bari Doab Canal	527+216	1.2
187	Ravi/ Balloki	Lower Bari Doab Canal	542+168	0.147
188	Ravi/ Balloki	Lower Bari Doab Canal	571+200	0.342
189	Ravi/ Balloki	Lower Bari Doab Canal	589+000	1.074
190	Ravi/ Balloki	Lower Bari Doab Canal	601+200	0.34
191	Ravi/ Balloki	Lower Bari Doab Canal	640+200	1.076
192	Ravi/ Sidhuni	S.M.B Link	0+014	4.479
193	Ravi/ Sidhuni	Sidhnai Canal	0+000	0.159
194	Ravi/ Sidhuni	Sidhnai Canal	19+500	0.374
195	Ravi/ Sidhuni	Sidhnai Canal	41+000	0.51
196	Ravi/ Sidhuni	Sidhnai Canal	54+100	0.323
197	Ravi/ Sidhuni	Sidhnai Canal	62+000	0.542
198	Ravi/ Sidhuni	Sidhnai Canal	163+800	0.201
199	Ravi/ Sidhuni	Sidhnai Canal	197+755	0.293
200	Ravi/ Sidhuni	Sidhnai Canal	0+000	0.46
201	Ravi/ Sidhuni	Sidhnai Canal	44+077	0.28
202	Ravi/ Sidhuni	Sidhnai Canal	61+077	0.126
203	Ravi/ Sidhuni	Sidhnai Canal	78+050	0.259
204	Ravi/ Sidhuni	Sidhnai Canal	117+117	0.209
205	Ravi/ Sidhuni	Sidhnai Canal	140+000	0.171
206	Sutlej/Islam	Bahawal Canal Upper	0+000	0.965
207	Sutlej/Islam	Bahawal Canal Upper	43+500	1.554
208	Sutlej/Islam	Bahawal Canal Upper	81+000	1.468

S. No	Project Name	Location	DISTANCE RD (Feet)	Capacity (MW)
209	Sutlej/Islam	Bahawal Canal Upper	86+100	0.74
210	Sutlej/Sulemanki	Eastern Saddiqia Canal	0+000	0.981
211	Sutlej/Sulemanki	Eastern Saddiqia Canal	0+000	0.505
212	Sutlej/Sulemanki	Eastern Saddiqia Canal	22+900	0.191
213	Sutlej/Sulemanki	Eastern Saddiqia Canal	38+900	0.199
214	Sutlej/Sulemanki	Eastern Saddiqia Canal	95+900	0.232
215	Sutlej/Sulemanki	P.I Link	0+000	0.357
216	Sutlej/Sulemanki	P.I.Link	113+600	0.116
217	Sutlej/Sulemanki	Pak Pattan Canal	0+000	1.287
218	Sutlej/Sulemanki	Pak Pattan Canal	52+000	0.923
219	Sutlej/Sulemanki	Pak Pattan Canal	112+350	4.347
220	Sutlej/Sulemanki	Pak Pattan Canal	124+950	0.561
221	Sutlej/Sulemanki	Pak Pattan Canal	191+642	0.689
222	Sutlej/Sulemanki	Pak Pattan Canal	218+272	0.226
223	Sutlej/Sulemanki	Pak Pattan Canal	241+500	0.205
224	Sutlej/Sulemanki	Pak Pattan Canal	266+400	0.289
225	Sutlej/Sulemanki	Pak Pattan Canal	304+340	0.935
226	Sutlej/Sulemanki	Pak Pattan Canal	322+843	0.388
227	Sutlej/Sulemanki	Pak Pattan Canal	353+726	0.389
228	Sutlej/Sulemanki	Pak Pattan Canal	354+172	0.536
229	Sutlej/Sulemanki	Pak Pattan Canal	406+828	0.483
230	Sutlej/Sulemanki	Pak Pattan Canal	469+310	0.092
231	Sutlej/Sulemanki	Pak Pattan Canal	476+730	0.456
232	Sutlej/Sulemanki	Pak Pattan Canal	498+872	0.156
233	Sutlej/Sulemanki	Pak Pattan Canal	548+310	0.082
234	Sutlej/Sulemanki	Pak Pattan Canal	406+828	0.107
235	Sutlej/Sulemanki	Pak Pattan Canal	607+000	0.152
236	Sutlej/Sulemanki	Pak Pattan Canal	631+000	0.028
237	Sutlej/Sulemanki	Pak Pattan Canal	647+000	0.039
238	Chenab/Marala	Marala Ravi Link Canal	0+000	0.612
239	Chenab/Marala	Marala Ravi Link Canal	220+122	2.046
240	Chenab/Marala	Marala Ravi Link Canal	237+230	6.854
241	Chenab/Marala	Marala Ravi Link Canal	249+850	10.519
242	Chenab/Marala	Marala Ravi Link Canal	265+998	13.661
243	Chenab/Marala	Marala Ravi Link Canal	302+496	7.105
244	Chenab/Marala	Marala Ravi Link Canal	313+500	14.396

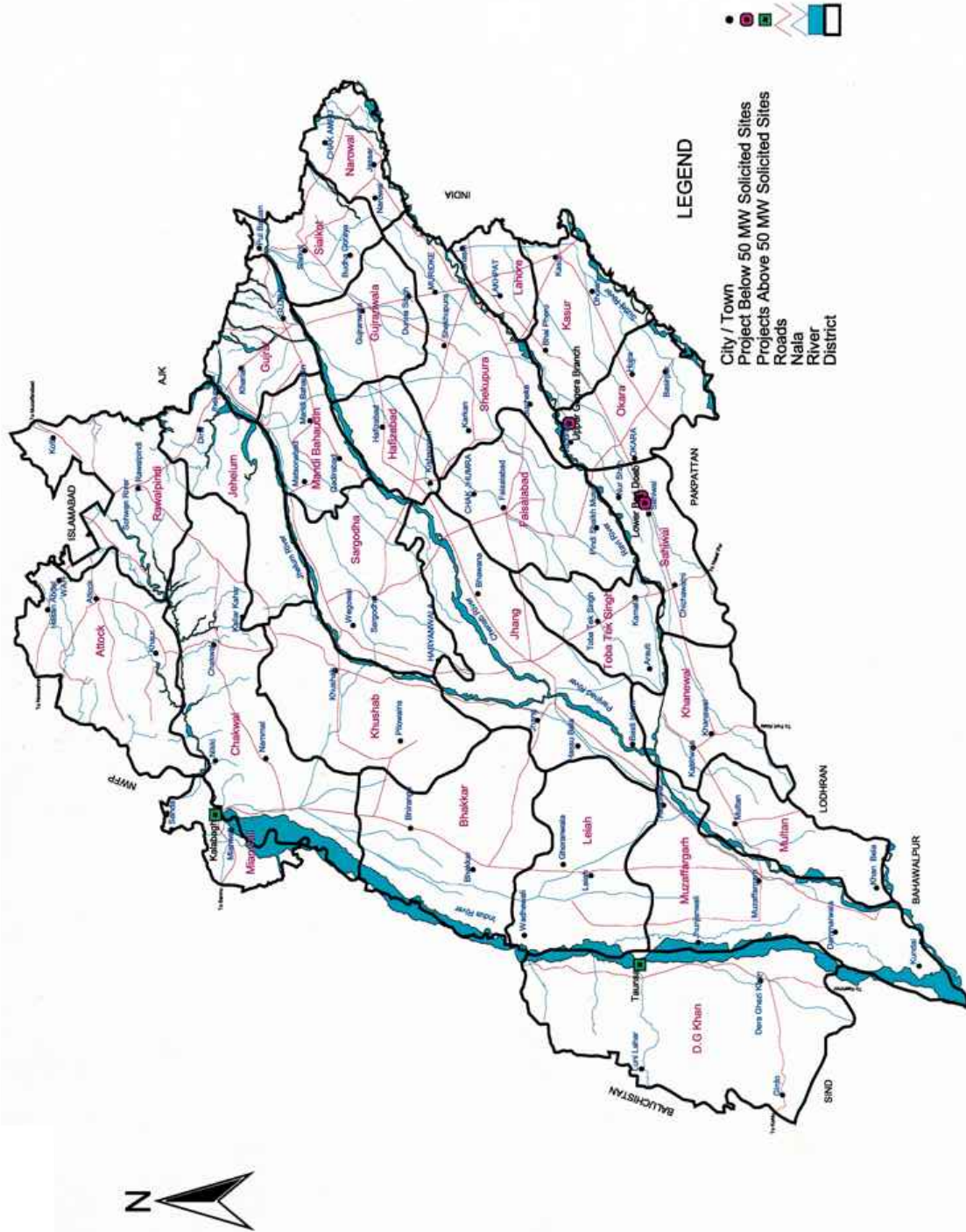
S. No	Project Name	Location	DISTANCE RD (Feet)	Capacity (MW)
245	Chenab/Marala	B.R.B.D Link Canal	0+000	0.302
246	Chenab/Marala	B.R.B.D Link Canal	92+000	1.8
247	Chenab/Marala	B.R.B.D Link Canal	113+412	1.833
248	Chenab/Marala	B.R.B.D Link Canal	157+390	0.676
249	Chenab/Trimmu	Haveli Canal	0+000	2.448
250	Chenab/Trimmu	Rangpur Canal	0+000	0.767
251	Chenab/Trimmu	Rangpur Canal	49+000	0.375
252	Chenab/Trimmu	Rangpur Canal	70+000	0.352
253	Chenab/Trimmu	Rangpur Canal	100+500	0.562
254	Chenab/Trimmu	Rangpur Canal	138+180	0.395
255	Chenab/Trimmu	Rangpur Canal	170+000	0.360
256	Chenab/Trimmu	Rangpur Canal	189+500	0.196
257	Chenab/Trimmu	Rangpur Canal	218+000	0.284
258	Chenab/Trimmu	Rangpur Canal	249+500	0.240
259	Chenab/Trimmu	Rangpur Canal	281+500	0.258
260	Indus/Taunsa	D.G. Khan Canal	0+000	1.083
261	Indus/Taunsa	D.G. Khan Canal	0+000	1.076
262	Indus/Taunsa	D.G. Khan Canal	3+500	2.268
263	Indus/Taunsa	D.G. Khan Canal	8+000	2.272
264	Indus/Taunsa	D.G. Khan Canal	14+000	2.062
265	Indus/Taunsa	D.G. Khan Canal	23+000	1.23
266	Indus/Taunsa	D.G. Khan Canal	58+078	0.605
267	Indus/Taunsa	D.G. Khan Canal	168+600	0.423
268	Indus/Taunsa	D.G. Khan Canal	142+100	0.3
269	Indus/Taunsa	Muzaffargrah Canal	0+000	1.166
270	Indus/Taunsa	Muzaffargrah Canal	164+357	1.293
271	Indus/Taunsa	Muzaffargrah Canal	127+300	1.699
272	Indus/Taunsa	Muzaffargrah Canal	147+500	0.954
273	Indus/Taunsa	Muzaffargrah Canal	177+093	0.326
274	Indus/Taunsa	Muzaffargrah Canal	206+700	0.417
275	Indus/Taunsa	Muzaffargrah Canal	246+800	0.753
276	Indus/Taunsa	Muzaffargrah Canal	290+300	0.629
277	Indus/Taunsa	Muzaffargrah Canal	329+112	0.671
278	Jhelum/Rasul	Lower Jhelum Canal	0+000	0.281
279	Jhelum/Rasul	Lower Jhelum Canal	11+790	0.159
280	Jhelum/Rasul	Lower Jhelum Canal	22+000	0.398

S. No	Project Name	Location	DISTANCE RD (Feet)	Capacity (MW)
281	Jhelum/Rasul	Lower Jhelum Canal	28+200	0.405
282	Jhelum/Rasul	Lower Jhelum Canal	49+950	0.295
283	Jhelum/Rasul	Lower Jhelum Canal	75+500	0.167
284	Jhelum/Rasul	Lower Jhelum Canal	83+985	0.233
285	Ravi/Balloki	B.S. Link II	0+000	0.573
286	Ravi/Balloki	B.S. Link II	33+430	8.21
287	Ravi/Balloki	B.S. Link II	193+339	0.694
288	Ravi/Balloki	Depalpur Canal Lower	0+000	0.409
289	Ravi/Balloki	Depalpur Canal Lower	8+430	0.16
290	Ravi/Balloki	Depalpur Canal Lower	78+224	0.115
291	Ravi/Balloki	Depalpur Canal Lower	85+074	0.136
292	Ravi/Balloki	Depalpur Canal Lower	99+979	0.283
293	Ravi/Balloki	Depalpur Canal Lower	137+410	0.076
294	Sutlej/Islam	Mailsi Canal	0+000	3.143
295	Sutlej/Islam	Mailsi Canal	11+500	0.678
296	Sutlej/Islam	Mailsi Canal	40+500	0.956
297	Sutlej/Islam	Qaimpur Canal	0+000	0.017
298	Sutlej/Islam	Qaimpur Canal	12+635	0.025
299	Sutlej/Sulemanki	Fordhwah Canal	0+000	0.104
300	Sutlej/Sulemanki	Pakpattan Canal	57+340	0.250
301	Sutlej/Sulemanki	Pakpattan Canal	68+170	0.293
302	Sutlej/Sulemanki	Pakpattan Canal	82+370	0.206
303	Sutlej/Sulemanki	Pakpattan Canal	114+000	0.364
304	Sutlej/Sulemanki	Pakpattan Canal	143+000	0.369
305	Sutlej/Sulemanki	Pakpattan Canal	176+500	0.421
306	Sutlej/Sulemanki	Pakpattan Canal	201+860	0.404
	TOTAL		349.6559	

TABLE -4.4

S.No.	Project Name	Location	Capacity (MW)
1	Kalabagh	Indus River. Distt Mianwali	3600
2	Taunsa	Indus River	120
	Total	3720	
SOLICITED SITES IDENTIFIED IN PUNJAB			
S.No.	Project Name	Location	Capacity MW
1	Head Main Line Upper Chenab Canal	Bambanwala Sialkot RD 133298	6.29
2	Main Line Lower (Upper Chenab Canal)	Deg Fall Sheikhpura RD 283100	6.29
3	Pakpattan Canal Upper	Pakpattan RD 112350	3.26
4	Lower Bari Doab	LBDC Sahiwal RD 285454	2.43
5	Upper Gugera Br.	Upper Gugera Canal SKP. RD 214000	2.34
6	Main line lower UCC	Main Line UCC Sheikupura RD 128000	3.5
7	Main line lower UCC	Main Line UCC Sheikupura RD 164400	3.5
8	Lower bari doab	Sahiwal RD 329058	4.56
	Total		32.17

Figure 4.2
PROJECTS ABOVE & LESS THAN 50 MW (SOLICITED SITES) IN PUNJAB





HYDEL POTENTIAL IN AJK

PAKISTAN
Hydel Power Potential

HYDEL POWER POTENTIAL

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HYDEL POTENTIAL IN AJK

5.1 Introduction

Azad State of Jammu & Kashmir (AJK), due to its topography has been endowed with abundant hydel potential. In the late eighties, WAPDA and GTZ conducted comprehensive hydel potential reports on the three main rivers of AJK, namely, the River Jhelum, River Poonch and River Neelum. The preliminary reports consist of the investigations and details of the identified potential sites, together along with recommendations for further detailed studies. Various sites with an estimated total capacity of about 4635 MW of hydel potential have been identified in AJK.

In order to exploit the plentiful hydel resources of AJK, the Government of AJK (GOAJK) established the AJK Hydro Electric Board in 1989. Public sector projects are implemented by the AJK HEB. The AJK HEB successfully completed the 1.6 MW Kathai, 2 MW Kundel Shahi, 2 MW Leepa and 30.4 MW Jagran hydel power projects. Subsequently, with the intention of providing a one-window facility and to encourage the development of hydel potential in the private sector, the GOAJK created the AJK Private Power Cell in 1995.

About 53 potential sites with a total capacity of 4635 MW were identified with high, medium and small head. Out of these, 8 projects are in operation, 2 sites are under implementation in the public sector and 7 sites has been offered to the private sector. Mainly, these sites are run-of-river sites, with some as daily storage projects. Table-5.1 indicates the list of the projects in operation with the total capacity of 1036 MW, while Figure-5.1 shows the location of these projects. Tables-5.2 & 5.3 lists the details of the projects which are under implementation in public sector and private sector with the total capacity of 974MW and 829 MW respectively; while Figure-5.2 shows the location of these projects. Table-5.4 illustrates the details of raw sites projects above 50 MW with the total capacity of 1152 MW, while Figure-5.3 shows the location of these projects. Table-5.5 indicates the details of raw site projects of below 50 MW with the total capacity of 177 MW , while Figure-5.4 shows the location of these projects. Table-5.6 indicates the list of the solicited sites of above and below 50 MW with the total capacity of 420 MW and 48 MW respectively, while Figure-5.5 shows the location of these projects.

TABLE -5.1
PROJECTS IN OPERATION

S. No	Project Name	Location	Capacity (MW)	Project Status
1	Mangla	Jhelum River	1000.00	C
2	Jagran HEP No.1	Jagran River	30.40	C
3	Kundal Shahi HEP	Jagran River	2.00	C
4	Leepa HEP	Qazi Nag Nullah	1.60	C
5	Kathai HEP	Jhelum River	1.60	C
6	Keel HEP	Naril Nullah	0.20	C
7	Chinari HEP	Kathi Nullah	0.10	C
8	Pattika/Phittka HEP	Neelum River	0.20	C
	Total		1036.10	

Figure 5.1
PROJECTS IN OPERATION IN AJK

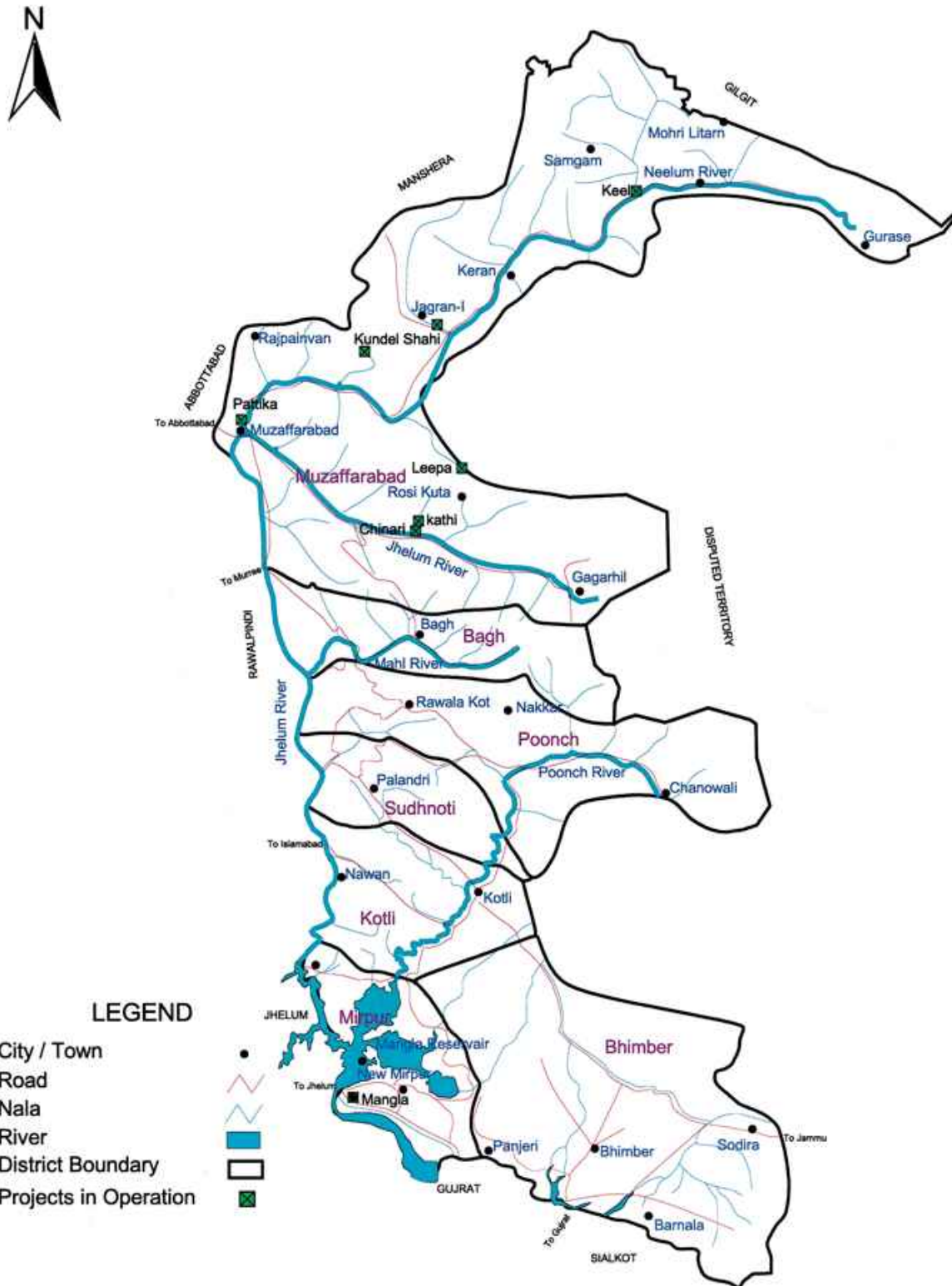


TABLE -5.2
PROJECTS UNDER IMPLEMENTATION BY PUBLIC SECTOR

S. No	Project Name	Location	Capacity (MW)	Status
1	Neelum Jhelum	Muzaffarabad	969.00	A
2	Battar	Punch River, Haveli, Distt, Bagh	4.80	B
	Total		973.8	

A. Project approved by ECNEC for implementation by WAPDA, construction not yet started.
B. Project approved by ECNEC but construction not yet started by AJK HEB, GOAJK.

TABLE -5.3
PROJECTS IN PRIVATE SECTOR

S. No	Project Name	Location	Capacity (MW)	Project Status
1	New Bong Escape	Mirpur	79	LOS
2	Rajdhani	Kotli	132	LOS
3	Madar Butdara	Muzaffarabad	10.2	LOS
4	Riali-I	Muzaffarabad	1.6	LOS
5	Kohala	Muzaffarabad	600	LOI
6	Jari	Mirpur	1	Completed
7	Riali-II	Muzaffarabad	4.9	LOI
	Total		828.7	

Figure 5.2
PROJECTS UNDER IMPLEMENTATION BY PUBLIC/PRIVATE SECTOR IN AJK

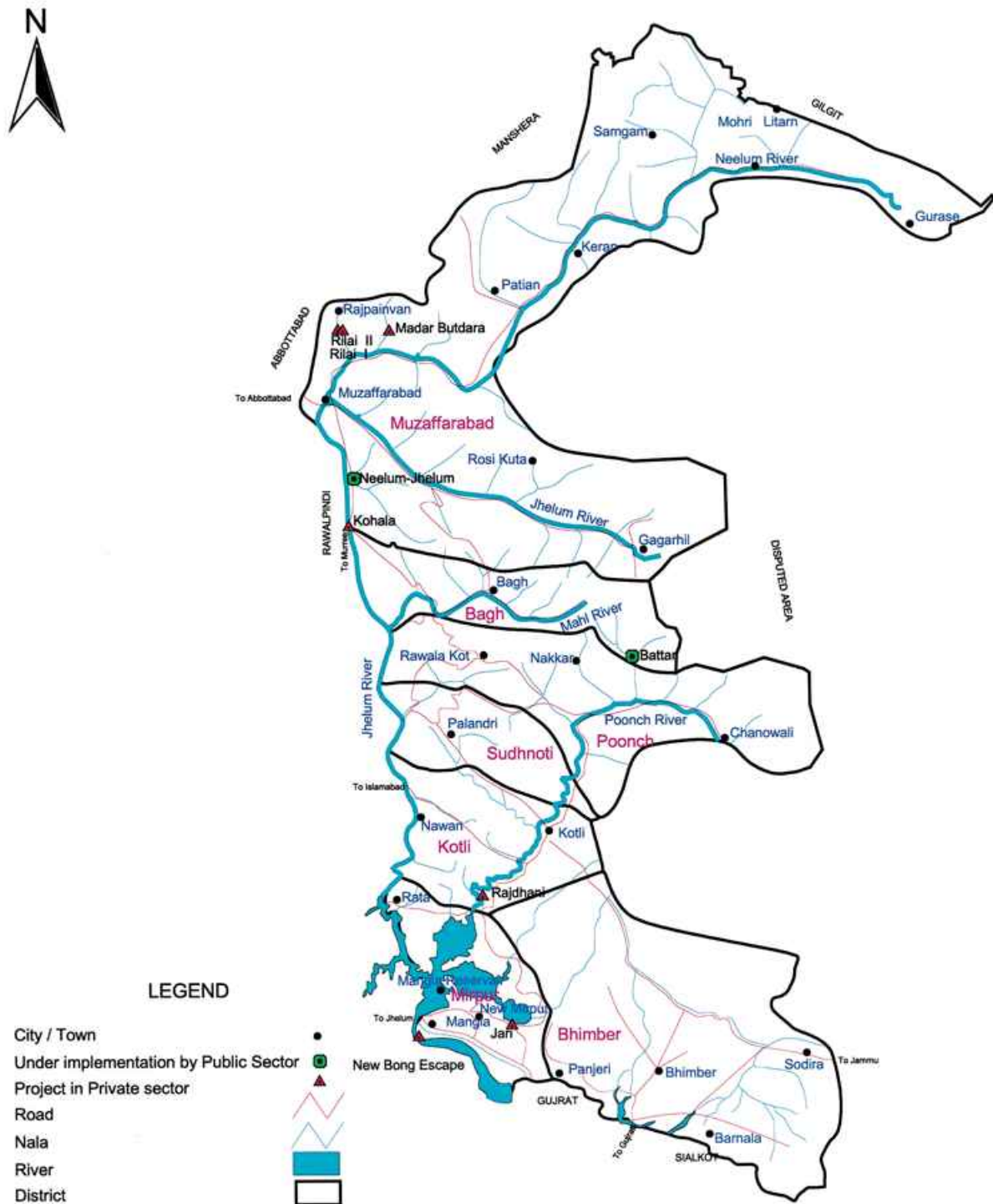


TABLE -5.4.
RAW SITES IDENTIFIED IN AJK (ABOVE 50 MW)

S.No.	Project Name	Location	Capacity (MW)
1	Mahl	Bagh	245.00
2	Karot	Kotli	240.00
3	Azad Patan	Poonch	222.00
4	Chakothi-Seri	Muzaffarabad	139.00
5*	Kotli	Kotli	97.00
6	Jagran-III	Muzaffarabad	90.00
7	Serha	Kotli	65.00
8	Hari-Ghal	Bagh	54.00
	Total		1152.00

Figure 5.3
PROJECTS ABOVE 50 MW (RAW SITES) IN AJK



TABLE -5.5
RAW SITES IDENTIFIED IN AJK (BELOW 50 MW)

S.No.	Project Name	Location	Capacity (MW)
1	Gumot Nar	Muzaffarabad	40.00
2	Dudainal	Muzaffarabad	30.00
3	Luat	Muzaffarabad	24.10
4	Shontar	Muzaffarabad	20.00
5	Doarian	Muzaffarabad	14.10
6	Naghdar	Muzaffarabad	11.20
7	Taobat	Muzaffarabad	5.00
8	Jana Wai	Muzaffarabad	5.00
9	Jing	Muzaffarabad	3.70
10	Dakhari	Kotli	3.20
11	Chamm Fall	Muzaffarabad	3.20
12	Hotreri	Muzaffarabad	2.50
13	Hajira	Poonch	2.40
14	Sharda	Muzaffarabad	2.00
15	Samani	Mirpur	1.60
16	Riali-I	Muzaffarabad	1.60
17	Dghanwan	Kotli	1.50
18	Sarhota	Kotli	1.00
19	Rerah	Kotli	1.00
20	Pothi	Kotli	1.00
21	Kotli Ban	Kotli	1.00
22	Barar	Bagh	1.00
23	Sarswah	Kotli	0.70
24	Patni	Bhimber	0.20
	Total		177.00

Figure 5.4
PROJECTS BELOW 50 MW (RAW SITES) IN AJK

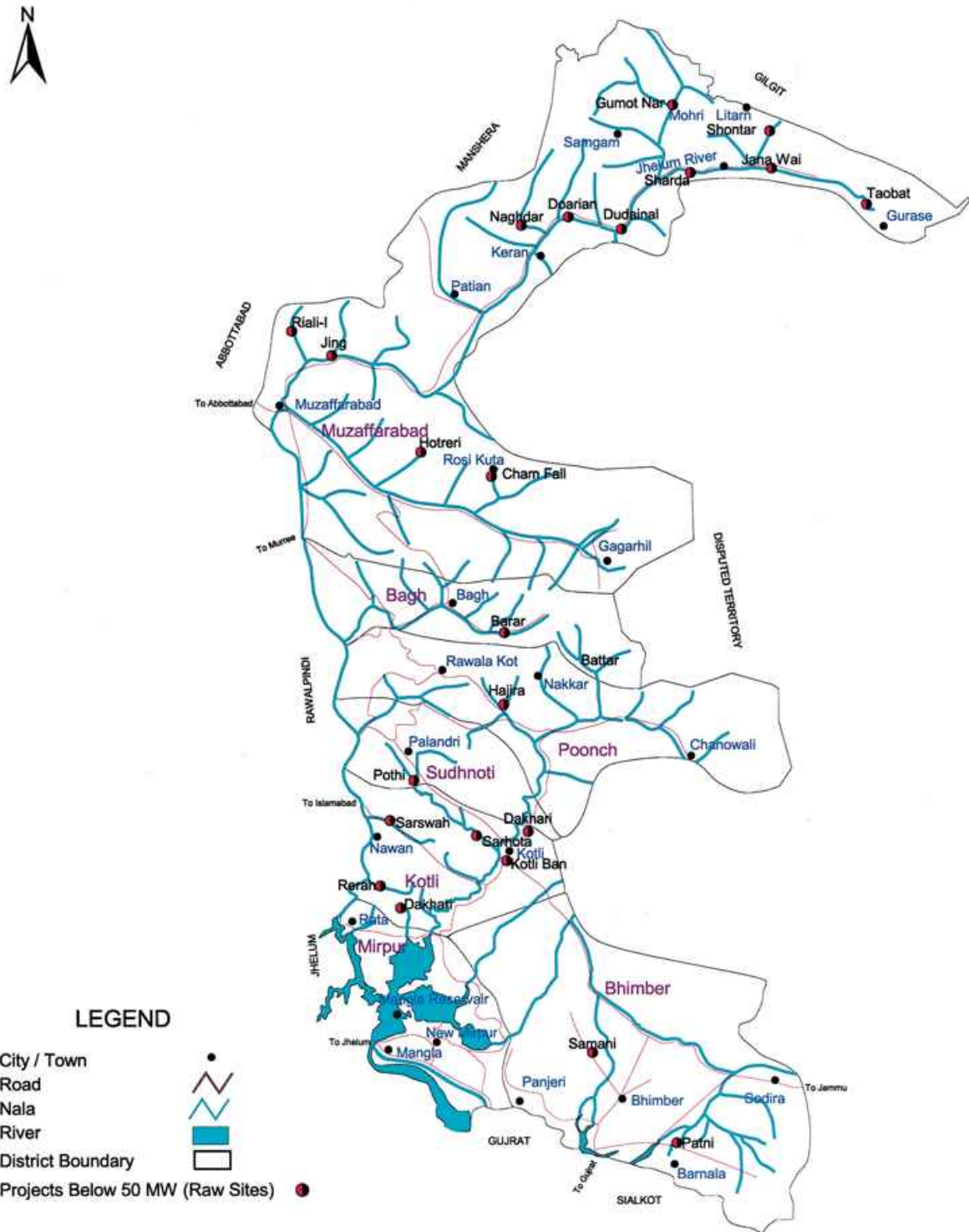


TABLE -5.6
SOLICITED SITES IDENTIFIED IN AJK (ABOVE 50 MW)

S.No.	Project Name	Location	Capacity (MW)
1*	Abbasian	Muzaffarabad	360.00
2**	Gulpur	Kotli	60.00
	Total		420.00

TABLE -5.6
SOLICITED SITES IDENTIFIED IN AJK (BELOW 50 MW)

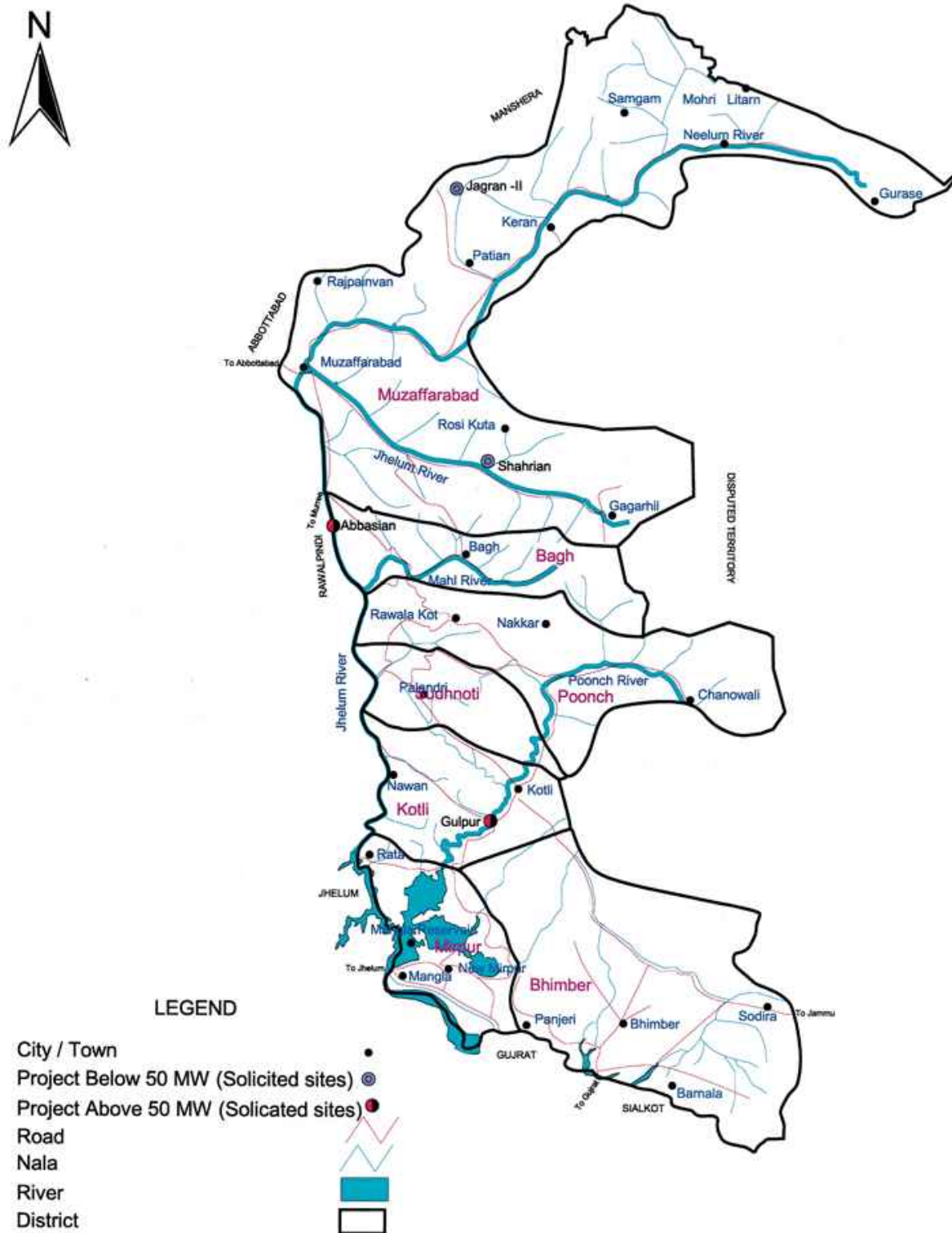
S.No.	Project Name	Location	Capacity (MW)
1***	Jagran-II	Muzaffarabad	45.00
2	Shahrian	Muzaffarabad	3.20
	Total		48.20

* The feasibility study previously carried by private sector but found deficient.

** The feasibility study is being updated by the GOAJK.

*** Pre-liminary report available.

Figure 5.5
IDENTIFIED PROJECTS SOLICITED SITES IN AJK



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The background of the cover is a teal-colored image of a large dam with water cascading over its spillways. In the upper right corner, there is a circular emblem containing the Pakistani flag, which consists of a green field with a white crescent and star. The title 'HYDEL POTENTIAL IN NORTHERN AREA' is centered in a bold, white, serif font. At the bottom, the words 'PAKISTAN' and 'Hydel Power Potential' are visible in a lighter, semi-transparent font. A vertical banner on the right side contains the text 'HYDEL POWER POTENTIAL' repeated vertically.

HYDEL POTENTIAL IN NORTHERN AREA

PAKISTAN
Hydel Power Potential

HYDEL POWER POTENTIAL

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Hydel Potential in Northern Area

6.1 Introduction

The main rivers and tributaries in the Northern Areas have been divided into three regions, i.e. the Eastern, Northern and Southern Regions.

• Northern Region

The Northern Region comprises of Gilgit (River Gilgit, Naltar and its tributaries), Hunza (River Boladas, Hunza and other tributaries), Ishkuma (River Ishkuman and Ghizar and their tributaries), Khunjerab (River Khunjarab, River Kilik and its tributaries) and Yasin (River Yasin, River Gilgit and their tributaries).

➤ Eastern Region

The Eastern Region comprises the Kharmang (River Kharmang and its tributaries), Shyok (River Shyok and its tributaries), Skardu (River Braldu, River Bashu, River Shigar and River Indus) and Rondu/ Haramosh (River Indus and its regional tributaries)

➤ Southern Region

The Southern Region comprises the Chilas (River Indus and its tributaries) and Astore (River Astore and its tributaries)

Numerous promising hydel potential sites have been identified in the Northern Areas, but, due to the absence of high power transmission lines, these sites have not been developed so far. On account of difficult mountainous terrain and the non-availability of high power transmission line system, the Northern Areas are not connected to the National Grid and no projects have been undertaken by private investors.

In order to provide electricity to the isolated network of the Northern Areas, the Northern Areas Public Works Department (NAPWD) was established, which is responsible for the generation and distribution of electricity. NAPWD has constructed various mini hydel power stations in the region and has built 11 KV lines for the transmission of power to consumers. Currently, approximately 40 % of the local population has been provided electricity.

About 241 potential sites with a total capacity of 12314 MW were identified with high, medium and small head. Out of these, 93 projects are in operation and no project either is under implementation nor being processed/undertaken by the private sector. Mainly, these sites are run-of-river, with some as daily storage projects. Table-6.1 indicates the details of the projects in operation with the total capacity of 94 MW, while Figure-6.1 shows the details of these projects. Table-6.2 shows the list of project under implementation in the public sector. Tables 6.3 & 6.4 illustrate the details of raw site projects above and below 50 MW with the total capacity of 10905 MW and 814 MW respectively, while Figures-6.2 & 6.3 shows the location of these projects. Table-6.5 indicates the list of solicited sites of above and below 50 MW with the total capacity of 505 MW and 72 MW respectively, while Figure-6.4 shows the location of these projects.

TABLE -6.1
PROJECTS IN OPERATION

S.No.	Project Name	Location	Capacity (MW)	Status
1	Gilgit	Gilgit	10.63	C
2	Skardu-I	Skardu	6.96	C
3	Chilas-I	Chilas	5.62	C
4	Hunza	Hunza	5.13	C
5	Shyok	Shyok	4.85	C
6	Kar Gah Phase VI	Gilgit	4.00	C
7	Astore	Astore	3.11	C
8	Kachura Phase II	Skardu	3.00	C
9	Ghizar	Ghizar	2.00	C
10	Thak	Chilas	2.00	C
11	Phandar	Distt. Ghizar	2.00	C
12	Kharmang		1.89	C
13	Yasin	Distt Ghizar	1.61	C
14	Rondu		1.52	C
15	Bunnar Chilas	Chilas, Distt. Diamer	1.50	C
16	Dumsum	Gha, Distt. Ghanche	1.50	C
17	Balagond	Gha, Dstt. Ghanche	1.50	C
18	Ishkuman-I		1.38	C
19	Kar Gah Phase V	Gilgit	1.20	C
20	Parishing/ Lous	Astore	1.00	C
21	Darel Phase II	Chilas	1.00	C
22	Bunner		1.00	C
23	Tangir	Chilas	1.00	C
24	Kar Gah Phase VII	Gilgit	1.00	C
25	Jalalabad	Gilgit	1.00	C
26	Hassanabad Phase V	Hunza	1.00	C
27	Hisper Phase I	Hunza	1.00	C
28	Ishkuman-II	Ishkuman	1.00	C
29	Naz Bar	Yasin	1.00	C
30	Jaglot Phase-II	Gaglot/Gilgit	1.00	C
31	Chalt	Nagar Valley/Gilgit	1.00	C
32	Khyber-II	Hunza/Gilgit	1.00	C
33	Shigar	Skardu	1.00	C

34	Shirting	Skardu	1.00	C
35	Skardu Phase III	Skardu	1.00	C
36	Pion	Distt. Ghanche/Gha	1.00	C
37	Basho Phase I	Skardu	0.80	C
38	Tormic Phase I	Rondu	0.80	C
39	Skardu Phase II	Skardu	0.64	C
40	Bubind	Astore	0.64	C
41	Kar Gah Phase III	Gilgit	0.60	C
42	Kar Gah Phase IV	Gilgit	0.60	C
43	Boladas Phase I	Hunza	0.60	C
44	Khunjerab	Gujrab river	0.59	C
45	Gol	Skardu	0.40	C
46	Harpo Phase I	Rondu	0.40	C
47	Harchu	Astore	0.40	C
48	Hassanabad Phase II	Hunza	0.40	C
49	Hassanabad Phase IV	Hunza	0.40	C
50	Kar Gah Phase I	Gilgit	0.32	C
51	Dainyor	Gilgit	0.32	C
52	Gurikot	Astore	0.25	C
53	Kayo	Skardu	0.24	C
54	Dango Das	Astore	0.22	C
55	Manthoka	Khamang	0.22	C
56	Astore	Astore	0.22	C
57	Gulmit	Ishkuman	0.22	C
58	Tolti Phase I	Kharmang	0.20	C
59	Khaplu Phase II	Shyok	0.20	C
60	Kachura Phase I	Skardu	0.20	C
61	Darel Phase I	Chilas	0.20	C
62	Hassanabad Phase III	Hunza	0.20	C
63	Khaibar Phase-I	Khunjerab	0.20	C
64	Khaibar Phase-II	Khunjerab	0.20	C
65	Parishing/Mushke	Astore	0.19	C
66	Rattu	Astore	0.19	C
67	Misgar	Khunjerab	0.19	C
68	Ghandus	Kharmang	0.16	C
69	Kiris Phase I	Shyok	0.16	C
70	Thally Phase I	Shyok	0.16	C

71	Mendi	Rondu	0.16	C
72	Stak	Rondu	0.16	C
73	Tangir Phase I	Chilas	0.16	C
74	Chilas-II	Chilas	0.16	C
75	Hassanabad Phase-I	Hunza	0.16	C
76	Hayul	Ishkuman	0.16	C
77	Khaplu Phase-I	Shyok	0.13	C
78	Sumayar Phase I	Hunza	0.13	C
79	Mehdabad	Kharmang	0.11	C
80	Nomal	Gilgit	0.11	C
81	Pari	Gilgit	0.11	C
82	Jaglot Sai	Gilgit	0.11	C
83	Sher Qila	Gilgit	1.11	C
84	Sermik Phase-I	Kharmang	0.10	C
85	Olding Phase I	Kharmang	0.10	C
86	Thore	Chilas	0.10	C
87	Minapin Phase-I	Hunza	0.10	C
88	Naltar	Gilgit	0.08	C
89	Singal	Gilgit	0.08	C
90	Ahmadabad Phase I	Hunza	0.05	C
91	Ahmadabad Phase II	Hunza	0.05	C
92	Chalt Phase-I	Hunza	0.04	C
93	Sosat	Yasin	0.01	C
	Total		93.732	

C-Commissioned

TABLE -6.2
PROJECTS UNDER IMPLEMENTATION BY PUBLIC SECTOR

S.No.	Project Name	River/Location	Capacity (MW)	Status
1	Naltar-III	Naltar Gah	18	A
	Total		18	

TABLE -6.3
RAW SITES IDENTIFIED IN NORTHERN AREA (ABOVE 50 MW)

S.No.	Project Name	Location	Capacity (MW)
1*	Skardu	Shiger river/near Skardu	4000
2**	Basha Dam	Indus/Chilas	3360
3	Bunji	Indus river/near Gilgit	1290
4	Yulbo	Indus River	710
5	Rakhiot	Indus river	670
6	Tangus	Indus River	625
7	Altit	Hunza River	250
	Total		10905.00

* Pre-feasibility study for the project is being carried out in the Public sector

** Detailed feasibility study for the Project is being carried out in Public Sector

Figure 6.1
PROJECTS IN OPERATION IN NORTHERN AREA

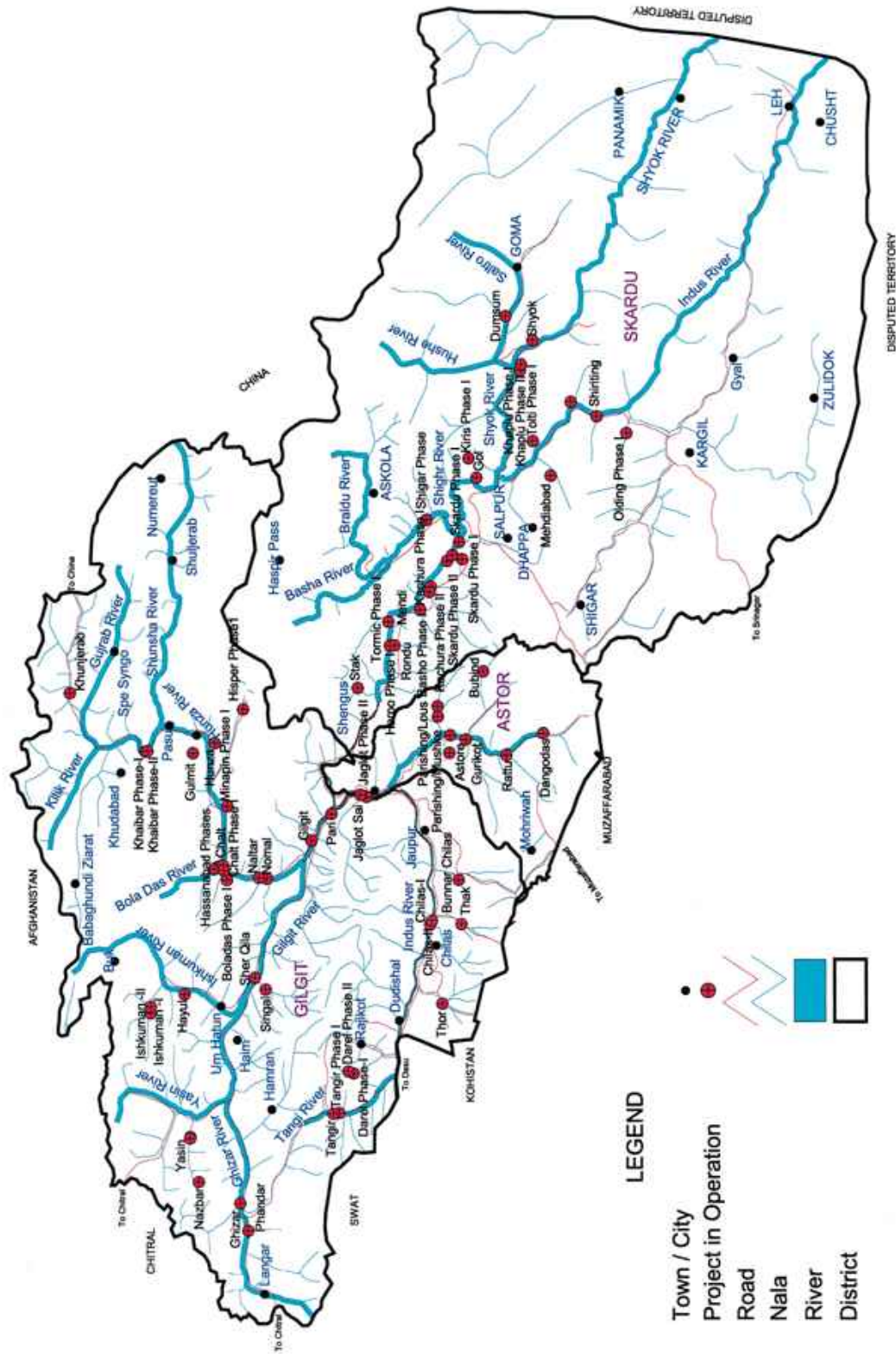


Figure 6.2
PROJECTS ABOVE 50 MW (RAW SITES) IN NORTHERN AREA

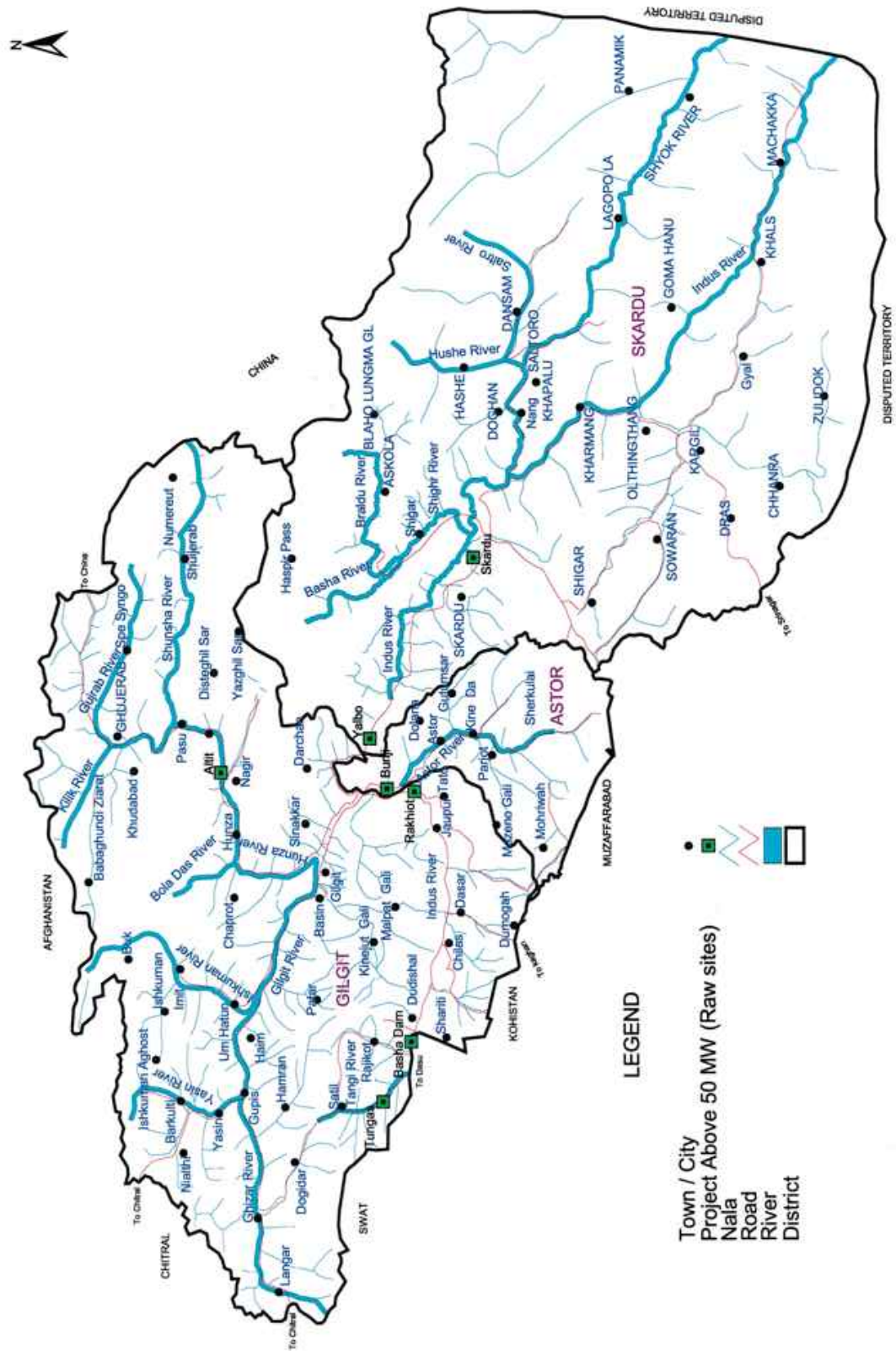


TABLE -6.4
IDENTIFIED HYDEL POTENTIAL IN NORTHERN AREA
(BELOW 50 MW) (RAW SITES)

S.No.	Project Name	Location	Capacity (MW)
1	Darel Phase-IV	Chilas	1.8
2	Tangir Phase-III	Chilas	3.7
3	Darel Phase-III	Chilas	1.5
4	Chilas Phase-III	Chilas	0.7
5	Darel Phase-IV	Chilas	1.1
6	Chilas Phase-IV	Chilas	0.6
7	Tangir Phase-IV	Chilas	12.2
8	Doyian	Astore	362.3
9	Parishing Phase-III	Astore	5.5
10	Parishing Phase-IV	Astore	3.1
11	Dichil	Astore	4.1
12	Bulashbar	Astore	0.5
13	Chhichi	Astore	1.1
14	Bubind Phase-II	Astore	1.1
15	Dango Das	Astore	0.5
16	Harchu	Astore	0.4
17	Aspai Alt-II	Astore	0.6
18	Aspai Alt-I	Astore	0.33
19	Rama Phase-II	Astore	0.26
20	Gurikot	Astore	0.14
21	Rattu Phase-II	Astore	0.15
22	Gozer/Gulo	Astore	0.12
23	Amni	Astore	0.14
24	Jaglot Alt-I	Gilgit	3.9
25	Naltar Phase-III	Gilgit	5.4
26	Sai Phase-I	Gilgit	10.5
27	Naltar Phase-V	Gilgit	17.3
28	Nomal	Gilgit	2.6
29	Kar Gah Phase-X	Gilgit	1.4
30	Naltar Phase-IV	Gilgit	2.2
31	Kar Gah Phase-VIII	Gilgit	1.4

32	Sher Qila Phase-II	Gilgit	1.02
33	Singal Phase-II	Gilgit	1.4
34	Damot	Gilgit	0.7
35	Kar Gah Phase-XI	Gilgit	3.9
36	Sai Phase-II	Gilgit	0.97
37	Hamuchal HPP	Gilgit	14
38	Kar Gah Phase-IX	Gilgit	1.7
39	Henzal HPP	Gilgit	15
40	Naltar Phase-II	Gilgit	0.75
41	Daintar	Hunza	4.2
42	Boldas Phase-II	Hunza	2.9
43	Hassanabad Phase-VI	Hunza	1.8
44	Hispar Phase-II	Hunza	2.6
45	Altit HPP	Hunza	36
46	Chalt Phase-III	Hunza	0.51
47	Nasirabad HPP	Hunza	15.3
48	Hassanabad Phase-VII	Hunza	0.4
49	Sumayar Phase-II	Hunza	0.38
50	Minapin Phase-III	Hunza	0.23
51	Baru	Ishkuman	7.6
52	Ishkuman	Ishkuman	1.8
53	Asambar	Ishkuman	1.3
54	Chhantir	Ishkuman	9.6
55	Gulmiti	Ishkuman	1.6
56	Gulmiti Alt-I	Ishkuman	1.3
57	Birgal	Ishkuman	0.8
58	Gulmiti Alt-II	Ishkuman	0.5
59	Hasis	Ishkuman	0.4
60	Hayul (Chatorkhand)	Ishkuman	0.3
61	Phakor	Ishkuman	0.21
62	Ghakuch	Ishkuman	0.13
63	Darmodar-I	Shyok	1.8
64	Nolti (NAPWD)	Shyok	3.7
65	Balti-2	Ghizar river	1.4
66	Roshan Alt.2	Ghizar river	1.1

67	Dahimal	Shyok	3.1
68	Naz Bar	Shyok	1.3
69	Darmodar-2	Shyok	1.1
70	Sosat	Ghizar river	0.49
71	Gupis	Ghizar river	0.51
72	Roshan Alt.1	Ghizar river	0.61
73	Darmodar (HEPO)	Shyok	0.6
74	Balti-1	Ghizar river	0.44
75	Muduli	Shyok	0.32
76	Skardu Phase-IV, Alt.II	Skardu	9.4
77	Basho Phase-II	Skardu	3.2
78	Skardu Phase-IV, Alt.I	Skardu	4.8
79	Basho Phase-III	Skardu	4.3
80	Kachura Phase-V	Skardu	18
81	Hashopi Phase-II	Skardu	0.64
82	Shigar Phase-III	Skardu	0.82
83	Narh	Skardu	0.41
84	Niaslo	Skardu	0.34
85	Ghoro	Skardu	0.44
86	Hoh	Skardu	0.39
87	Doko	Skardu	0.13
88	Kiris Alt.2- Phase-II	Shyok	0.57
89	Mngio HPP	Shyok	0.44
90	Thagas	Shyok	0.57
91	Kustang	Shyok	0.57
92	Daltar HPP	Shyok	0.74
93	Brodas	Shyok	0.79
94	Mian HPP	Shyok	0.31
95	Tormic Phase-II	Rondu/Haramosh	15.3
96	Harpo Phase-II	Rondu/Haramosh	14.9
97	Talu	Rondu/Haramosh	8.6
98	Gainji	Rondu/Haramosh	2.4
99	Sermik Phase-II	Kharmang	2.1
100	Sermik Phase-III	Kharmang	2
101	Tolti	Kharmang	1.7

102	Rumboka	Kharmang	1.6
103	Manthoka (Upgrade)	Kharmang	0.75
104	Shirting Phase-II	Kharmang	0.63
105	Gavis	Kharmang	0.68
106	Gidiaksdo	Kharmang	0.75
107	Olding Phase-II	Kharmang	0.4
108	Sermik Phase-III	Kharmang	0.91
109	Mehdiabad	Kharmang	0.46
110	Shushkati	Khunjerab	0.69
111	Derdi	Khunjerab	0.85
112	Kilik	Khunjerab	0.37
113	Lupghari	Khunjerab	0.63
114	Khaiber Phase-II	Khunjerab	0.17
115	Abgarch	Khunjerab	0.14
116	Phandar-Chhashi Alt-II	Ghizar	12.2
117	Phandar-Chhashi Alt-I	Ghizar	12.1
118	Masholan Gol	Ghizar	11.4
119	Bahach Handrap HPP	Ghizar	2.7
120	Chumar Khan Phase-I	Ghizar	0.94
121	Bahushtaro Gol	Ghizar	0.99
122	Serbal Gol	Ghizar	0.51
123	Chumar Khan Phase-II	Ghizar	0.37
124	Zhojat Gol	Ghizar	0.46
125	Phultukish	Gultari& Minimarg	0.99
126	Karapchu	Gultari& Minimarg	0.99
127	Thali Alt-I	Gultari& Minimarg	34
128	Thali Alt-ii	Gultari& Minimarg	38.9
129	Thang	Gultari& Minimarg	0.56
130	Nero Phase-II	Gultari& Minimarg	0.41
131	Buniyal	Gultari& Minimarg	0.32
132	Burzil Alt-II	Gultari& Minimarg	0.39
133	Burzil Alt-I	Gultari& Minimarg	0.14
134	Nero Phase-I	Gultari& Minimarg	0.17
135	Franshat	Gultari& Minimarg	0.15
136	Rathok	Gultari& Minimarg	0.16
	Total		814.15

Figure 6.3

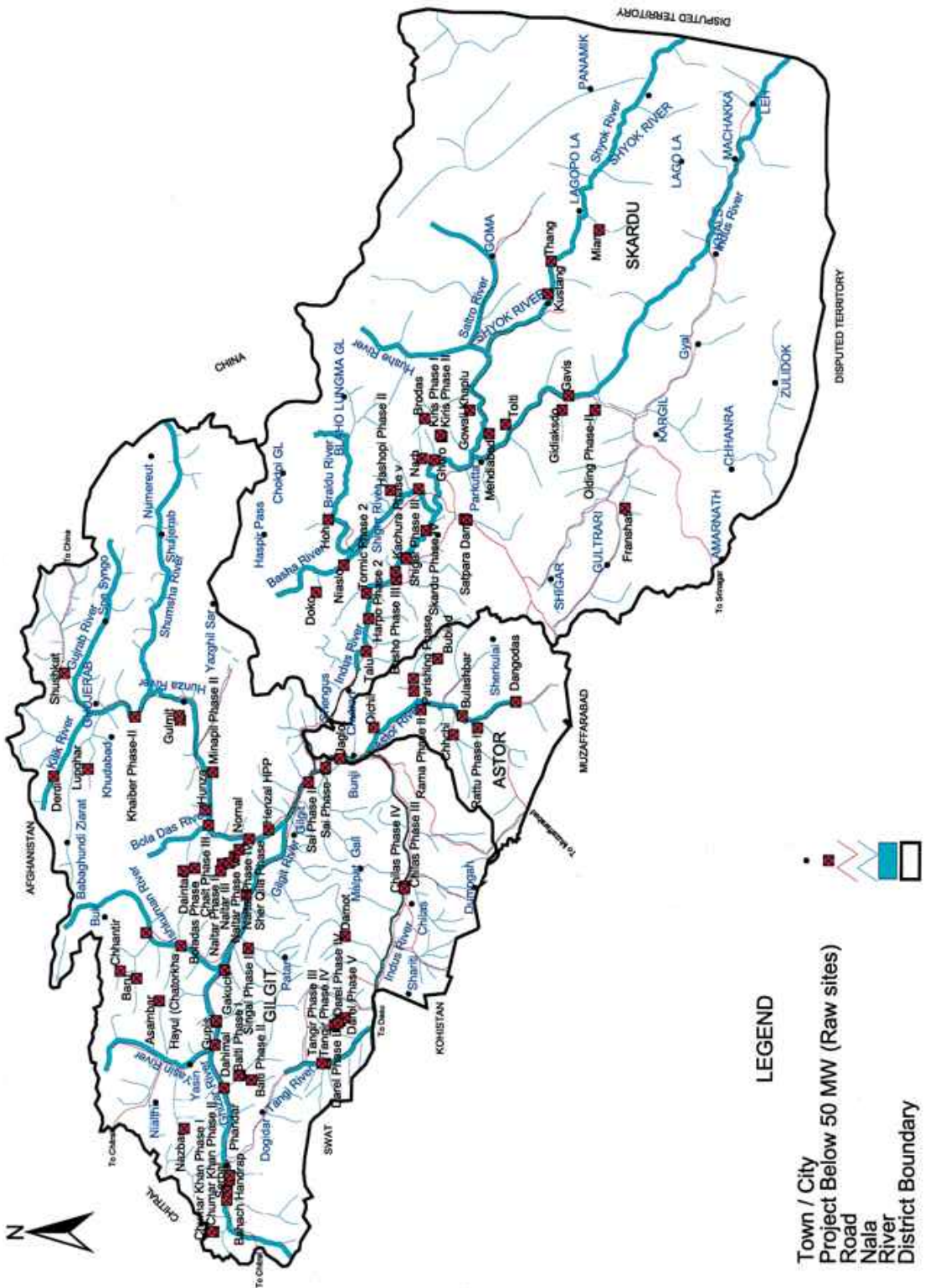


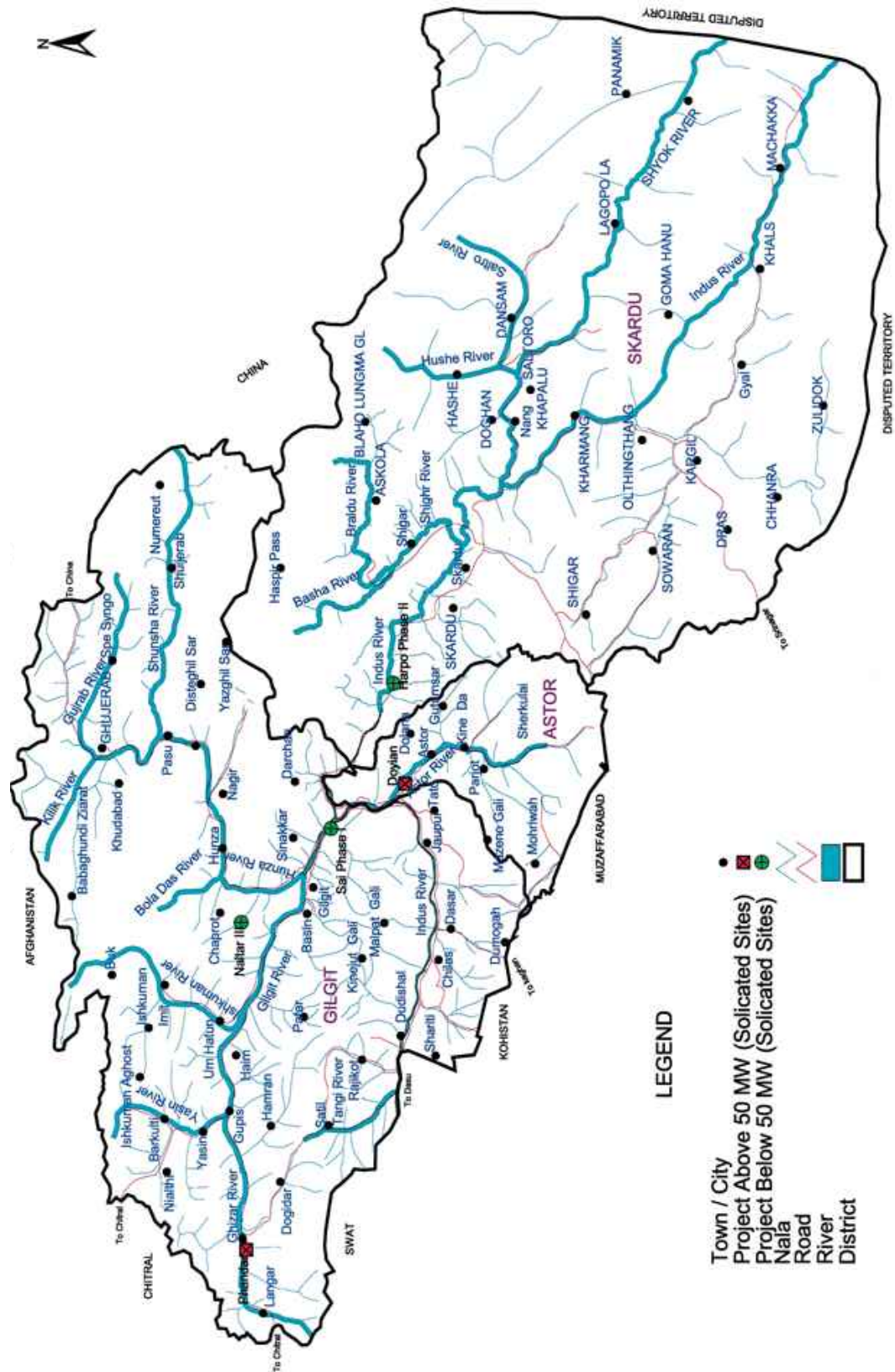
TABLE -6.5
SOLICITED SITES IDENTIFIED IN NORTHERN AREA
(ABOVE 50 MW)

S.No.	Project Name	Location	Capacity (MW)
1	Doyian	Astore River	425
2	Phandar	Ghizar River	80
	Total		505

TABLE -6.5
SOLICITED SITES IDENTIFIED IN NORTHERN AREA
(BELOW 50 MW)

S.No.	Project Name	Location	Capacity (MW)
1	Harpo Phase II	Harpo Lungma	33.00
2	Bashu	Ishkuman River	28.00
3	Sai Phase -I	Gilgit River	10.50
	Total		71.50

Figure 6.4
PROJECTS ABOVE & BELOW 50 MW (SOLICITED SITES) IN NORTHERN AREA





HYDEL POTENTIAL IN SINDH

PAKISTAN
Hydel Power Potential

HYDEL POWER POTENTIAL

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HYDEL POTENTIAL IN SINDH

7.1 Introduction

Sindh is bounded in the north by the Punjab, in the east by the Indian Province of Rajsthan, in the south by the Runn of Kutch and the Arabian Sea, and in the West by Lasbela and Kalat districts of the province of Balochistan. In terms of population, it is the second largest province of the country. The lower Indus basin forms the province of Sindh and lies between 23 to 35 Degree and 28-30, north latitude and 66-42 and 71-1-degree east longitude. It is about 579 kms in length from north to south and nearly 442 kms in its extreme breadth (281 kms average). It covers approximately 140,915 square kms. It is basically an agrarian province. The Indus is by far the most important river of the Sindh. Within the last 45 years, three irrigation barrages have been constructed across the Indus. The command areas of the three barrages are: Sukkur Barrage 3.12 million hectares, Kotri Barrage 1.12 million hectares, and Guddu Barrage 1.172 million hectares. The Irrigation & Power Department, Govt. of Sindh is responsible for conducting hydropower activities in the Province, and for facilitating and liasing with the respective agencies.

The hydropower projects identified in the Province are Nai Gaj Fall, Sukkur (Indus /Nara Canal, Rohri and Guddu Barrage Projects). These projects have an estimated 178 MW capacity. Feasibility studies of the Rohri and Guddu Barrage Projects have been completed, and it is expected that implementation work will be started in the near future. Presently, no hydel projects are in operation or under implementation either in the public and private sectors.

Six potential sites of an estimated total capacity of 178 MW, with medium and low head at different canals have been identified. Presently, no hydel projects are in operation or under implementation in the public sector, and no projects are being processed/undertaken by the private sector. Table-7.1 illustrates the details of raw sits projects above & below 50 MW with the total capacity of 80 MW and 48 MW respectively, while Table-7.2 shows the list of the projects of solicited sites of above & below 50 MW with the total capacity of 49 MW respectively. Figure-7.1 shows the identified hydel potential in the Province.

TABLE -7.1
RAW SITES IDENTIFIED IN SINDH (ABOVE 50 MW)

S.No.	Project Name	Location	Capacity (MW)
1	Nai Gaj Fall	Gaj river in Kisthar mountain range	80
	Total		80.00

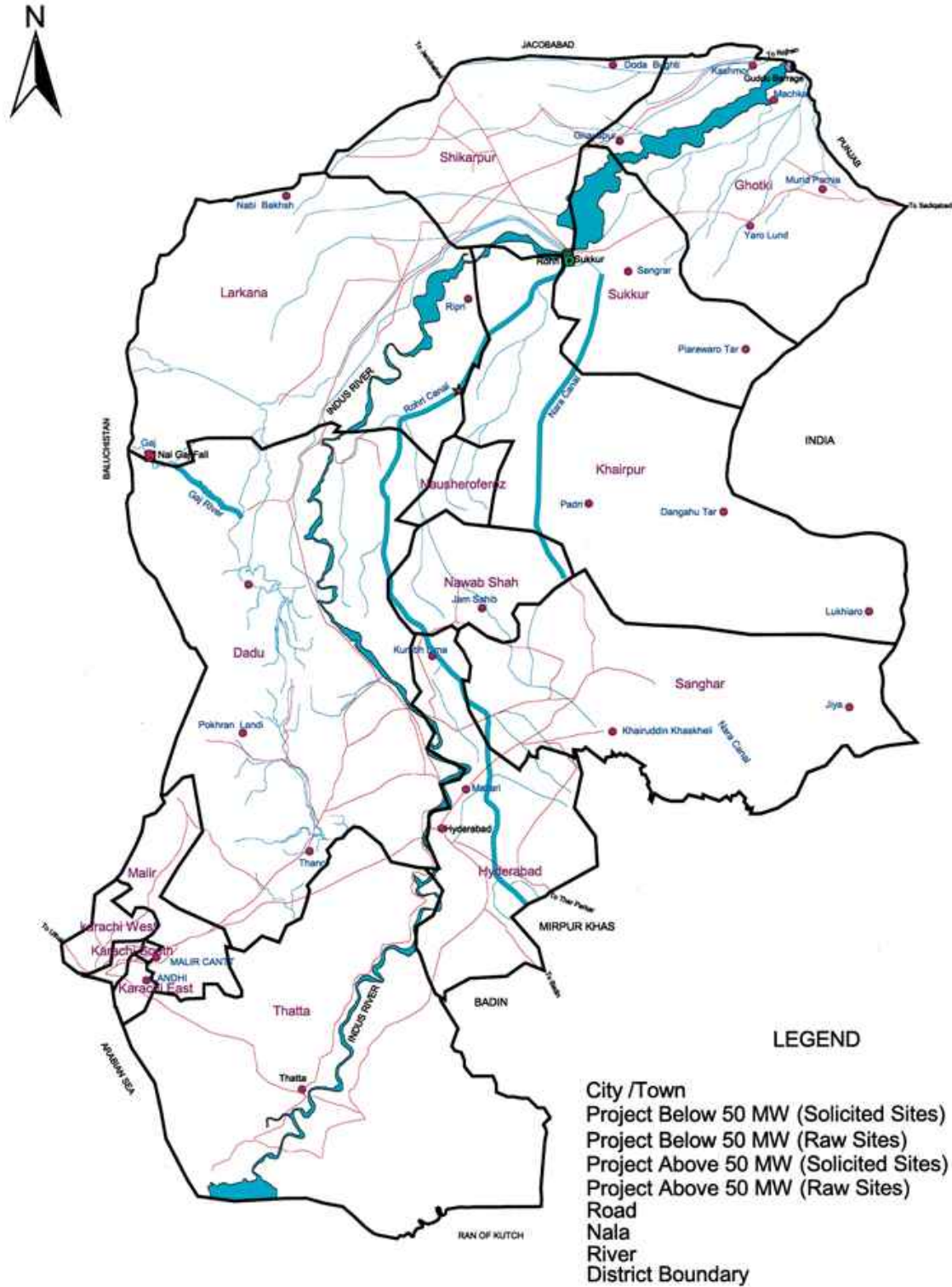
TABLE -7.1
RAW SITES IDENTIFIED IN SINDH (BELOW 50 MW)

S.No.	Project Name	Location	Capacity (MW)
1	Sukkur	Indus/Nara canal	22.51
2	Sukkur	Indus/Nara canal	18.15
3	Sukkur	Indus/Nara canal	7.89
	Total		48.55

TABLE -7.2
SOLICITED SITES IDENTIFIED IN SINDH (BELOW 50 MW)

S.No.	Project Name	Location	Capacity (MW)
1	Guddu barrage	Guddu barrage	33.5
2	Rohri	Rohri canal RD 15+000	16
	Total		49.5

Figure 7.1
IDENTIFIED HYDEL POTENTIAL IN SINDH



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HYDEL POTENTIAL IN BALOCHISTAN



BALOCHISTAN
Hydel Power Potential

HYDEL POWER POTENTIAL

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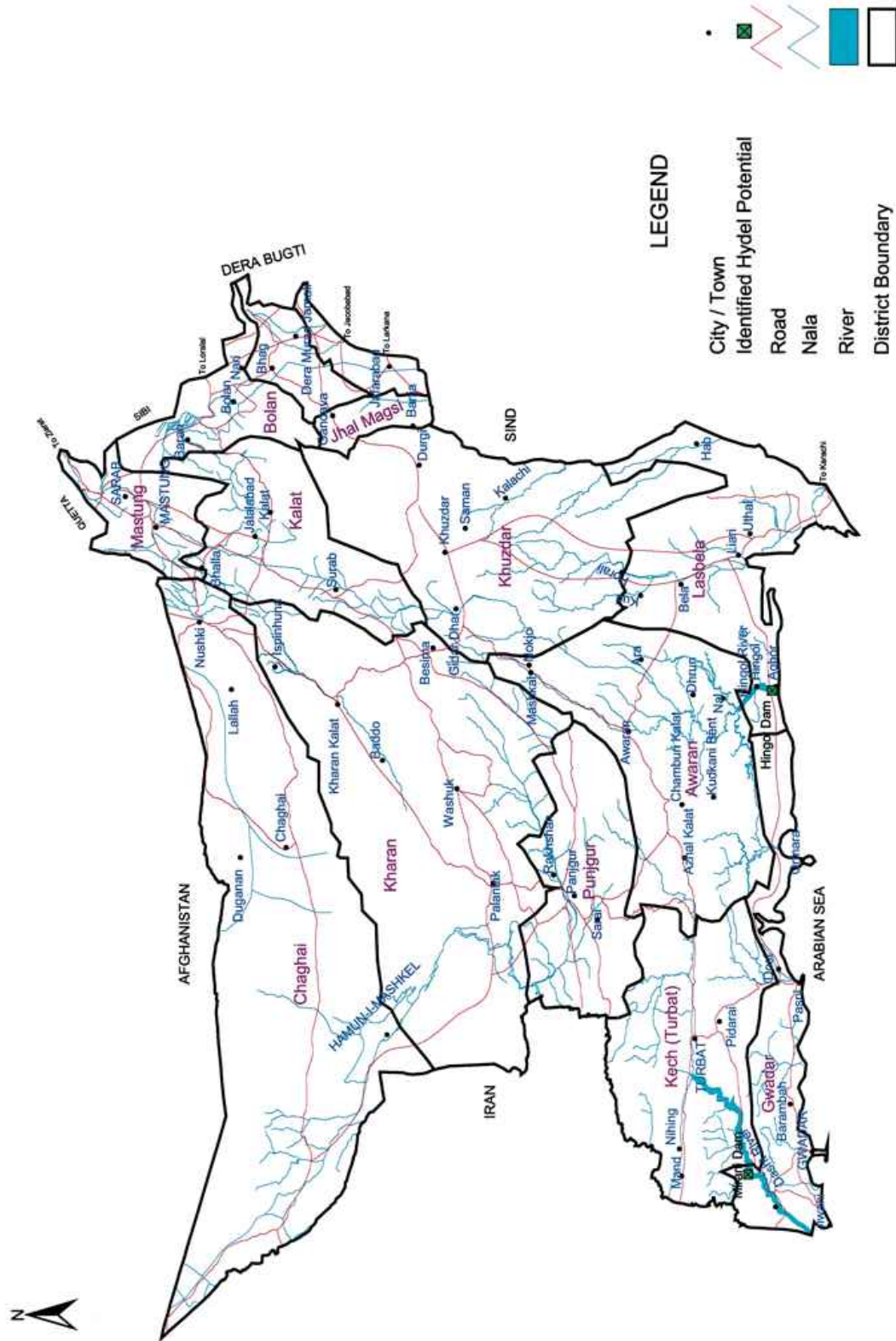
HYDEL POTENTIAL IN BALOCHISTAN

8.1 Introduction

Balochistan is richly endowed with mineral resources and major occupations are in iron and coal mining and oil and gas exploration. The country's largest natural gas reservoir is located here at Sui, which, when discovered in 1952, was the largest in Asia. There are several irrigation control and water supply projects in the Province. However, due to non-availability of reasonable head, electricity cannot be generated from these canals. The total identified hydel potential in the province is 0.50 MW. Although there are a number of proposed dams in Balochistan, such as the Mirani Dam, Naulung Dam, Magi Dam, Talli Tangi Dam and Hingol Multipurpose Dam, none of them is viable for generating electricity as a by-product except the Mirani Dam and Hingol Dam Multipurpose Project.

The Mirani Dam is located on the River Dasht about 48 Km west of Turbat in the Mekran Division of Balochistan. The main objective of the Project is to provide water for irrigation; however, about 0.2 MW power can also be generated. The Hingol Dam site is located near Aghor on the River Hingol, at a distance of 145 miles northwest of Karachi and about 5 miles north of Kund Malir. The feasibility study of the proposed dam was completed in 1992 and about 0.3 MW electricity can be generated by it. The National Water Resources Development Programme for Balochistan included 8 irrigation projects, but none of them have the required head to generate electricity. Presently, no hydel projects are in operation or under implementation in the public sector, and no projects are being processed/undertaken by the private sector. Figure-19 shows the total hydel potential identified in the Province.

Figure 8.1
IDENTIFIED HYDEL POTENTIAL IN BALUCHISTAN





POLICIES AND INCENTIVES FOR HYDEL POWER GENERATION

PAKISTAN
Hydel Power Potential

HYDEL POWER POTENTIAL

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POLICIES AND INCENTIVES FOR HYDEL POWER GENERATION

9.1 Introduction

After construction of the Tarbela and Mangla reservoirs in NWFP and AJK respectively, the first inventory of hydropower potential was undertaken in the 1980s with the assistance of the Canadian International Development Agency (CIDA) and German Agency for Technical Co-operation (GTZ). Subsequently, in the early 1990s, further detailed investigations were carried out on the catchment areas of the River Indus, River Jhelum and River Kabul, and a number of potential sites for hydel power generation were identified.

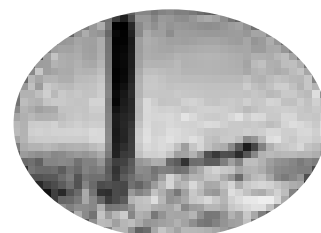
The Pakistan power sector is in its developmental stage and the benefits of electricity still have to be provided in many parts in the country. In 1993, the GOP constituted a Task Force on Energy entrusted with the tasks of drawing up an outline of a coordinated and comprehensive energy policy, formulating strategies for elimination of load-shedding, recommending proposals for mobilisation of resources and promoting private sector investment and marketing recommendations for enhancing indigenous oil and gas production. In its multiple approach, the Task Force recommended, inter alia, large scale induction of the private sector in power development.

The GOP from time to time announced power policies with the objective of meeting future energy demand and attracting the Foreign Direct Investment (FDI) in the Energy Sector through the private sector involvement. However, due to the inability of WAPDA to install new power projects to cater to the energy demand in the country, power crises prevailed during the 1980s which resulted in long-lasting load shedding and a huge loss to the Government revenues. In order to overcome these problems, the Federal Cabinet, in its meeting held on 22nd September 1985, decided to encourage private investment in the energy sector. Consequently, in September, 1985, the GOP announced certain incentives to encourage private investment in the power sector. In 1993, the Government planned a rapid increase of generating capacity and offered additional incentives for private investment in the power generation.

9.2 Power Policies Announced by the GOP

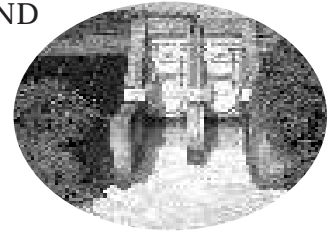
9.2.1 1994 Power Policy

In March 1994, the GOP announced the “POLICY FRAMEWORK AND PACKAGE OF INCENTIVES FOR PRIVATE SECTOR POWER GENERATION PROJECTS IN PAKISTAN.” This Policy attracted an enthusiastic response, mainly in thermal power plants, and resulted in direct foreign investment of US \$ 4 billion.



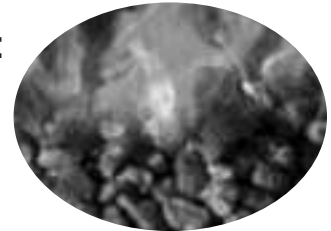
9.2.2 1995 Hydel Power Policy

In May 1995, the GOP announced the “POLICY FRAMEWORK AND PACKAGE OF INCENTIVES FOR PRIVATE SECTOR HYDEL POWER GENERATION PROJECTS IN PAKISTAN”, with an emphasis on promotion of hydel power generation. Like the 1994 Power Policy, the Hydel Policy 1995 also elicited an encouraging response. Forty one Letters of Interest and thirteen Letters of Support were issued under its provisions.



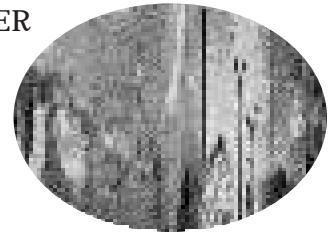
9.2.3 1998 Power Policy

In July 1998, the GOP announced its “POLICY FOR NEW PRIVATE INDEPENDENT POWER PROJECTS”. This Policy was based on the concept of minimum levelized tariff through International Competitive Bidding. However, the response from the private sector was not encouraging.



9.2.4 2002 Power Policy

In October 2002, the GOP announced its “POLICY FOR POWER GENERATION PROJECTS YEAR 2002”. The Policy 2002 envisages implementation of both solicited and unsolicited proposals. Response to the Policy 2002 is encouraging and twenty three (23) proposals have been received so far, out of which five (5) are for the hydel projects with an estimated capacity of 1074 MW.



The salient features of the “Policy for Power Generation Projects 2002” that has been devised to accelerate the development of generation capacity through Private Sector resource mobilization are as follows:

General / Administrative:

- The basis for selection of private power project is a minimum levelized tariff
- Detailed feasibility studies for a particular site-specific hydel or indigenous coal based projects to be prepared before bids were invited
- Hydel projects to be implemented on a Built-Operate-Transfer (BOOT) or BOO model and thermal projects on a Build-Own-Operate (BOO) basis
- The GOP guaranteed the terms of executed agreements, including payment terms
- Companies to be operated according to the applicable laws of Pakistan
- Institutional arrangements/roles arranged for the implementation of the Policy
- Implementation of projects through both solicited and unsolicited proposals
- For hydel and indigenous fuels and renewable projects, unsolicited proposals to be permitted from sponsors in the absence of feasibility studies for the projects
- Availability of standardized security agreements
- For Solicited proposal tariff will be determined through ICB and for proposals on raw sites

tariff will be determined through negotiations

- For indigenous coal and gas based projects, integrated power generation proposals can be furnished
- One-window facility will be provided at federal level by PPIB for all projects above 50 MW capacity
- However, provinces can manage the investment for projects upto 50 MW capacity. For projects above 50 MW, the provinces would be the main drivers and catalysts for marketing and coordinating projects with PPIB

Financial Regime:

- Permission for power generation companies to issue corporate registered bonds.
- Permission to issue shares at discounted prices to enable venture capitalists to be provided higher rates of return proportionate to the risk.
- Permission for foreign banks to underwrite the issue of shares and bonds by the private power companies to the extent allowed under the laws of Pakistan.
- Non-residents are allowed to purchase securities issued by Pakistani companies without the State Bank of Pakistan's permissions and subject to the prescribed rules and regulations.
- Abolition of 5% limit on investment of equity in associated undertakings.
- Independent rating agencies are operating in Pakistan to facilitate investors in making informed decisions about the risk and profitability of the project company's Bonds/TFCs.

Fiscal Regime

- Customs duty at the rate of 5% on the import of plant and equipment not manufactured locally.
- No levy of sales tax on such plant, machinery and equipment, as the same will be used in production of taxable electricity.
- Exemption from income tax including turnover tax and withholding tax on imports; provided that no exemption from these taxes will be available in the case of oil-fired power projects.
- Exemption from Provincial and local taxes and duties.
- Repatriation of equity along with dividends is freely allowed, subject to the prescribed rules and regulations.
- Parties may raise local and foreign finance in accordance with regulations applicable to industry in general. GOP approval may be required in accordance with such regulations
- Maximum indigenization shall be promoted in accordance with GOP policy.
- Non-Muslims and Non-residents shall be exempted from payment of Zakat on dividends paid by the company.

Transfer of Complex:

The ownership of hydel projects would be transferred to the GOP at the end of concession period

Hydrological Risk:

For projects with a capacity above 50 MW power purchaser will bear the risk of availability of water

Environmental Guidelines

Environmental guidelines have to be met as per the requirements of the Pakistan Environmental Protection Agency (PEPA) Act 1997,

Security Package (Standard Agreements)

The security package (standard agreements) for projects above 50 MW provides the following salient features:-

- (a) Model (standard) Implementation Agreement, Power purchase Agreement and Water Use License have been prepared for private/public-private partnership power projects to eliminate the need for protracted negotiations and are available upfront to any investor who wishes to invest in Power Sector in Pakistan.
- (b) The GOP will:
 - (i) Guarantee the contractual obligations of its entities, namely WAPDA/KESC, etc. and Provincial/AJK governments even though some or all of the utilities may be privatized during the term of various agreements.
 - (ii) Provide protection against specified "political" risks.

Provide protection against changes in the taxes and duties regime. Ensure convertibility of Pakistan Rupees into US Dollars at the then-prevailing exchange rates and the remittability of foreign exchange to cover necessary payments related to the projects, including debt servicing and payment of dividends. Tariff components, however, will be adjusted and indexed as per this Policy, against exchange rate variation, inflation, etc.

9.3 Merits Of Hydel Power Projects

- Renewable resource
- Fuel saver
- Flexible to meet load
- Efficient
- Reliable and durable
- Low operation and maintenance
- Costs
- Proven technology
- Improvement in Communications
- No atmospheric pollutants

- Improved living Standard
- Environmental benefits
- Tourism
- Educational Benefits
- Substitution of more expensive imported liquid fuels with consequent improvement in balance of payment
- Relief to the hard-pressed infrastructure of ports, roads and railways used in movement of imported liquid petroleum
- Shift towards gas-driven environment friendly energy economies
- Reduction in the cost of electricity generation
- Significant direct and indirect economic benefits during the construction and over the life of the project through employment , transit fees, availability of clean fuel, economic and industrial growth
- Creation of new business and investment opportunities
- Strengthening regional cooperation and provide a foundation for future economic growth throughout the region
- Hydropower is the most important source of renewable energy in the world
- Hydropower has furnished electricity to the world for over a century, making it a proven, reliable technology
- Some of the oldest hydropower projects have supplied electricity for more than 100 years and are still going strong
- Hydroelectric power still represents one of the most inexpensive ways to generate power
- Most importantly, all hydropower projects are clean, renewable sources of energy

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APPENDICES

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Appendix-I TOTAL HYDEL POTENTIAL

S.No.	Province/(Area)	Projects in operation MW	Projects under implementation in public sector		Projects in Private Sector MW	Projects where no feasibility Study established		Projects where feasibility Study established		Hydel potential un-tapped MW	Total hydel potential MW
			By Province	ECNEC approved the projects, construction not yet started		Above than 50	Less than 50	Above than 50	Less than 50		
1	NWFP	3767.2	81	554	84	13584	426	58	143.9	14211.9	18698.1
2	PUNJAB	1698	N.A.	96	N.A.	N.A.	349.65	3720	32.17	4101.82	5895.82
3	AJK	1036.1	4.8	969	828.7	1152	177	420	48.2	1797.2	4635.8
4	Northern Area	93,732	18	N.A.	N.A.	10905	814	505	71.5	12295.5	12313.5
5	SINDH	N.A.	N.A.	N.A.	N.A.	80	48.55	N.A.	49.5	178.05	178.05
6	BALUCHISTAN	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0.5	0.5	0.5
		6595.032	103.8	1619	912.7	25721	1815.2	4703	345.77	32584.97	41721.77

Appendix-II
GOVERNMENT INSTITUTIONS RELATED TO HYDRO POWER DEVELOPMENT

S.No.	NAME OF ORGANIZATION	ADDRESS
1	Ministry of Water and Power	A-Block, Pak Secretariat Islamabad. Tel # 051-9203187
2	Water and Power Development Authority (WAPDA)	WAPDA House, Lahore. Tel # 042-9202111, Fax: 042-9202578
3	Private Power and Infrastructure Board (PIIB)	50, Nazimuddin Road F-7/4, Islamabad Tel # 051-9205421-23, Fax # 051-9217735, 9215723
4	Karachi Electric Supply Corporation (KESC)	Fareed Chambers, Abdullah Haroon Road Saddar Karachi, Tel # 021-9206570
5	National Electric Power Regulatory Authority (NEPRA)	OPF Building, Shahrah-e-Jamhuriat, G-5/1, Islamabad. Tel # 9220902, Fax:9210215
6	Energy Wing, Planning and Development Division	99-West Shalimar Plaza Blue Area Islamabad, Tel # 051-9216310, Fax # 051-9220724
7	Sarhad Hydropower Development Organization (SHYDO)	368-WAPDA House, Shami Road, Peshawar Cantt. Ph # 091-9212034, Fax # 091-9211988
8	Punjab Power Development Board	Civil Secretariat, Lahore Tel # 042-9212150-9212794
9	Irrigation and Power Department, Government of Sindh	Civil Secretariat, Karachi. Tel # 021-9211405
10	Irrigation and Power Department, Government of Punjab	Civil Secretariat Lahore. Tel # 042-9211445
11	Irrigation and Power Department, Government of NWFP	Civil Secretariat Peshawar. Tel # 091-9210845
12	Azad Jammu & Kashmir Hydro Electric Board, Government of AJK	H.No.B-95, Upper Chattar Housing Colony, near Supreme Court Square, Muzaffarabad. Ph # 058810-32048, Fax # 058810-34521
13	Northern Areas Public Works Department (NAPWD)	Gilgit. Tel # 05831-55101-50220
14	NESPAK (National Engineering Services Pakistan Private Limited)	NESPAK House, 1-C, Block-N, Model Town Extension, Lahore. Ph # 042-5160500 Fax:042-5160554
15	Office of the Chief Engineering Adviser/CFFC, Ministry of Water and Power	Office of the Chief Engineering Adviser/CFFC, Ministry of Water and Power, Safdar Mansion, 16-D, Blue Area, Islamabad. Ph # 9206589, Fax # 9221805
16	Hydro Electric Planning Organization (HEPO), WAPDA	Sunny View, Lahore. Ph # 042-9202778, Fax # 042-9202689
17	Board of Investment	Ataturk Avenue, G-5/1, Islamabad. Ph # 9207531, Fax # 9217665
18	Pakistan Council of Appropriate Technology	House No.1-B, Street 47, F-7/1, Islamabad. Ph # , Fax # 9202073
19	GTZ	House No. 63-A, St # 5, F-8/3, Islamabad Ph # 051-2264161-225563, Fax # 2264159
20	Frontier Works Organization	GHQ, Rawalpindi, Ph # 9271300 - 9271306

ABOUT THE PRIVATE POWER & INFRASTRUCTURE BOARD (PPIB)

The Organization - PPIB

The Chief Executive Officer of the Private Power and Infrastructure Board is Managing Director appointed with the approval of Government of Pakistan. The Managing Director is also the Secretary of the Board, and heads four distinct sections i.e. Projects, Legal, IT/Admin and Finance. The total sanctioned strength of PPIB comprises of 27 executives and 22 support staff personnel. The PPIB executives possess advanced degrees in their fields.

Wide variety of experience and dedication have groomed the PPIBians to a degree where with the expertise, which is a unique blend of engineering techniques, contract administration abilities, practice of solving legal riddles, project management proficiency, negotiation skills and financial dexterity, and IT skills they can handle complex issues arising out during administering the Security Documents comprising of, *inter alia*, Implementation Agreement(s), Power Purchase Agreement(s), Fuel Supply Agreement(s), Water Use Licence(s), Shareholders Agreement(s), Escrow Agreement(s), Lease Agreement(s) etc, and dealing with international organizations and multinational companies.

Assisting GOP in policy formulation on private power generation and allied infrastructure, its implementation and day to day administration of Security Agreements is the expertise of PPIB almost unmatched in Pakistan. However, the hallmark of PPIB is that all the quality work is being delivered with only a little staff.

PPIB Functions

Established with a view to offer support by the Government of Pakistan to the private sector in implementing power projects, PPIB's functions are the following:

- To provide "One-Window" facility to investors in the private power sector by acting as a one stop organization on behalf of all ministries, departments and agencies of the GOP in matters relating to establishing power projects in the private sector.
- To issue Letters of Interest and Letters of Support on behalf of the GOP, and to execute Implementation Agreements (IAs).
- To negotiate the IA and provide support in negotiating Power Purchase Agreements (PPAs), Fuel Supply Agreements (FSAs), Water Use Licenses (WULs) and other related agreements.
- To provide Sovereign Guarantee to IPPs for the performance of GOP entities such as WAPDA, KESC, PSO, OGDCL etc.
- To liaise with the concerned local and international agencies for facilitating and expediting the progress of private sector projects.
- To process solicitation of projects and entertain unsolicited proposals for establishing private power projects.
- To assist private investors in obtaining consents and licenses from various agencies of the GOP and Provincial Governments.
- To act as a mediating organization on behalf of the GOP on issues/disputes arising among IPPs, WAPDA/KESC, fuel suppliers, Provincial Governments etc.

- To assist the regulatory authority (NEPRA) in determining and approving the tariff for new private power projects.
- To prepare, conduct and monitor litigation and international arbitration for and on behalf of GOP.
- To provide support to formulate, review and update policies and procedures relating to private sector investments in power generation and allied infrastructure, with the prior approval of the GOP.
- To act as a secretariat for consolidating feedback on various policy issues and assist the Ministry of Water & Power in evolving and refining private power policies.

PPIB's Activities Over The Years

Over the past eight years since its establishment, PPIB has been an interface between the GOP and IPPs, and has remained instrumental in resolving various matters concerning GOP agencies and the IPPs in the context of the power policies.

Until now, PPIB has issued thirty four (34) Letters of Support (LOS) totaling 8,340 MW of net capacity. Out of these nineteen (19) IPPs totaling 3,158 MW of net capacity have achieved Financial Close. Fifteen (15) of them have been commissioned, while the rest are at various stages of implementation. Even against the odds of our politico-economic system, PPIB remained successful in attracting foreign investment through these IPPs.

The private power projects, both in their implementation and operational phases, have frequently faced multifarious problems, ranging from technical and financial to commercial and legal issues. In almost all these situations, PPIB examined contentious issues and strove for their settlement to the best satisfaction of the stakeholders. Close coordination and liaison with the concerned ministries/organizations has been maintained all along. This process/responsibility is of continual nature and will be sustained with requisite zest and spirit.

Below is a summary of PPIB's multiple tasks undertaken thus far:

- Successfully and transparently implemented the 1994 Power Policy resulting in Foreign Direct Investment of about US\$ 4 billion within three years.
- Helped in overcoming load shedding in the country.
- Provided an effective and efficient interface between IPPs and the GOP.
- Resolved various contentious IPP issues such as those pertaining to withholding tax, foreign exchange availability, sales tax, duties and taxes on spare parts, etc.
- Successfully negotiated, executed, and administered agreements with IPPs.
- Provided full support to the Ministry of Water & Power on matters relating to the power sector.
- Successfully handled arbitration and litigation cases with a number of non-performing companies.
- Provided support to GOP in finalizing various power generation policies.

**We
Welcome Private
Investors To
Join Hands With
Us To Develop
Pakistan's Power
Sector for
Mutual Benefit**





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**Private Power and Infrastructure Board
Ministry of Water & Power
Government of Pakistan**